Qualified Oral Presentations

- Elastography in Gastroenterology
- CEUS
- Pediatrics
- Family Medicine
- Musculoskeletal
- Vascular
- Urology
- Gastroenterology
- Varia
Invited Speakers` Lectures
(in alphabetical order)
English
Accessory renal arteries are routinely considered to be normal anatomical variant. The prevalence of multiple renal arteries is reported to be about 20-27.7%, bilateral occurrence in 5-10% and early division in 8%. However, lower pole crossing renal vessel may be the cause of pediatric ureteropelvic junction obstruction. Besides, increased presence of multiple renal arteries were reported in hypertensive patients compared with normotensive. Among children with renal artery stenosis, 12.5-51.4% were in accessory arteries. Accessory arteries were found more frequent stenotic than single renal arteries (34.6% vs. 10.3%). Intrarenal blood flow of the area supplied by that stenotic artery is reduced and the T-P (tardus et parvus) flow pattern with acceleration time >80 ms will appear in Doppler ultrasound.

The experience with Doppler US in pediatrics is rather limited and there are difficulties with detection of stenoses of small renal artery branches, segmental or accessory renal arteries, often <1 mm of diameter.

Non-invasive imaging cannot replace formal angiography in the diagnosis of renovascular hypertension in children, but thin arteries originating directly from the aorta/iliac artery or arteries entering renal parenchyma directly out of renal hilus are detected in less frequency in angiographic series. In hypertensive patients with no arteriographic evidence for stenosis in long, tortuous and narrow aberrant renal arteries, a modest elevation of systemic renin activity was discovered, suggesting underperfusion of the affected renal segment. The arterial flow pattern monitored by Doppler US supports the diagnosis and follow-up of these children.

The indications for performing Doppler US to investigate for accessory renal arteries in children will be presented, based on clinical cases and practical experience.
Abstract:

The treatment of complete Achilles tendon rupture, both conservative and surgical, carries a high risk of failure both early and late; resulting either directly from the surgical procedure, but also frequently occurring on the course of rehabilitation.

Diagnostic imaging serves as a clinical support in monitoring the healing process of the Achilles tendon. Both ultrasound and MRI have a well-established position in the evaluation of the Achilles tendon healing progress. MRI contributes to an excellent assessment of the tendon’s structure, while the US allows to determine the tendon’s vascularity as well as to run a complete dynamic assessment.

During the lecture, the Achilles tendon healing pattern developed from a comparative assessment of patients following surgical reconstruction of the tendon will be presented. Both modalities will be discussed concerning their advantages and limitations, with particular emphasis on the method of dynamic assessment of the healing tendon in ultrasound, taking into account the need to evaluate resting tendon tension, passive movement and active tendon movement.
Abstract:
The treatment of complete Achilles tendon rupture, both conservative and surgical, carries a high risk of failure both early and late; resulting either directly from the surgical procedure, but also frequently occurring on the course of rehabilitation.

Diagnostic imaging serves as a clinical support in monitoring the healing process of the Achilles tendon. Both ultrasound and MRI have a well-established position in the evaluation of the Achilles tendon healing progress. MRI contributes to an excellent assessment of the tendon’s structure, while the US allows to determine the tendon’s vascularity as well as to run a complete dynamic assessment.

During the lecture, the Achilles tendon healing pattern developed from a comparative assessment of patients following surgical reconstruction of the tendon will be presented. Both modalities will be discussed concerning their advantages and limitations, with particular emphasis on the method of dynamic assessment of the healing tendon in ultrasound, taking into account the need to evaluate resting tendon tension, passive movement and active tendon movement.
As noninvasive and with high resolution images ultrasound is the examination of choice in the area of the scrotum and inguinal canal. It shows changes not available in the clinical examination. In case of acute scrotal pain Color Doppler ultrasound should be used. In current ultrasound scanners Color Doppler is as sensitive like Power Doppler, has less motion artifacts and 80-90% flow detection sensitivity. In doubtful cases MicroFlow Imaging MFI [Philips] Or Superb Microvascular Imaging SMI [Toshiba] can be used.

The most frequent reasons of acute scrotal pain are torsion of the testis appendix, acute orchitis/epididymitis and incomplete testis torsion. Less frequent -testis torsion, trauma, idiopathic scrotal edema, hernia, hydrocele and tumors.

Acute scrotal pain is a common source of surgical consultation in the emergency room and may require prompt surgical intervention. Thus accurate diagnosis has great therapeutical and prognostic significance.
AN EXPERIMENTAL ULTRASOUND SCREENING FOR THE EARLY DIAGNOSIS OF DEVELOPMENTAL DISPLASIA OF THE HIP (DDH) TARGETED AT INFANTS WITH RISK FACTORS, CONDUCTED BY THE FAMILY PHYSICIANS.

Abstract:

Background: This study aims to demonstrate the accuracy of a hip ultrasonographic screening at infants with high risk, between 6-14 weeks of life, conducted by the family physician with expertise in this technique, compared with the positive diagnosis established by the radiologist. DDH is a condition where there is an inadequate formation of the acetabulum finally has an abnormal relationship with the femoral head or may grow abnormally.

Methods: We made a targeted ultrasound hip screening of 588 infants at high risk. The inclusion criteria were both: anamnestic risk factors after Dimeglio, along with the clinical examination, with limb length discrepancy, thigh fold symmetry and any limitation of hip abduction with the following positive maneuvers as Barlow, Ortolani or Galeazzi. Each baby was US examined, the first time in six weeks, and those found positive were sent to the radiologist and then re-examined within 12-16 weeks. We used both ultrasonographic Graf’s classification of DDH and second the femoral head cover (FHC) after Terjesen method. All the data obtained were introduced into a smart software created by us with a diagnostic algorithm. We also practiced hip joint strain elastography and found some patterns.

Results: The incidence of DDH in our targeted ultrasound screening was 2.72%. The sex ratio showed the female predominance 4:1. The left hip was involved two times more often, with 20% bilateral involvement. We obtained after Graf’s classification the follow results: normal (type 1a-93.5%/type 1b-3%), physiologically immature (type 2a=1.3%), dysplastic (type 2b–c=1%), subluxated (type 3=0.68%), and dislocated (type 4=0.34%). Regarding the risk factors the distribution was as follows: hereditary (31%), pelvic respectively breech presentation (20%), abdominal delivery (14%), premature birth (5.0%). The screening had the sensitivity 80%, specificity 98.2%, and accuracy 97% with 95% Cl: 96.04% to 98.69%, p<0.01.

Conclusions: The targeted screening has a high accuracy and could increase the rate of early diagnosis of DDH with a permanent disability, to be treated in the first trimester of life using splinting, but depends on the physician’s expertise.
ARTIFACTS IN CEUS HOW TO SEE MICROBUBBLES

Autors:
Martin Stenzel

Affiliation:
Paediatric Radiology, Children’s Hospital Amsterdamer Str., City of Cologne, Germany

Abstract:
Artifacts in imaging may lead to uncertainty and uncorrect diagnoses. Every experienced examiner knows about the common artifacts. Microbubbles create artifacts, too, which are rarely described in literature. Since contrast-enhanced ultrasound gains in popularity potential artifacts need to be known.

The author gives an overview of potential pitfalls in intravenous and intravesical use. Recommendations for quality of care CEUS will be presented.
BENIGN FOCAL LIVER LESIONS IN PEDIATRIC PATIENTS: 
ROLE OF B-MODE US, COLOR DOPPLER AND CEUS

Autors:
Zoltan Harkanyi MD, PhD

Affiliation:
Department of Radiology, Heim Pal National Pediatric, Budapest, Hungary

Abstract:
B-mode US is still the basic modality to assess pediatric focal liver lesions (FLLs) for many decades with some inherent limitations. Both the detection and the characterisation of FLLs often require further CE imaging studies (MR/CT) after B-mode US. Color Doppler US also has limitations in order to characterize solid liver lesions. Although it can be helpful to demonstrate the patency of the liver vessels. CEUS can be considered as an efficient, safe alternative and often problem solving tool to differentiate between metastatic and benign nodules, and also to characterize different solid masses. The radiologist must clearly define the goal of the CEUS liver study before its performance. It is almost always a focused study in order to answer a specific diagnostic question after baseline B-mode US. The use of CEUS in FLLs can reduce the number of unnecessary MR/CT studies decreasing the risk of radiation exposure and the need of application of iodinated or gadolinium contrast injection, and also reduce the number MR studies with sedation.

Indications of pediatric liver CEUS studies in case of suspected or in proven benign FLLs:
• Incidental FLLs detected by abdominal US
• Differentiation of focal fatty infiltration / sparing and focal neoplasm
• Follow up of benign liver mass, if needed
• Equivocal abnormality after MR, CT, or guided biopsy
• US-guided local ablation of focal mass
• In case of poor renal function

BONE TUMORS

Autors:
Tomasz Madej

Affiliation:
Dr n.med.
Zakład Radiologii Dziecięcej II Wydział Lekarski Uniwersytetu Medycznego w Lublinie

Abstract:
By contrast with soft tissue tumours, the role of ultrasonography in the assessment of focal lesions of bone structures in children is not clearly defined and determined. The main modality for the diagnosis and assessment of bone tumours is conventional radiography. A considerable number of ultrasound scans performed in children, often as the first or even the only examination, makes it necessary for the ultrasonographist to be familiar with typical sonographic presentation of bone tumours, especially the malignant ones, in order to detect patients with this pathology and promptly refer them for adequate diagnosis and treatment. The paper presents sono-graphic images of bone tumours, with particular attention paid to elements that suggest the malignant nature.

Moreover, the paper also discusses the place of ultrasonography in the diagnosis of benign bone lesions, where the usefulness of this modality is generally limited, but may be valuable in selected conditions, such as osteochondral spurs.
Ultrasound (US) and MR imaging have been shown able to detect in-depth features of brachial plexus anatomy and to localize pathologic lesions in disorders where electrophysiologic and physical findings are nonspecific or non-localizing. A careful scanning technique based on anatomical landmarks is required to image the plexus components (ie, roots, trunks, divisions, and cords) with US.

On the other hand, high-end gradient technology, phased array coils and selection of an appropriate protocol of pulse sequences are the main requirements to evaluate the brachial plexus nerves with MR imaging and to distinguish between intrinsic and extrinsic pathologic changes. In traumatic brachial plexus injuries, US is an excellent means to determine the presence of a lesion outside the spinal canal, to establish the site and the level of nerve involvement, as well as to confirm or exclude major nerve injuries in the acute setting that is a critical issue in terms of patient’s management. The main limitations of this technique include difficulties for examination of the lower plexus components and the costoclavicular space. On the other hand, MR imaging is able to exclude nerve lesions at the level of neural foramina and at intradural location. In this regard, MR myelography with state-of-the-art technology yields remarkably high-quality images, although it cannot replace CT myelography entirely.

MR imaging can be used for assessing the extraspinal portion of the plexus in alternative to US or when the results of this latter technique are negative or only minor lesions are detected despite clear clinical evidence for a major lesion. Beside brachial plexus injuries, both imaging modalities can be contributory in a variety of non-traumatic brachial plexopathies of compressive, neoplastic and inflammatory nature.
CERTIFICATION IN POINT-OF-CARE ULTRASOUND? PRO!

Authors:
Paweł Andruszkiewicz

Affiliation:
II Klinika Anestezjologii i Intensywnej Terapii
Warszawski Uniwersytet Medyczny

Abstract:
Until recently ultrasound was performed only in dedicated radiology suits and echocardiographic labs by physicians and technicians specialized in imaging. Advances in ultrasound systems (mobility and introduction of user friendly software) enabled clinicians representing various specialities access to this imaging modality. Ultrasound has become a primary advance imaging tool for primary physician in life threatening emergencies when patient critical condition excludes transfer to imaging facility. Point-of-care ultrasound (POC US) is a term which describes focused ultrasound examination which is performed by clinician as an adjunct to the physical examination. Ultrasound examination of critically ill patient done by non-imager (radiologist or cardiologist) in non-optimal conditions may result in misinterpretation or overinterpretation. Both these situation may lead to wrong clinical decisions with deleterious consequences for the patient and medicolegal for the physician.

Acquiring accreditation in POC US issued by recognised by medical speciality related association is an objective confirmation of competence. Enthusiasm and confidence about our skill is not enough anymore. Thus, we should not ask the question if the certification/accreditation is required, but how we should organise the educational framework. The educational pathway must take into account differences between POC and comprehensive ultrasound. Trainees must learn not only how to acquire and interpret the image, but also how to integrate this information to the clinical decision making process. Blended model of education has been implemented into POC US education. It comprises of traditional measures such as: lectures, recommended reading, hands-on-training; web-based training (podcasts, face to face discussion: mentor-mentee) and high fidelity simulation. Accreditation should be followed by validated CME to prevent knowledge and skill loss.
CERVICAL LYMPH NODES – A WIDE SPECTRUM OF ULTRASOUND FINDINGS CONSIDERED IN SIX YEAR OLD PATIENT WITH CERVICAL LYMPHADENOPATHIA.

Authors:
Anna Moczulska, MD, PhD

Affiliation:
Gdański Uniwersytet Medyczny

Abstract:
Ultrasound of cervical lymph nodes is often used to direct physician to a correct diagnosis. There are plenty of diseases that can be presented with similar ultrasound characteristics, however it is crucial to distinguish these details for a correct conclusion based on the clinical context. The presentation is divided into four parts: patient introduction, images of reactive, pathological cervical lymph nodes and abscess of a lymph node.

There are several noticeable things that we should consider: shape and morphology – reactive lymph nodes are usually oval, with short to long axis (s/l axis) < 0,5 with hypoechogetic cortex and hype-rechogenic hillum, while pathological ones are usually round (s/l axis > 0,5). In abscess caused by irradiation or tuberculosis there is visible nodal matting and surrounding soft tissue oedema. Later we should evaluate borders – only in pathological lymph nodes we can see discontinuous capsule. It is recommended to evaluate the lymph nodes’ vascularity in Doppler imaging (CD/PD) – reactive lymph nodes are characterized by hillar vascularity pattern, while pathological often have peripheral or mixed vascularity.

They also might have avascular areas or displacement of vessels. In some cases follow-up examinations are recommended to dispel any doubts. Last part is case completion and treatment suggestion.
CEUS IN PEDIATRIC RADIOLOGY DEPARTMENT – CLINICAL CASES

Authors:
Martin Stenzel

Affiliation:
Paediatric Radiology, Children’s Hospital Amsterdamer Str., City of Cologne, Germany

Abstract:
There is increasing data that shows that CEUS gives relevant additional information in many diseases, supplementing and enhancing B-mode and colour coded sonography. Use of CEUS in children differs a lot in paediatric hospitals. Limited personal experience, off-label use, and lack of comparing studies explain the current situation in Europe.

The author gives an overview of his personal experience in CEUS imaging from 2001 to 2018.
CONTRAST ENHANCED ULTRASOUND IN PEDIATRIC IMAGING
CLINICAL CASES

Autors:
Zoltan Harkanyi MD, PhD

Affiliation:
Department of Radiology, Heim Pal National Pediatric, Budapest, Hungary

Abstract:
Our Department of Radiology has introduced contrast US ten years ago. The vast majority of the CEUS studies are performed in oncology/liver, kidney and also follow up of abdominal trauma patients. In the presentation we try to demonstrate the advantages and limitations of CEUS according to our everyday clinical practice.

We selected 12 cases for the lecture with some comments. Since CEUS study generally is not the part of the clinical protocols a close cooperation is needed to define the indications in agreement of the referring colleagues. Local institutional protocols should be applied.

One of the major drawbacks of regular CEUS applications in pediatric patients is the lack of reimbursement of the CEUS studies.
COULD CEUS IMPROVE THE IMAGING OF SUPERFICIAL STRUCTURES?

Authors: 
Christoph F Dietrich

Affiliation: 
Prof. Dr. med. Christoph F. Dietrich, MBA, Caritas Krankenhaus Bad Mergentheim, Germany, 97980 Bad Mergentheim

Abstract:
Previous contrast-enhanced ultrasound (CEUS) guidelines from the European Federation of Societies for Ultrasound in Medicine and Biology (EFSUMB) have been published encompassing hepatic and non-hepatic applications. Much less is known for CEUS of superficially located organs and structures. The conventional linear high frequency transducers (and endoscopic ultrasound) are used enabled for a CEUS examination of superficially located organs. A higher UCA concentration is required; typically 4.8mL of SonoVue™ [Bracco SpA, Milan]. The presentation gives examples for extracranial and peripheral vessels, thyroid, testis, muscles and joints and other possible applications. The presentation will also focus on topics of the current update of the EFSUMB GUIDELINES AND RECOMMENDATIONS FOR THE CLINICAL PRACTICE OF CONTRAST ENHANCED ULTRASOUND (CEUS) IN NON-HEPATIC APPLICATIONS.

Focal splenic lesions are most often detected incidentally by US or CT. CEUS examination of the spleen is simple: short arterial phase after injection and a long venous/late phase which lasts 5-7 minutes.

Most of the cystic lesions can be characterize by B-mode US and by color Doppler. The most common are congenital cyst, post-traumatic cyst, pancreatogen cyst and infectious cyst. The splenic abscess can be cystic or mixed, in selected cases CEUS can be helpful to depict the real extent of the lesion/s. The solid focal splenic lesions can be detected by B-mode US (high frequency probe often helpful), however the characterization of the lesions needs further work up with contrast enhanced US or MR. The most common benign solid masses are the haemangioma, hamartoma, and granulomatous disease. Hypoechoic splenic masses can represent lymphoma, leukemia, or infection. Splenic infarction and post-traumatic changes can be also hypoechoic with B-mode with no contrast enhancement.

References:


Abstract:

Mediastinal structures can be visualized comprehensively by computed tomography as well as magnetic resonance tomography. Transthoracic sonography in contrast identifies only parts of the mediastinum.

As early as in 1971 Goldberg pointed out the suprasternal sonographic access to the mediastinum. This access was used by cardiologists for the representation of the thoracic aorta and aortic valve. In the mid-1980s sonography of the mediastinum was researched in pediatrics (Lengerke and Schmid 1988; Liu et al. 1988) as well as in adult medicine and its efficiency was proved (Braun 1983; Blank et al. 1986; Wernecke et al. 1986; Brüggemann et al. 1991). In the following years the diagnostic potential of sonography was systematically researched (Heizel 1985; Wernecke et al. 1986; Wernecke 1991; Blank et al. 1996b; Bosch-Marcet 2007, Subacul 2013). Further possibilities were disclosed by the application of color-Doppler sonography and, recently, through contrast-enhanced sonography (Bettsch et al. 1992, 1994; Dietrich et al. 1997, 1999; Kunz et al 2004; Caremani et al. 2009; Chen 2014; ). Mediastinal space-occupying masses are most frequently found in the anterior upper mediastinum. They can be evaluated with transthoracic sonography nearly as reliably as with computed tomography, and histological material can usually be easily obtained by sonography-guided puncture (Nasi 2013, Chen 2014).

In case of acute thoracic symptoms, this procedure can be implemented as a point-of-care sonography in emergency diagnosis (Blank, Mathis, Osterwalder 2014).

The disadvantages of sonography, however, are significant. The procedure is strongly investigator dependent and only reveals portions of the mediastinum compared with computed tomography. Moreover, the image quality is highly variable. Some of these disadvantages can be balanced by the application of endoluminal transesophageal and endobronchial sonography.
Neck US in children is a challenge, especially when child is under 4 years old. We should have different sizes of linear probes and hockey-stick to could examine not only thyroid but the whole neck from tongue basis to sternum. Gel in room temperature is cold and children cry, so we warm it. Patient should be in supine or sitting position with hyperextended neck. We need parents and toys to keep child in right position. The survey technique should be adapted to the patient.

Talking about children diseases, we have to start from embryology. The primodium thyroid develops in the floor of the primordial pharynx, then, descends caudally, lobes fuse and there is complete thyroid gland. Thyroglossal duct connects tongue and thyroid and disappears. We can find ectopic thyroid gland along the migration course (lingual thyroid) or thyroglossal duct cysts.

Volume of the thyroid increases with age of child, so we have to check if is correct. Newborn with congenital hypothyroidism can have thyroid dysgenesis (aplasia, hypoplasia, hemiplasia or ectopy), but 20% have dyshormonogenesis with normal US findings of thyroid or enlarged gland with abnormal echogenicity. Thyroid scintigraphy can help to diagnose a problem. The ectopy thyroid and enlarged thyroid can manifest as neck tumor.

The most frequent cause of acquired hypothyroidism is Hashimoto’s thyroiditis. Graves’ disease is the most frequent cause of hyperthyroidism, but is rare in children. For chronic autoimmune thyroiditis fall most often girls in puberty age and it is a premalignant lesion. Thyroid nodules are seen in 0,2-2% children, but mean 26% is malignant. The biopsy is made when one of this US feature is present: metastatic lymph nodes, invasive growth, microcalcifications, solid and hypoechogenic, tumour is taller than wider, irregular margins, increased vascularisation, ≥ 1 cm in the greatest diameter.
DIFFUSE THYROID DISEASES

Authors:
Maciej Ledziński

Affiliation:
Ludwik Rydygier Collegium Medicum in Bydgoszcz
Nicolaus Copernicus University in Torun

Abstract:
Diseases of the thyroid gland occur in a significant percentage of the population. Physician of any specialty may come across with patients suffering from them, so he should be able to put a right diagnosis of these diseases. The basic thyroid imaging examination is ultrasound. The aim of the presentation is to tell briefly about ultrasound features of three common diseases: Graves’ disease, Hashimoto’s disease and de Quervain’s thyroiditis as well as clarify role of ultrasound in diagnosis of these diseases. Ultrasound due to the extremely dynamic development that allow obtaining images with more and better quality, as well as access to new functions and cheapness, non-invasiveness, wide availability plays a significant role in the differential diagnosis of thyroid diseases, including diagnosis and monitoring of the above mentioned diseases.

De Quervain’s thyroiditis is characterized by diffuse or focal hypoechogenicity, inhomogeneous pulp of thyroid, enlargement of perithyroidal lymph nodes and decreased blood flow.

The image of Hashimoto’s disease in ultrasound depends on the phase of the disease. Early phase is characterized by diffuse hypoechogenicity and heterogeneity of the pulp, enlargement of perithyroidal lymph nodes, increased blood flow, extention of isthmus and development of hyperechoic bands of connective tissue. In late phase thyroid is atrophic, more hypoechoic, inhomogeneous, with decreased blood flow, with extention of isthmus and enlarged perithyroidal lymph nodes.

Image of Graves’ disease in ultrasound is characterized by i.a goiter development, inhomogeneous, hypoechoic pulp of thyroid, extremely increased blood flow (thyroid inferno).

Basing on ultrasound examination recognition can be speculated, but completely diagnosis can be put by summarizing of data from interview, physical examination, results of lab tests and imaging examination (especially ultrasound). However, ultrasound is a useful test in differential diagnosis of thyroid diseases and to monitor their progress.
DOPPLER EVALUATION OF NATIVE AND TRANSPLANT RENAL ARTERY

Authors:
Maryla Kuczyńska, Anna Drelich-Zbroja

Affiliation:
Zakład Radiologii Zabiegowej i Neuroradiologii, Uniwersytet Medyczny w Lublinie
Department of Interventional Radiology and Neuroradiology, Medical University of Lublin

Abstract:
This presentation aims to provide relevant and useful information regarding the examination technique and currently accepted parameters and norms in Doppler ultrasonography of the native and transplant renal arteries.

This will include evaluation of both the normal vascular images as well as the most common vascular pathologies.
Visceral artery aneurysms are rare findings. They are mostly asymptomatic, but in case of a rapture, the mortality rate is high. Clinical conditions which increase the risk of development of aneurysm are: pregnancy, portal hypertension, mediointimal degeneration, infection, trauma and other.

The ultrasound examination, due to its non-invasive feature, is often the first step in diagnosis of abdominal aneurysms. It reveals location and size of aneurysms, presence of thrombosis, atherosclerotic plaque, thickening of the wall. Use of Doppler imaging allows to confirm the arterial features of the mass and measure the speed of the flow in the vessel. Diagnosis with use of ultrasonography is limited by bowel gas, which can make impossible to visualize retroperitoneal space and mesenteric vessels. Other limitations of this examination are connected with: patient’s obesity, calcified wall and limited spatial resolution.

There are two methods of treatment of visceral artery aneurysms – open surgery or intra-vascular technique. Nowadays, in most cases the second method is treatment of choice.
Acute collections are divided into: acute peripancreatic fluid collections (APFC) and acute necrotic collections (ANC); chronic fluid collections are divided into: pseudocysts or walled-off pancreatic necrosis (WOPN).

External drainage under ultrasound guidance can be used in simple collections (APFC), mainly inflammatory fluid in the course of acute pancreatitis, where there is no connection with the pancreatic duct system, so as not to create a permanent pancreatic fistula. Percutaneous drainage involves placement of an external drainage catheter into the pseudocyst using real-time imaging guidance, usually with computed tomography (CT) or ultrasound (US).

Currently, we do not use external cyst drainage in the course of chronic pancreatitis, except for the temporary decompression of lesions characterized by inormus pain, mechanical jaundice or in cases of infected collections, where we simultaneously collect material for bacteriological estimation. Such drainage is performed only as an introduction to surgical or endoscopic treatment. Better results were determined by external drainage of reservoirs or pseudocysts after acute pancreatitis, where the success of the method can be determined as much as 60 to 85%. Thin-walled collections or pseudocysts are not suitable for surgical-anastomotic treatment because of the great difficulty in performing the anastomosis alone and the possibility of secondary leakage.

Percutaneous drainage for WOPN involves placement of a catheter into the collection under US guidance or CT. Ideally, a retroperitoneal approach is taken. After placement and aspiration of as much fluid as possible, 12 French drains are left in place and irrigated with sterile saline 3 times daily. The catheters can be upsized to a maximum of 28 French as the patient’s follow-up requires. Consequently, percutaneous drainage is more often used as an adjunct therapy, often serving as the first step of a step-up approach to endoscopic or surgical drainage.
DYSNPNEA PRESENTED BY 9 YEAR OLD PATIENT.

Authors:
Aleksandra Ramel

Affiliation:
Gdański Uniwersytet Medyczny

Abstract:
Case report of 9 year old child presenting tachycardia, cough and shortness of breath for two weeks. Patient has been brought by the parent to Doctor’s Office for lung ultrasound to diagnose the cause of symptoms. After performing lung ultrasound and eliminating the most common causes of dyspnea in children, ultrasound of mediastinum was suggested and performed. The scans had shown abnormal masses in mediastinum of the patient which caused changing differential diagnosis from pulmonary diseases to diseases that give significant alterations in mediastinum. Four disease entities were taken into consideration during differential diagnosis, being Hodgkin’s lymphoma, non-Hodgkin’s lymphoma, pericardial tamponade and mediastinal tumor such as neuroblastoma, thymoma and liposarcoma. Taking into consideration age, symptoms shown by the patient and the scans of mediastinum the final diagnosis was made as Hodgkin’s lymphoma.
Prostate cancer is a major health care disease as it is the most common diagnosed malignancy in men (besides skin cancer) and the second cause of cancer death in men. Prostate cancer is difficult to detect despite the improvement of biological tests (PSA - prostate-specific antigen dosage), the development of new imaging techniques, and the use of invasive procedures such as biopsy.

Ultrasound elastography is a recent imaging technique capable of mapping tissue stiffness of the prostate. It is known that prostatic cancer tissue is often harder than healthy tissue due to increased cellular density and micro vascularization, as well as changes in glandular architecture (including stromal reaction). The author will review the available US elastography techniques, strain elastography and the Acoustic Radiation Force Impulse, insisting on real-time shear wave elastography. Tissue stiffness is an additional information that improves the detection of prostate cancer and provide guidance for biopsy. For each technique, procedure, reproducibility, results and limitations will be analyzed.

The recent Guidelines produced by the WFUMB and the EFSUMB provide information about the use of elastography for prostate diseases. Finally, recommendations will be given based on the level of evidence of the published literature and on the WFUMB expert group’s consensus. This document has a clinical perspective and is aimed at assessing the usefulness of elastography in the management of prostate diseases.
EFSUMB HISTORY OF ULTRASOUND

Authors:
Christoph F Dietrich

Affiliation:
Prof. Dr. med. Christoph F. Dietrich, MBA, Caritas Krankenhaus Bad Mergentheim, Germany, 97980 Bad Mergentheim

Abstract:
EFSUMB in general has aimed to enrich the ultrasound community with updated material on many aspects of ultrasound. History of ultrasound details may be forgotten soon since so many pioneers have been fading away and with them also the detailed knowledge of the first scanners, congresses and meetings by competition and friendship.

EFSUMB is aware that this is the right time to reflect and illustrate the achievements of European Ultrasound. EFSUMB has strengthened the interdisciplinary collaboration in the field of diagnostic ultrasound and promoted safety of ultrasound in medical use and most recently started a project on EFSUMBs History of Ultrasound

- To summarize the history of ultrasound from the very beginning up to the introduction of the most recent technologies of contrast enhanced ultrasound and elastography.
- To present the very beginning and advances of ultrasound technology.
- To present the pioneers and their important followers.
- To present most important references.
- To present important events (congresses).
- To present illustrative images of the pioneers and technologies.
- To present the convergence and divergence of various ultrasound disciplines.

ELASTOGRAPHY FOR BEGINNERS, INVESTIGATOR EDUCATION

Autors:
Christoph F Dietrich

Affiliation:
Prof. Dr. med. Christoph F. Dietrich, MBA, Caritas Krankenhaus Bad Mergentheim, Germany, 97980 Bad Mergentheim

Abstract:
Tissue stiffness assessed by palpation for diagnosing pathology has been used for thousands of years. Ultrasound elastography has been developed more recently to display similar information on tissue stiffness as an image. There are two main types of ultrasound elastography, strain and shear wave. Strain elastography is a qualitative technique and provides information on the relative stiffness between one tissue and another. Shear wave elastography is a quantitative method and provides an estimated value of the tissue stiffness that can be expressed in either the shear wave speed through the tissues in meters/second, or converted to the Young’s modulus making some assumptions and expressed in kPa. Each technique has its advantages and disadvantages and they are often complimentary to each other in clinical practice. This presentation reviews the principles, technique, and interpretation of elastography in various organs.

EMERGENCY PEDIATRIC ABDOMINAL ULTRASOUND

Autors:
György Harmat MD, PhD

Affiliation:
Semmelweis University, Budapest, Hungary

Abstract:
In the last 20 years clinician-performed ultrasound has expanded from a screening test in trauma to being used by almost every medical specialty for diagnosis, monitoring or procedural guidance. In 2010, the ACR reaffirmed that ultrasonography should be the first-line imaging study in children under 14 years and in pregnant women.

Recently, in 2016 the American Academy of Pediatrics published a policy statement endorsing the use of point-of-care ultrasound by pediatric emergency medicine providers. Ultrasound has become the diagnostic test of choice in the evaluation of patients with suspected ileocolic intussusception. In addition to making the diagnosis of intussusception, ultrasound can be utilized to determine if blood flow is still present to the affected bowel, or to identify free fluid, which may prognosticate the success of enema reduction. The female reproductive organs can be visualized sonographically in non-pregnant pediatric females who present with abdominal pain for the evaluation of ovarian cysts, pelvic inflammatory disorder (PID)/tubo-ovarian abscess (TOA), and ovarian torsion. The pylorus can be evaluated sonographically in infants in whom there is clinical concern for idiopathic hypertrophic pyloric stenosis (HPS).

Ultrasonography has many applications in the evaluation of pediatric patients presenting with both traumatic and non-traumatic emergencies. Because of its rapidity, ease of use and absence of ionizing radiation, US has not only been used to make or exclude clinical imaging diagnoses, but it has also become the modality of choice of both the stable and serious unstable pediatric patient in the Emergency Department or in the Pediatric Surgical Departments.

Our presentation highlights some important clinical situation.
FEASIBILITY OF HIGH FREQUENCY ULTRASOUND IN VULVAR SKIN PATHOLOGY- PRELIMINARY REPORT.

Autors:
Michał Migda¹,², Marian Stanisław Migda¹, Bartosz Migda³, Marek Maleńczyk³, Rafał Słapa³,

Affiliation:
1.Civis Vita Cetrum Medyczne, Toruń
2. Oddział Kliniczny Płodności, Chorób Kobiecych i Ginekologii Onkologicznej, Wojewódzki Szpital Zespolony w Toruniu, Uniwersytet Mikołaja Kopernika w Toruniu, Polska
3. Zakład Diagnostyki Obrazowej, Drugi Wydział Lekarski z Wydziałem Nauczenia w Języku Angielskim oraz Wydziałem Fizjoterapii, Warszawski Uniwersytet Medyczny w Warszawie, Polska

Abstract:
Vulvar cancer (vulvar malignancy) is a rare cancer. However, it is increasing and will occur in certain at-risk individuals or groups. Worldwide incidence studies would suggest large variations in age-standardized incidences between countries. Malignant tumors of the vulva account for approximately 4% of malignancies found in the female genital tract in Poland. Squamous cell carcinoma accounts 90%-95% of these tumors; the others are basal cell carcinoma, melanoma, adenocarcinoma, and mesenchymal tumors.

Standard examination of the vulva is sometimes handicapped by inadequate exposure and poor illumination. The use of colposcope solves the issue where to take the biopsy, and application of 1% toluidine blue solution is also recommended.

The aim of this work is to refer to data collected during our study period (2014-2018) including 8 cases of squamous cell carcinoma, 1 basal cell carcinoma, 1 Paget disease and assessment of these pathologies using high frequency ultrasound.
US elastography was proven to correlate well with the grade of fibrosis. However, the authors of the initial concept have admitted that it is unlikely that only one physical parameter, liver stiffness (LS), can describe completely a complex biological system of which fibrosis is just a part. Indeed, the liver is an organ wrapped in a distensible but non-elastic envelope (Glisson’s capsula). Therefore, additional space-occupying tissue abnormalities (oedema and inflammation, cholestasis and congestion), may interfere with LS measurement, independently of fibrosis.

When we talk about „fibrosis staging”, we are mainly interested in the LS cutoff values for fibrosis prediction and their performance. Even though the cutoff values defined for a certain population may be relevant, they may not be applicable in another population where the incidence of fibrosis is different. Because of this, it is indicated that each centre establishes its own cutoff values, in agreement with the prevalence of fibrosis stages in that particular population, and calculates the performance of the method in relation with those cutoff values.

We will discuss the LS cutoff values and their performance for fibrosis prediction for the main types of elastographic techniques (transient elastography, point shear wave elastography, 2D-SWE) in some common diffuse liver diseases: CHC, CHB, NAFLD and ALD. According to EFSUMB Guidelines for liver ultrasound elastography, TE, pSWE and 2DSWE can be used as the first-line assessment for the severity of liver fibrosis in CHC patients and these techniques performs best with regard to the ruling out of cirrhosis. TE, pSWE and 2DSWE are useful in CHB patients to identify those with cirrhosis, but concomitant assessment of transaminases is required to exclude flare up. TE can be used to exclude cirrhosis in NAFLD or in ALD patients, provided that acute alcoholic hepatitis is not present (in the last case).
FLUID THERAPY ON ICU: THE FALLS-PROTOCOL

Autors:
Daniel Lichtenstein

Affiliation:
Medical ICU
Hospital Ambroise-Paré
F-92100 Boulogne (Paris-West university, France)

Abstract:
Fluid therapy is an extremely complicated field, and many tools are used for trying to control it in adults (cardiac catheterization, echocardiography, thermodilution a.m.o.). In neonates, the issue is not simpler. The lack of gold standard makes a basic limitation in the use of all tools. This being said, in the aim of decreasing the high mortality of circulatory failure, the consideration of any tool should be carefully done. Lung ultrasound has the advantage of being noninvasive, easy to learn, fast to perform, repeatable at will. The FALLS-protocol widely includes lung ultrasound for approaching a circulatory failure [CHEST 147:1659-1670]. In parallel to any available other tool, the FALLS-protocol makes a sequential analysis. First step, an obstructive shock is sought for. In the absence of pericardial effusion (suggestive of tamponade), dilated right ventricle (suggestive of pulmonary embolism) and pneumothorax, obstructive shock is rapidly excluded. Second step, a cardiogenic shock (of left origin) is sought for. In the absence of a B-profile (lung rockets with lung sliding at the anterior chest wall), left cardiogenic shock is unlikely. The third step of the FALLS-protocol is to perform Fluid Administration (Limited by Lung Sonography, i.e., the acronym FALLS). A hypovolemic shock is improved under fluid therapy, which can be therefore discontinued. In the case of distributive shock, fluid will not fix the circulatory failure. The basis of the FALLS-protocol is to give enough fluid for just enlarging the interstitial sector, generating hemodynamic interstitial syndrome, a silent, infra-clinical step preceding alveolar edema, the step to be avoided. If lung rockets appear under fluid therapy, without clinical improvement, fluid therapy is discontinued, hypovolemic shock is unlikely, and distributive shock is envisaged. Multiple questions cannot be dealt with in the given volume. Lastly, the concept of the FALLS-protocol is fully open to any comment or criticism.
FROM MACROVASCULAR TO MICROVASCULAR ULTRASOUND IMAGING

Autors:
JM Correas\textsuperscript{1+2+3} MD PhD, O Couture\textsuperscript{3} PhD, M Tanter\textsuperscript{3} PhD

Affiliation:
1: Department of Adult Radiology, Necker University Hospital, Paris, France
2: René Descartes Medical University, Paris, France
3: Inserm U979 Wave Physics for Medicine -ESPCI - Langevin Institute CNRS UMR 7587 Paris, France

Abstract:
The authors will review Ultrasound Imaging Techniques for the detection of the microvasculature to microvasculature, moving from conventional imaging modalities to more advanced technology using contrast and non-contrast methods, including UltraSensitive Doppler techniques and Ultrafast Imaging.
GALLBLADDER PATHOLOGY

Autors:
Nira Beck –Razi MD

Affiliation:
Department of Medical Imaging
Rambam Health Care Center and Bruce and Ruth Rappaport Faculty of Medicine, Technion, Israel Institute of Technology

Abstract:
Gallbladder disease includes a wide spectrum of pathologies. The talk will cover major sonographic appearances of gallbladder disease. Starting from gallstones, gallbladder sludge, acute cholecystitis and chronic cholecystitis. Complications of acute cholecystitis will be specifically discussed. Finally, gallbladder tumors and masses, benign and malignant will also be covered. Emphasis will be put on the need to differentiate between entities and of course recognise acute complications in order to facilitate emergent treatment.
GASTROINTESTINAL TRACT ULTRASOUND – CASE REPORT

Authors:
Bogna Staniuk

Affiliation:
Students’ and Young Doctors’ Section of the Polish Ultrasound Society

Abstract:
Gastrointestinal tract ultrasonography is a relatively new field of ultrasound that is developing rapidly and currently playing an increasingly crucial role in the diagnosis and monitoring of bowel diseases. It is well established in the assessment of appendicitis or intussusception but it is also very useful in evaluation of the intraluminal and extraluminal pathologies associated with diagnosis and complications of inflammatory bowel diseases. In my presentation I would like to show you the possibilities of using ultrasound in diagnosis of gastrointestinal diseases in everyday medical practice. I will introduce a clinical case of a teenage patient with abdominal pain, diarrhea and fever and I will discuss the possibilities of differential diagnosis.
“HISTORY OF POLISH SONOGRAPHY”

Autors: 
Janusz Tyloch, Dominik Tyloch

Affiliation: 
Department of General and Oncological Urology, Collegium Medicum in Bydgoszcz, Nicolaus Copernicus University in Toruń, 85-095 Bydgoszcz, ul. M. Skłodowskiej-Curie 9

Abstract: 
A history of the Polish ultrasonography on the background of the European and American ultrasonography was presented. In the 1960s Professor Filipczyński, the Chief of the Department of Ultrasound of the Institute of Fundamental Problems of Technology at the Polish Academy of Sciences, was one of the top researchers in the field of application of ultrasounds in medicine. His studies resulted in the construction of the world’s fourth ultrasound apparatus for clinical applications. There are three more professors whose contribution to the development of Polish ultrasonography can not be also omitted. Andrzej Nowicki, Zdzisław Boroń and Wiesław Jakubowski - two engineers and one medical doctor contributed to the development of ultrasonography at a high global level.
Acute pancreatitis (AP) is an acute inflammatory process of the pancreas with variable involvement of other regional tissues or remote organ systems. It is associated with raised pancreatic enzyme levels in blood and/or urine. Wide variety of etiologies of AP exists, gallstones and alcohol abuse account about 75-80% of all causes. The diagnosis of AP requires two of the following three features: (1) abdominal pain, (2) serum lipase (amylase) activity at least three times greater than the upper limit of normal, (3) characteristic findings on imaging: ultrasound (US), computed tomography (CT), magnetic resonance imaging (MRI). Imaging plays a great role not only in early diagnosis of AP, but also in the differential diagnosis of acute abdominal pain. A proper radiologic test can be helpful to elucidate the etiology, to stage the morphologic severity, to assess and monitor local complications of AP or guide interventional procedures.

US is frequently used as an initial diagnostic study for patients suffering from acute abdominal pain. This is a primary modality for assessment of biliary stones and biliary tract as the cause of AP. US better than CT characterizes pancreatic collections by demonstrating necrotic debris within pancreatic collections, and thus, differentiating liquid from nonliquid material. Furthermore, US has more advantages: it is widely available, it could be used at the bedside or in an intensive care unit. US does not expose the patient to ionizing radiation and requires no potential hazardous intravenous contrast agents.

The major disadvantage of US remains the limited visibility of retroperitoneal region because of the presence of overlying bowel gas and because of limited sound waves penetration in obese patients. Abdominal US less accurate in delineating extrapancreatic inflammatory spread within retroperitoneal spaces and in detecting intrapancreatic necrosis. The latter drawback could be overcome by contrast enhanced US or CT and MRI.
Interventional ultrasound was born at the First World Congress on Ultrasound Diagnostics in Vienna in 1969, when Alfred Kratochwil, a young Austrian obstetrician, presented an ultrasound transducer with a central canal through which an amniocentesis could be performed with a thin needle guided by A-mode i.e. 1-D ultrasound.

A few months later a young Danish urologist, Hans Henrik Holm, and his research group in Copenhagen, Denmark inspired by Kratochwil’s 1-D puncture transducer developed the first system for puncture under guidance of manual 2-D B-scanning. Very peculiar, the first puncture guided by this new static B-scanning system, was that of a large renal cyst that, turned out to be malignant. This took place late in 1969 and the first report on the new US-guided puncture system was in a film entitled “Ultrasound in renal diagnosis” presented at the 1970 annual meeting of AIUM in Cleveland, USA. The principle of this static B-scanning system was published in print 1972, same year as the first article on the use of so-called A-mode presentation (same principle as originally presented by Kratochwil in 1969) was published by Goldberg and Pollack.

In the following years, the development of interventional ultrasound gained widespread interest worldwide and extensive research took place at many centers in Europe and worldwide, including abovementioned research team around Hans Henrik Holm, first at Gentofte and later at Herlev Hospital. In 1974, the first puncture guided by dynamic scanning was carried out by the Danish group of interventional ultrasound pioneers when Fog Pedersen equipped a “homemade” multielement transducer with a puncture device through which a needle could be inserted and visualized on the monitor where a drawn line indicated the needle path. The late professor Holm was recognized for his pioneering work and proudly bore his cognomen “The father of Interventional ultrasound”.

While the early development of medical ultrasound imaging per se took place, especially in the USA and in Japan, its special branch, “interventional ultrasound,” was first introduced in Europe where the early development took place in Vienna, Copenhagen, Italy and Switzerland.

Numerous dedicated professionals took part in this pioneering work and since it most likely will never be possible to pay fair acknowledgment to all, we should always bear this in mind and keep an attitude of thankfulness and appreciation towards those who paved the way and in the footsteps of whom we walk and
perform our daily duties. Some very few names mentioned in random order are Grønvall, Livraghi, Solbiati, Otto and in the lecture names and work of several pioneers in interventional ultrasound will be presented. Ultrasound is an unsurpassed modality for interventional procedures and there are numerous outstanding applications recognized by medical professionals throughout a wide range of specialties. One of its most versatile features is the capability to visualize in real time a handheld needle passing through layers of muscles, fat and organs on its way to a target, decided by the performing physician, deep inside the body. No other imaging modality can compete with ultrasound regarding degree of freedom when choosing the puncture route thereby optimizing the possibility of placing the needle correctly in the target and simultaneously minimizing the risk of complications. In addition, the procedure is rapid and often convenient for both the medical doctor and the patient. All puncture directions are possible. There is no ionizing radiation and the equipment is mobile. Finally, the power requirement is low, and the equipment is relatively inexpensive. As a consequence of these advantages ultrasound and ultrasound-guided punctures have gained widespread use. Interventional ultrasound procedures are minimally invasive, less time consuming and gentle alternatives to, or replacements for, many surgical procedures and have consequently had a great impact on the management of numerous diseases. Endoluminal ultrasound-guided punctures have evolved from transrectal ultrasound-guided prostatic punctures to the development of transducers with dedicated needle-guiding systems for transvaginal, endoscopic, intraoperative and laparoscopic applications. The applications of interventional ultrasound can be divided into two major groups: Diagnostic and therapeutic intervention. Diagnostic interventions include biopsy of solid tissue, aspiration of fluid and instillation of diagnostic material such as for instance contrast agents through a catheter. Therapeutic interventions comprise drainage of fluid collections like ascites, pleural and pericardial effusions, lymphoceles and abscesses, tubulation of hollow organs as in nephrostomies, gastrosomes and choledochostomies and tissue ablation by means of heat, frost or radiation.

The basic principle of ultrasound guidance is either the "needle guide" or the "free hand" technique. Some interventionalists speak strongly in favor of one over the other. This, in my opinion, is a wrong attitude. Both techniques are excellent tools but each, like everything else in life, has its upsides and downsides.

Recent technological achievements in diagnostic imaging modalities have provided new elements to the use of, and indication for ultrasound-guided interventions. CEUS, image fusion techniques and improved features of CT, PET and MRI have established new possibilities in patient management and diagnostic capabilities. CEUS and fusion probably will reduce traditional indications for interventional such as biopsies. However, both CEUS and fusion also at the same time will extend the use of interventional US with new applications and support existing applications.

Interventional ultrasound at its present stage has countless applications and, in the future, will remain of crucial importance involving more complex and dedicated techniques. Thus, despite this presentation was about history of interventional ultrasound, international ultrasound is by no way history. To the contrary, interventional ultrasound without doubt will continue to inspire new users to develop impressive new procedures to the benefit of patients and the medical community worldwide.

Selected References:

8. Otto and in the lecture names and work of several pioneers in interventional ultrasound will be presented.
9. Therapeutic interventions comprise drainage of fluid collections like ascites, pleural and pericardial effusions, lymphoceles and abscesses, tubulation of hollow organs as in nephrostomies, gastrosomes and choledochostomies and tissue ablation by means of heat, frost or radiation.
10. The basic principle of ultrasound guidance is either the "needle guide" or the "free hand" technique. Some interventionalists speak strongly in favor of one over the other. This, in my opinion, is a wrong attitude. Both techniques are excellent tools but each, like everything else in life, has its upsides and downsides.
11. Recent technological achievements in diagnostic imaging modalities have provided new elements to the use of, and indication for ultrasound-guided interventions. CEUS, image fusion techniques and improved features of CT, PET and MRI have established new possibilities in patient management and diagnostic capabilities. CEUS and fusion probably will reduce traditional indications for interventional such as biopsies. However, both CEUS and fusion also at the same time will extend the use of interventional US with new applications and support existing applications.

Interventional ultrasound at its present stage has countless applications and, in the future, will remain of crucial importance involving more complex and dedicated techniques. Thus, despite this presentation was about history of interventional ultrasound, international ultrasound is by no way history. To the contrary, interventional ultrasound without doubt will continue to inspire new users to develop impressive new procedures to the benefit of patients and the medical community worldwide.
Pneumatosis intestinalis (PI) is the intramural gas that consists of gas bubbles along the subserosal and submucosal layers. It appears secondary to the passage of intraluminal gas into the injured bowel wall. Portal venous gas (PVG) originates from absorption of intramural gas into the intestinal venous system travelling into the portal vein.

PI and PVG are usually seen in preterm infants suffering from necrotizing enterocolitis (NEC). However, there is a number of other conditions than NEC, that can also cause PI and PVG. PI and PVG are not a stand-alone disease but they accompany other diseases of the abdomen. The ultrasound appearance, causes and theories on the mechanisms of the PI and PVG origin are going to be shown during the presentation. Moreover, the examples of NICU patients` case presentations are going to call attention to the diagnostic value of PI and PVG.

Finally, based on the review of the literature and own experience, the main conclusions and limitations of PI and PVG in ultrasound diagnosis of neonatal abdominal diseases are going to be suggested.
INTRAOPERATIVE AND LAPAROSCOPIC US

Authors:
Mustafa Secil

Affiliation:

Abstract:
Intraoperative ultrasound (IOUS) is an easily applicable, helpful tool for surgical procedures. The most commonly used organs are the liver, pancreas, kidney, adrenal, and testis. The indications of IOUS are the detection of impalpable lesions, guidance of technique of the surgical procedure, evaluation of the vessels during the operations, and intraoperative ablative procedures of additional lesions that cannot be extirpated.

The equipment used in IOUS is a high resolution US device with standard linear and convex transducers and/or with transducers specifically designed for intraoperative use.

For an appropriate workflow, an US machine may be dedicated for surgical rooms. If multipurpose US device is being used, a daily IOUS patient list is advised to be prepared. IOUS examiner should check for the previous CT or MR images of the lesion that will be searched for during IOUS.

The best way of transducer sterilization is the gluteraldehyde solution, at least 20min. Sterile cover (1,5-2m length sterile surgical camera drapes) should be used in the operation area. By the help of the operation nurse a sterile drape is covered on the transducer. The transducer and the drape are covered by gel, inside of the drape is converted out, transducer and the cable of the transducer covered and fixed.

An assistant is necessary to use the control panel of US machine or if the sterile applicant will use the control panel, a sterile, transparent cover should be used for the panel of the US machine. Sterile saline is used for lubrication of the surface of the organ that will be examined. In order to cover all target organ a systematic approach is advised. Dimming of the operation room is necessary. One should be in care for the operation area for a possible bleeding during the procedure where everybody is looking at the monitor of US device.
INTRAOPERATIVE ULTRASOUND FOR RENAL TUMORS

Autors:

Waldemar Białek

Affiliation:

Department of General and Transplant Surgery and Nutritional Treatment,
Medical University of Lublin, Poland
Department of Urology, St. John of Dukla Center of Oncology of the Lublin Region, Lublin, Poland

Abstract:

There are many reasons for the use of intraoperative ultrasound for renal tumors. Before resection, IOUS:
- confirms the choice of the appropriate kidney,
- helps to identify any significant tumor within the organ ("index" tumor and "satellites"),
- locates with reference to blood vessels and the calyceal system,
- reveals and helps to extract coexisting stones.
During tumor resection, IOUS:
- helps to delineate tumor and ensure safe surgical margins,
- ensures the quality of resection or tumor ablation,
After resection, IOUS:
- reveals bleeding undermining hemostatic material within the tumor bed or into the pelvicalyceal system,
- helps in D-J stent positioning,
- helpful during the re-operation.
The IOUS is easily accessible in the operation room, most actual real live, with high resolution, avoiding artifacts.
Variety of ultrasound probes may be used – depending on operative access (open or endoscopic). Endorectal probe may be used for pelvicalyceal system puncture or renal tumor biopsy. IOUS usually is easy to perform but remember:
- sterile probes (or disinfected probes with sterile covers), sterile jelly or saline should be used,
- scanner should be prepared (tuned) before operation starts,
- adequate access to the organ should be achieved,
- ultrasound probe should be handled carefully (kidney parenchyma and cystic lesions are fragile, we have to avoid rupture of the tumor),
- renal pedicle, pelvicaliceal system or calcifications are good landmarks for imaging,
- it is important to get wide view of the organ before trying to visualize details,
- IOUS anatomy is much more detailed in comparison with TAUS. Before IOUS start in-vitro examinations to be familiar with normal echogenicity of renal parenchyma,
- IOUS reveals more complex echogenicity of solid or cystic lesions.
IS SHEAR WAVE ELASTOGRAPHY (SWE) A USEFUL TECHNIQUE TO GUIDE THE NODULES TO THE BIOPSY?

Autors:
Ewelina Szczepanek-Parulska

Affiliation:
Department of Endocrinology, Metabolism and Internal Medicine, Poznan University of Medical Sciences

Abstract:
Thyroid nodules (TN) are the most common endocrine disorder, with a relatively low risk of malignancy at 3-15%. Fine-needle aspiration biopsy (FNAB) remains the gold standard in diagnostics of TN. Sonoelastography is a novel ultrasound technique that provides information on elasticity of thyroid lesion. Decreased elasticity has proved to be a predictor for malignancy of thyroid nodules. The aim of this lecture is to present whether shear wave elastography [SWE] might be a useful tool in the decision: whether FNAB is necessary, which part of the lesion to choose in case of large or heterogeneous lesions and which lesion to choose for FNAB in a case of multinodular goitre (MNG). In meta-analysis, elastography had the highest pooled risk ratio if compared to other conventional features of malignancy.

The data on the usefulness of SWE in selecting nodules representing the highest risk of malignancy for FNAB in patients with MNG is reported. The relatively high stiffness of a lesion compared to other nodules from the same MNG should be considered as a strong argument for choosing that particular one for FNAB. SWE was proved to be useful also in choosing an area of the nodule for FNAB in larger lesions, increasing the diagnostic value and chances to detect malignancy on cytological examination. It might be particularly useful in patients with chronic thyroiditis or nodules with microcalcifications. However, SWE diagnostic performance might still be limited in case of acromegaly, acute or subacute thyroiditis, large lesions, with macrocalcifications, with cystic component, localized on posterior wall or close to the isthmus. Thus, SWE might serve as a complementary tool for assessing targets for FNAB, and has the potential to reduce the number of FNABs especially thanks to its strong negative predictive value.
LIVER LESIONS: COULD CEUS BE THE BEST DIAGNOSTIC MODALITY?

Authors:
Paul S. Sidhu

Affiliation:
Department of Radiology, King’s College Hospital, London, United Kingdom

Abstract:
The use of CEUS is widespread in the practice of ultrasound, originally developed for the assessment of focal liver lesions, rapidly expanded to be useful in the diagnosis of other abnormalities in other organs, but CEUS still remains a strong contender for characterisation of focal liver lesions. Could CEUS be the best modality for this purpose? The evidence is strong that it outperforms CT and is in close contention with MR imaging. However there are inherent limitations with CEUS, and these limitations mirror that of B-mode ultrasound – if you cannot find the lesion, than the difficulty of characterisation is present. This will be illustrated with examples, recommendations and guidelines from learned societies on the usefulness of the technique in assessing focal liver lesions.
LUNG CONSOLIDATIONS

Authors: Oskar Puk

Affiliation: STN Collegium Medicum im. Ludwika Rydygiera w Bydgoszczy, SSML PTU Bydgoszcz

Abstract: Ultrasonography is an useful tool in diagnosis of pathological changes in lungs and it is used more and more frequent due to its extraordinary advantages such as: sensitivity and specificity in pneumonia detection above 90 % which is more then chest x-ray, short examination time, common availability of ultrasonographic devices, no radiation and possibility to perform examination almost in every circumstances. Although ultrasonography reveals only peripheral lesions more than 90 % of solid pathological changes in lungs are peripheral thus detectable by ultrasound. Furthermore in specific cases clinicians can perform invasive treatment procedures under control of ultrasonography even right after diagnosis. In view of its advantages ultrasonography is the future of diagnostics of lung diseases in common clinical practice.
Lung ultrasonography (LUS) can be easily obtained during standard echocardiography, providing additional information about heart failure (HF) status. B-lines (or comets) appear in the second stage of lung water cascade, as a symptom of increased extra-vascular fluid in the lung, before crackles and dyspnea are clinically evident. The number of B-lines has been shown to be correlated with NT-proBNP and E/e' in acute dyspnea and during stress test. B-lines can be used as a marker of the pulmonary congestion severity and response to standard decongestion therapy, i.e. diuretics, both in heart failure with preserved or reduced ejection fraction. It has been shown that LUS response to treatment is an independent 6-month survival predicting factor for all-causes mortality and acute HF re-hospitalizations. LUS is proposed as a part of integrated quadruple stress echocardiography that includes the assessment of regional wall motion abnormalities, lung water, contractile reserve and coronary flow velocity reserve. Different variants of chest wall acquisition points are proposed in supine or prone position in different studies, with the view to obtain simplicity, feasibility and time reduction. There are evidences that passive leg rise is helpful tool to predict impaired exercise diastolic function in patients with HF with preserved ejection fraction. In our preliminary study we show that in some patients preload increase caused by leg rise can provoke emerging or boost of B-lines. It is consistent with lung water cascade Picano’s theorem, and need more research.
LUNG ULTRASOUND IN THE CRITICALLY ILL NEONATE

Authors:
Daniel Lichtenstein

Affiliation:
Medical ICU Hospital Ambroise-Paré
F-92100 Boulogne (Paris-West university, France)

Abstract:
Lung ultrasound in the critically ill (LUCI), not supposed to exist, has however been developed in adults these recent decades. In the neonate, the gold standard is currently missing (CT cannot be used). In spite of this issue, our observations showed that the semiology assessed in adults is found again with no difference. The ten main signs are fully standardized: the pleural line, the A-line, lung sliding, the quad and sinusoid sign, the fractal sign, the lung sign, the B-line (and lung rockets), the stratosphere sign and the lung point. Two additional signs, the lung pulse and the dynamic air bronchogram can be used.

The diagnoses of pleural effusion, lung consolidation, interstitial syndrome and pneumothorax are accessible with results quite similar to those of CT (in adults). As LUCI increasingly becomes the gold standard in adults, allowing decrease of radiation among others, we should make neonates benefit of it. The BLUE-protocol (an ultrasound approach to respiratory failure using combination of signs), operational in adults, can be performed the same in neonates (under submission).

We used a simple machine without Doppler. Those who fear (unproven) side effects can record short sequences (<5") on standardized points, the BLUE-points. This allows fast diagnosis as well as a posteriori analysis.

Among pulmonary edema (B-profile), pneumothorax (A’-profile), asthma (A-profile) and few others, we detail only one of the applications of the BLUE-protocol: diagnosing pneumonia. Four profiles, called the B’-profile, the C-profile, the A/B-profile and the A-V-PLAPS profile have in adults a 89% sensitivity and a 94% specificity (Chest-136:117-125). For diagnosing diseases specific to the neonate and young child, the analysis can be enriched by clinical data and others, so LUCI gives its best. The only way to make efficient BLUE-protocol is to carefully read its methodology, based on simplicity but also on rigor.
MUSCLE CHARACTERIZATION IN A ELDERLY POPULATION
BY ULTRASOUND

Authors:
Rute Santos, Helena Ferraz

Affiliation:
Medical Imaging and Radiotherapy, Coimbra Health School, Polytechnic Institute of Coimbra, Coimbra, Portugal

Abstract:
Background: The increase of elderly in our society requires simple tools for quantification of sarcopenia (reduction in muscle mass) in patients. Muscles are among the soft tissues one of the best adapted to ultrasound examination.

Purpose: To analyse and characterise the muscle in elderly individuals by ultrasound and to verify muscle changes with age.

Methods: 40 elderly participants were submitted to an ultrasound examination for muscle characterisation. The quadriceps and brachial biceps muscles were evaluated in a longitudinal view, using the some parameters in all acquisitions. All the images were analysed by Image J software and the results were obtained using SPSS v.24 software.

Results: The quadriceps muscle and brachial biceps in elderly individuals showed an increase in echo-intensity values and a decrease in thickness values when compared with an young population. In participants with more advanced age the values were more evident.

Conclusion: The aging significantly affects human skeletal muscle architecture. These structural alterations are expected to have implications for muscle function in old individuals.
Necrotizing enterocolitis (NEC) is one of the most serious conditions in newborns, affecting up to 10% of very low birth weight infants (VLBW). In the most premature population mortality rates can rise as high as 60%.

Typical findings on abdominal radiography (AR) include pneumatosis intestinalis (PI), portal vein gas (PVG) and pneumoperitoneum, but are sometimes not present even in severe cases. Abdominal ultrasound (AUS) can depict PI, PVG and pneumoperitoneum (in some cases a head of AR), but it also provides other crucial information such as bowel wall viability (thickness or thinning), free abdominal fluid and blood flow in SMA and intestine wall perfusion. Published reports have emphasized the role of the bowel wall thickness, peristalsis and bowel wall perfusion (BWP) as findings typical for NEC and solely detected on AUS.

These additional findings are helpful in expediting diagnosis and management of NEC. The use of AUS may increase the accuracy of diagnosing NEC, and precipitate treatment.
NERVE ULTRASOUND GUIDELINES

Autors:
Zaottini Federico, Picasso Riccardo, Pistoia Federico, Martinoli Carlo

Affiliation:
University of Genoa, DISSAL dep.

Abstract:
High-resolution ultrasound is an extremely useful and versatile technique for examining the peripheral nervous system. It has the advantage of being readily available and inexpensive, at the same time providing highly detailed information regarding nerves, muscles, and other soft tissues. The ultrasound seems to be superior to MR imaging in the evaluation of the peripheral nervous system, where this technique allows to examine long nerve segments in a single study and is able to identify pathologic conditions affecting small nerve branches (often less than 1mm thick) in the extremities with high accuracy. The recommendation is to study the nerve in short axis plane and following the nerve contiguously throughout the limbs using the so-called “elevator technique”. In the setting of entrapment neuropathies, ultrasound represents the technique of choice, moreover in case of dynamic pathologies (i.e. ulnar nerve instability). In case of traumatic injuries, ultrasound is able to grade the entity of injury with a precise correlation with the nerve conduction studies, providing significant prognostic information.

In the field of autoimmune neuropathy, US can contribute to identify focal nerve swellings at the site where conduction blocks are detected at electrophysiology, or nerve morphological alterations when the electrophysiology is still unexpressive, contributing to early diagnosis of the disease. Finally, Ultrasound is helpful in the diagnosis of nerve tumours, being able to depict the typical features of these lesions, in particular the origin of the mass from nervous fascicles. In conclusion Ultrasound provides morphologic information about the nerve and its surroundings, it is informative in patients with absent motor or sensory responses and it helps to interpret ambiguous electrophysiological findings reducing the need for further exclusionary studies.
NEW APPROACH TO US-GUIDED PUNCTURES

Authors:
Grzegorz Pilecki, Zbigniew Pilecki

Affiliation:
Sports Medicine Center, Zabrze, Poland

Abstract:
We understand puncture techniques as procedures having a common element in the form of tissue puncturing performed under the ultrasound control.

The father and pioneer of puncture techniques we accept Alfred Krotochwil, who in 1968 developed a transmitter working in A mode with a hole in the middle that allows punctures of the cyst. Puncture techniques are not homogenous group, but they have many common features and are compatible.

The most well-known are: evacuation, injection, vascular cannulation, needling and slicing, ablation and coblation, stimulation, biopsy, drainage and rinsing, idication, fixation. Mentioned above compatibility allows to merge the various techniques and the creation of 2in1, 3in1 and allin1, which is already moving on to the sonosurgical techniques.

The most common is evacuation - that is, the removal of the content of a certain structure through bowling. Frequently connected with injection - means giving the solution, often the same needle.

Very important element is the cannulation of large and small vessels, arterial and venous vessels under the control of the ultrasound machine.

Indication and fixation is a group of procedures aimed at marking and, if possible, stabilizing a certain element that facilitates further procedures.

Drainage and rinsing is the development of evacuation and injection techniques, performed with slightly different techniques and repeated. Very useful in everyday surgical practice.

Multiple puncture (needling, slicing) is a technique used in chronic changes within the musculo-skeletal systém aimed at improving healing.

The techniques mentioned above are already an example of the 2in1 technique. After watching and listening to the presentation, we should not look at individual puncture techniques, but their collection, which we can combine with each other.
OVERVIEW OF SONOSURGICAL TECHNIQUES

Autors:
Zbigniew Pilecki, Grzegorz Pilecki

Affiliation:
Sports Medicine Center, Zabrze, Poland

Abstract:
Sonosurgery is currently defined as a branch of a miniminvasive surgery, in which the procedures are performed in ultrasound imaging. It requires a very good knowledge of endoscopic techniques and experience with ultrasound imaging. It derives its roots from puncture techniques. As a surgical discipline, it requires respect for all laws governing surgery - especially asepsis. The principle that drives sonosurgical techniques is complementarity, which we understand as matching and supplementing the components of the surgery. Sonosurgical procedures have their stages similar to all surgical procedures: sonotopography, preparation, proper surgical procedure, sewing, end of the procedure. Sonotopogram is a mapping with the help of ultrasound camera, which allows you to integrate yourself in the topography of the surgical site and plan the most beneficial access. Preparation is a simultaneous performance of access and anesthesia, having a range of techniques - from the basic (needle-fluid, tool, electrottools, thread and mixed) to advanced (balloon, hook, application and hybrid). The proper sonosurgical technique is, for example, reposition and fixation of fracture, removal of metal or altered tissue, etc. The methods of sewing tissues are very different and depend on their type. Because there are only one or two small access left on the skin, it does not cause trouble. Finally, we recommend mapping the operated area and applying a pressure dressing. Initially, in our activities and performances we paid particular attention to the fact that sonosurgery focused only on surgical procedures with continuous ultrasound imaging. Now, however, we believe that its popularization requires merging with other surgical techniques. However, the presence ultrasound apparatus in the operating room is not enough for the procedure to be called sonosurgery - we must still use it in the right way. Sonosurgery allows for safe and patient-friendly performance of the procedure, but requires considerable experience and training.
PAPILLARY THYROID CANCER – CORRELATION US IMAGING WITH GENETIC BACKGROUND

Authors:
Andrzej Lewiński

Affiliation:
Department of Endocrinology and Metabolic Diseases, Medical University of Lodz, Lodz, Poland

Abstract:
In 2017, WHO classification of endocrine tumours was published, containing the chapter on the classification of thyroid tumours. The authors introduced a new class of diagnoses: “Other encapsulated follicular-patterned thyroid tumours”, which did not exist in previous classifications. Borderline tumours, distinguished in the thyroid, seem to be an equivalent of carcinoma in situ in other organs, with described as the first “non invasive follicular thyroid neoplasms with papillary-like nuclear features” (NIFTP), located somewhere at the border between follicular adenoma and carcinoma or between follicular adenoma and a follicular variant of papillary thyroid carcinoma (PTC). The cited classification is extremely detailed and includes 16 variants of PTC, 5 of which are characterized by a particularly poor prognosis. These are: diffuse sclerosing variant, tall cell variant, columnar cell variant, cribriform-morular variant (CMV) and hobnail variant. Genetic background of PTC variants is very diverse. Initiating mutations in PTC comprise BRAF or N-K-H-RAS mutations, or gene fusions (paracentric inversions), leading to formation of RET/PTC oncogenic sequences. PTC variants differ as regards incidence and common ultrasonographic (US) features, e.g. aggressive variants present typical malignant US features (solid hypoechoic nodules with microcalcifications, spiculated/microlobulated margins, or nonparallel orientation). Additionally, tall cell and hobnail variants frequently present nodal metastases, while columnar cell and solid variants - circumscribed borders. In turn, diffuse sclerosing variant, caused by RET/PTC rearrangement, is characterized by ill-defined masses and scattered microcalcifications. CMV presents usually as solid oval to round nodule, without calcifications. The tumour in question lacks malignant US features, however its biological behaviour can be quite often aggressive which is probably related to CTNNB1 gene coding beta-catenin in patients usually positive for the APC gene. Generally, all PTC variants caused by BRAF mutations have more US features speaking for malignancy. In contrast, follicular variants (encapsulated) usually look like solid hypoechoic or isoechoic nodule.
Dynamic Contrast Enhanced Ultrasound (DCE-US) is an imaging technique that utilizes microbubble contrast agents in diagnostic ultrasound. The purpose of this presentation is to highlight the EFSUMB position paper on DCE-US to provide some recommendations and descriptions of the quantification of ultrasound images, technical requirements for analysis of time-intensity curves (TICs), methodology for data analysis, and interpretation of the results [Dietrich CF, Averkiou MA, Correas JM, Lassau N, Leen E, Piscaglia F. An EFSUMB Introduction into Dynamic Contrast-Enhanced Ultrasound (DCE-US) for Quantification of Tumour Perfusion. Ultraschall Med 2012; 33(4):344-351]
Non-neoplastic lesions include the tunical cysts, epidymal cyst, spermatocoele, fibrous pseudotumor, spermatic cord cyst, spermatic cord lipomatosis, and polyorchidism. Cystic lesions are easy to detect and diagnose as anechoic masses on US. Lipomatosis is seen as the echogenic thickening of the spermatic cord that may occur isolated or reactive process to accompanying hydrocele. In polyorchidism, the additional testis is almost in similar echogenicity with the original testes. Fibrous pseudotumor is a solid, homogenous well defined lesion in intermediate echogenicity.

Neoplastic lesions may either be benign or malignant. Benign neoplasms are adenomatoid tumor, papillary cystadenoma and benign mesenchymal tumors, lipoma being the most common, followed by leiomyomas and by other rare lesions. Adenomatoid tumor appers as a homogeneous, avascular, well defined tumor at the juxta-testicular position. Papillary cystadenoma is a bunch-of grape like cystic tumor with papillary projections inside, that develop at the epididymis and related to von Hippel Lindau disease in more than 60% of the patients. Lipoma has a characteristic appearance on US, with echogenic interlobular septations in a homogeneous, well defined, avascular, compressible soft tissue lesion.

Malignant neoplasms are commonly mesenchymal in origin, namely the rhabdomyosarcoma, leiomyosarcoma, liposarcoma, malignant fibrous histiocytoma (undifferentiated pleomorph sarcoma), and other extremely rare ones. Malignant mesothelioma is another type of primary tumor of the region, which originates from tunica vaginalis as nodular lesions. Metastases to the paratesticular region may also occur secondary to various primaries. Lymphoma/leukemia and plasmocytoma may involve the paratesticular tissues, either alone or in combination with the involvement of the testis. Malignant tumors are commonly rapidly growing lesions that are big, sometimes huge in dimensions at the time of diagnosis. Malignant tumors are heterogeneous solid lesions that may contain cystic/necrotic areas, and they are commonly highly vascular on Doppler images.
PATIENT READY ULTRASOUND PROBES - CAN WE IMPROVE SURFACE CLEANLINESS?

**Authors:**
*Susan Campbell Westerway* ¹,²  *Jocelyne Basseal* ²,  *Greg Whiteley* ³

**Affiliation:**
¹ WFUMB  ² Australasian Society for Ultrasound in Medicine, Australia.
³ Whiteley Corporation, NSW, Australia.

**Abstract:**
This presentation describes how a simple cleaning intervention can reduce the bacterial and viral load on ultrasound probes and associated equipment, thereby reducing the risk of contamination.

Method: 250 cleaned and disinfected ultrasound transducers and related equipment (cords, keyboards, connectors, machine handles etc), deemed to be patient ready were swabbed for the presence of Adenosine Tri-Phosphate (ATP). If high levels were present then the equipment was cleaned with disposable pH neutral detergent wipes and retested.

Results: Of the 250 surfaces tested 10% were deemed to be unclean. In 91% of these cases, wiping the surface with disposable pH neutral detergent wipes reduced the ATP contamination to an acceptable range.

For 6% of transducers repeated cleaning was required to achieve a satisfactory level of cleanliness.

Conclusions: Low-level disinfection plays an important role in the cleaning process in the ultrasound department. It will not replace the need for high-level disinfection of ultrasound probes that have come into contact with mucous membranes, blood or body fluids but will clean away surface residue that may harbour bacteria.
Diffuse (nodular) hyperplasia of the thyroid may be homogeneous or mildly heterogeneous with closely opposed, isoechoic solid nodules. By time, the nodules undergo a varying degree of cystic or complex cystic changes because of necrosis, colloid accumulation, or hemorrhage. Dystrophic calcifications are common which are typically coarse in nature and may cause posterior acoustic shadowing.

Graves’ disease is seen as diffuse enlargement of the gland. Convexity is increased and bowing of the anterior gland margin is observed with mild textural coarsening, patchy ill-defined hypoechogenic areas or diffusely hypoechogenic appearance. “Thyroid inferno” pattern on Doppler imaging is typical.

Hashimoto’s disease may present with tiny solid hypoechoic micronodules in early period of the disease but commonly is in heterogeneous pattern with coarsened parenchyma, innumerable hypoechoic solid micronodules surrounded by echogenic rim of fibrosis and ondulation of margins.

De Quervain’s (subacute granulomatous) thyroiditis is seen as bilateral, asymmetrical patchy, ill-defined, geographic hypoechoic infiltrations which are well demarcated to the normal parenchyma.

Postpartum thyroiditis resembles Hashimoto’s disease in pattern but the clinical history of childbirth within one year is typical.

Amyloid goiter has a typical pattern of very high echogenicity approaching to that of the connective tissue of the neck. There is decreased ultrasound penetration, ground-glass appearance due to fatty infiltration of the gland together with amyloid.

Drugs such as amiodarone and lithium may change the thyroid echotexture which can be recognized in correlation with the clinical history. Lithium causes diffuse microcystic changes. As amiodarone toxicity may increase the vascularity of the thyroid, the echogenicity of the gland diffusely decreases due to hyperemia.
Accessory renal arteries are routinely considered to be normal anatomical variant. The prevalence of multiple renal arteries is reported to be about 20-27.7%, bilateral occurrence in 5-10% and early division in 8%. However, lower pole crossing renal vessel may be the cause of pediatric ureteropelvic junction obstruction. Besides, increased presence of multiple renal arteries were reported in hypertensive patients compared with normotensive. Among children with renal artery stenosis, 12.5 -51.4% were in accessory arteries. Accessory arteries were found more frequent stenotic than single renal arteries (34.6% vs. 10.3%). Intrarenal blood flow of the area supplied by that stenotic artery is reduced and the T-P (tardus et parvus) flow pattern with acceleration time >80 ms will appear in Doppler ultrasound.

The experience with Doppler US in pediatrics is rather limited and there are difficulties with detection of stenoses of small renal artery branches, segmental or accessory renal arteries, often <1 mm of diameter.

Non-invasive imaging cannot replace formal angiography in the diagnosis of renovascular hypertension in children, but thin arteries originating directly from the aorta/iliacal artery or arteries entering renal parenchyma directly out of renal hilus are detected in less frequency in angiographic series. In hypertensive patients with no arteriographic evidence for stenosis in long, tortuous and narrow aberrant renal arteries, a modest elevation of systemic renin activity was discovered, suggesting underperfusion of the affected renal segment. The arterial flow pattern monitored by Doppler US supports the diagnosis and follow-up of these children.

The indications for performing Doppler US to investigate for accessory renal arteries in children will be presented, based on clinical cases and practical experience.
ACCESSORY RENAL ARTERY IN CHILDHOOD - A HARMLESS ANATOMICAL VARIANT ONLY?

Authors:
Magdalena Maria Woźniak, Andrzej Paweł Wieczorek

Affiliation:
Department of Pediatric Radiology, Medical University of Lublin, Poland

Abstract:
Anatomical region of pelvis and pelvic floor is one of the most complex area in human body. Complicated anatomy and functions, varying between males and females, remain very important contributing to normal micturition, defecation and sexuality/reproduction. Considering that this area consist of many various organs playing different roles, also the diagnostics and treatment of this part of human body is often challenging and requires multidisciplinary approach of various specialists. Among many various diagnostic techniques available nowadays ultrasound remains one of the most important diagnostic tools in pelvis and pelvic floor imaging. The presentation includes clinical cases of various pathologies visualized with the use of modern high resolution pelvic floor ultrasound (PFU) and contrast-enhanced voiding urosonography (ceVUS), including three- and four-dimensional techniques.
The aim of this study was to establish recommendations for the use of lung ultrasound in internal medicine, based on reliable data and expert opinions. Methods: The bibliography from the databases (Pubmed, Medline, OVID, Embase) has been fully reviewed up to August 2017. Members of the expert group assessed the credibility of the literature data. Then, in three rounds, a discussion was held on individual recommendations (in accordance with the Delphi procedure) followed by secret voting. Results: Thirty-eight recommendations for the use of lung ultrasound in internal medicine were established as well as discussed and subjected to secret voting in three rounds. The first 31 recommendations concerned the use of ultrasound in the diagnosis of the following conditions: pneumothorax, pulmonary consolidation, pneumonia, atelectasis, pulmonary embolism, malignant neoplastic lesions, interstitial lung lesions, cardiogenic pulmonary edema, interstitial lung diseases with fibrosis, dyspnea, pleural pain and acute cough. Furthermore, seven additional statements were made regarding the technical conditions of lung ultrasound examination and the need for training in the basics of lung ultrasound in a group of doctors during their specialization programs and medical students. The panel of experts established a consensus on all 38 recommendations.
“PROF. DR HAB. MED. ZDZISŁAW BOROŃ - AUTHOR OF THE FIRST POLISH TEXTBOOK OF THE ULTRASONOGRAPHY”

Authors:
Janusz Tyloch, Dominik Tyloch

Affiliation:
Department of General and Oncological Urology,
Collegium Medicum in Bydgoszcz, Nicolaus Copernicus University in Toruń,
85-095 Bydgoszcz, ul. M. Skłodowskiej-Curie 9

Abstract:
A biography of Professor Zdzisław Boroń - one of the Polish pioneers of ultrasonography in diagnosis was presented. Professor was the co-organizer and the active member of the Ultrasound Section of the Polish Medical Radiology Society [PLTR], co-organizer of the Polish Ultrasound Society [PTU], initiator of the Kujawsko-Pomorskie department of that Society and the first private founder of the Prize for the best doctoral dissertation in the field of ultrasonography. Professor was also the author of the first Polish textbook of ultrasonography, a longtime head of the Department of Radiology and Diagnostic Imaging at the Medical Academy in Bydgoszcz.
The use of elastography for evaluating chronic diffuse liver disease has ‘exploded’ in the last 10 years, with many different techniques available on the market. The early use of transient elastography has established the use with new developments in point shear wave elastography and 2D shear wave elastography offering to improve imaging. The various methods have advantages and disadvantages, with patient factors also contributing to the overall assessment and accuracy. The various methods of liver elastography will be discussed and illustrated, with the overall acceptance of this technique demonstrated with examples. Varios techniques will be discussed with evidence of the efficacy of the methods.
“PROSTATE”

Autors:
Janusz Tyloch

Affiliation:
Department of General and Oncological Urology,
Collegium Medicum in Bydgoszcz, Nicolaus Copernicus University in Toruń,
85-095 Bydgoszcz, ul. M. Skłodowskiej-Curie 9

Abstract:
The paper presents USG basis examination of prostate gland and ultrasonography administration in diagnosis and treatment of benign prostate hyperplasia, inflammatory processes and prostate cancer.
RENAL ARTERY PATHOLOGIES

Autors:
Anna Drelich-Zbroja¹, Michał Elwertowski², Agnieszka Marianowska², Tomasz Jargiello¹

Affiliation:
¹ Medical University of Lublin
² Medical University of Warsaw

Abstract:
This work aims to depict ultrasonographic images of the renal vascular pathologies, including renal artery stenosis, thrombosis, occlusion and aneurysm, renal vein thrombosis and examples of the nutcracker syndrome. Both morphologic and hemodynamic features of the pathologies are widely discussed, based on B-mode and Doppler imaging. Diagnostic traps and errors are additionally presented.
ROLE OF CONTRAST-ENHANCED ULTRASOUND (CEUS) IN PEDIATRIC PRACTICE: UPDATE 2018 AND FUTURE PROSPECTIVES

Authors:
Paul S. Sidhu

Affiliation:
Department of Radiology, King’s College Hospital, London, United Kingdom

Abstract:
An update on the use of CEUS in children will be presented, with emphasis on the application in liver and trauma, with aspects of safety and off-label discussed. The current use outside the liver and VUR will be highlighted, with current practice detailed. Illustration of many novel uses will be demonstrated. A vision of future applications and the role in managing imaging needs highlighted.
SCROTAL ELASTOGRAPHY: HYPE OR REAL?

Authors:
Michele Bertolotto, Irene Campo, Camilla Sachs

Affiliation:
Dept Radiology, University of Trieste - IT

Abstract:
Grey-scale and Doppler modes are the imaging modalities of choice for evaluation of scrotal pathology. They have almost an absolute sensitivity for identification of testicular lesions but their specificity is limited, as it is often impossible to differentiate between benign and malignant pathologies. This differentiation should be important in the clinical practice since organ sparing surgery can be an option for lesions with uncertain malignant potential. Multiparametric US can be used to improve scrotal lesion characterization.

The first investigations dealing with use of elastography in imaging the testis claimed an important role for characterization of small nodules, of less than one centimetre in diameter, but when we observe the behaviour of the different testicular lesions in more detail, and we correlate with histological features, we realize that reality is more complex. Generally speaking, when a hard lesion is identified malignancy is suspected, while soft masses are more often benign. However, exceptions exist to this rule. A variety of benign testicular lesions may appear hard at elastography and, on the contrary, malignant tumours may be softer than expected. Moreover, some lesions change in consistency over time. In fact, elastography features are non-specific, as a number of factors contribute for a lesion to be hard or soft. This conclusion is supported by the most recent literature, which shows that for scrotal lesions the added value of elastography in the clinical practice remains to be proved.

Testicular lesions need a multiparametric assessment, mainly based on colour Doppler US and CEUS, reserving to elastography an additional role. Specificity in lesion characterization increases combining the different US modes, elastography enclosed. Reason for the use of elastography modes stems from the existence of large differences in stiffness between surrounding normal and pathologic tissues that may otherwise possess similar image contrast with conventional US.
Ultrasonography is a particularly useful modality in children with suspected soft tissue tumours. Owing to safety, readiness and ease of performing the examination as well as its availability and excellent spatial resolution, it is often the first method used in the work-up in these cases. The paper presents the most common focal lesions of the musculoskeletal soft tissue in children, including non-neoplastic lesions mimicking real tumours (so-called pseudotumours) as well as the most common benign and malignant tumours encountered in the paediatric population. As for pseudotumours and lesions that mimic focal masses, attention is paid to sonographic signs enabling final diagnosis and conclusion of the diagnostic work-up. Distinguishing benign from malignant lesions is a very important issue in imaging of soft tissue tumours, including in ultrasonography. Certain tumour features may indicate its nature, but the final differential diagnosis cannot be made on this basis. The paper illustrates the most significant sonographic features of tumours that may indicate their nature.
Atherosclerosis is one of the deadliest diseases of our civilization. Its early detection and population prophylaxis may lead to reducing the morbidity due to cardiovascular diseases. The study presents sonographic atherosclerotic symptoms depicted within the abdominal aorta in relatively young patients. According to the standards of Polish Society of Ultrasonography the abdominal examination should also comprise evaluation of the retroperitoneal vessels. Our observations indicate that most of sonographers focus on the detection of aortic aneurysms, omitting less advanced, atherosclerotic changes. This should be considered as a lapse, as the 10-year atherosclerotic cardiovascular diseases risk score system in Polish population accounts the presence of atherosclerosis revealed by diagnostic imaging in any vascular network. The primary symptoms of atherosclerosis in transabdominal ultrasound examination are usually solitary, thin plaques. Most of them are already calcified at the moment of diagnosis and do not impair the blood flow. However most of the patients have already risk factors for atherosclerosis, which should be determined in order to implement prophylaxis or proper treatment. These findings may lay the groundwork for ultrasonography to contribute in reducing the cardiovascular events. Thus during transabdominal ultrasound examination the status of abdominal aorta should always be carefully analyzed, even in young and middle-aged patients, and all of the findings should be described in the result.

Key words: atherosclerosis, abdominal aorta, ultrasound
SONOGRAPHIC FINDINGS IN DIABETIC RETINOPATHY

Authors:
Piotr Fryczkowski

Affiliation:
Retina Eye Hospital Warsaw

Abstract:
Proliferative diabetic vitreoretinopathy (PDVR) is the main cause of blindness in the course of diabetes mellitus (DM). After 15-20 years of DM onset PDR occurs in 50% DM type 1, 5-10% in non-insulin dependent DM type 2, and in 30% in insulin-dependent DM type 2. Due to the very special structure of the diabetic vitreous body which contain larger amounts of hyaluronic acid, laminin, fibronectin as well as collagen common sonographic finding is vitreoschisis which could easily be misdiagnosed as posterior vitreous detachment. Once vascular proliferation exceeds retinal surface level and rich vitreous, hemorrhages begin to start. We can find blood in retro hyaloidal space, vitreous cortex, vitreous core or in a whole vitreous body.

Multiple and repeatable hemorrhages lead to the development of fibrovascular membranes which exert traction on the retina. In sonography, one can find X type or H type tractions which lead to tractional retinal detachment.

Except for the retinal state, one must check the optic nerve in an ultrasonographical examination to exclude optic nerve atrophy.

Multiple examples of comparison between sonographic findings with the real state of the retina and vitreous will be presented.
THE APPLICATIONS OF „POINT OF CARE ULTRASONOGRAPHY” (POC-US) IN FAMILY MEDICINE: AN EXPERIMENTAL FOCUS (FOCUSED CARDIAC ULTRASOUND) SCREENING OR BASIC CARDIAC ULTRASOUND FOR NON-CARDIOLOGISTS KNOWN UNDER THE ACRONYMS OF: RAPID CARDIAC ASSESSMENT (RCA).

AUTHORS:
Mihai IACOB, Ana REMES, Madalina STOICAN.

AFFILIATION:
Department of Research in Primary Care, Ultrasound Working Group / EUVEKUS / AEDUS, Vienna / Timisoara, Austria/Romania.

ABSTRACT:
Background: FOCUS is a complement of the clinical exam, for the evaluation of cardiac function, in the hemodynamic critical patient. These concepts of ultrasonographic examination of the heart, performed as a diagnosis documentation after a physical examination by non-cardiologists, have gained many followers over the prior two decades.

Methods: FOCUS can be done in a few minutes, and involves the following five views: Subxiphoid view, Parasternal long/short axis, Apical four-chamber view, and IVC-assessment. Within each view, there are several cardiac sections, that must be evaluated according to the orientation of the probe. We conducted an experimental FOCUS-screening on 1780 patients with very high cardiovascular risk. Patients identified with inclusion criteria were first examined by a family physician with expertise and subsequently compared with ultrasound review by cardiologists, to determine the accuracy of this application. We have developed a Computerized Diagnostic Algorithm of the cardiac pathology US-detected by non-cardiologists.

Results: We identified 585 patients with cardiac pathology at our FOCUS-screening. We did the descriptive statistical analysis of the echocardiographic cases detected. The accuracy of FOCUS-screening was: 96.07% (95%CI: 95.06% to 96.92%) with a sensitivity: 95.12% and a specificity: 96.57%, p<0.001, for all 1780 emergency patients that were subsequently confirmed by the cardiologist as the “Gold-Standard method”. The combination of multiple ultrasound techniques greatly increases the precision of the method, as evidenced by ROC analysis. The prevalence of cardiac pathology detected was: 34.55% with 95%CI: 32.34% at 36.81%. FOCUS can be recommended for patients with a very high cardiovascular risk, which presents the suspicion of cardiac pathology [cardiomegaly, valvulopathy, pericarditis, endocarditis, malformations, aneurysms, arrhythmias].

Conclusion: Early diagnosis of many cardiac conditions, by FOCUS, can save the lives of patients in primary care, based on concepts and guidelines of good clinical practice. Being an operator-dependent method, we only propose it, as a complementary or as a further guidance tool for the clinical examination and finally, we recommend referral to the cardiologist.
Abstract:
Transcranial color-coded duplex ultrasonography (TCCS) makes possible the visualization of basal cerebral arteries through color-coding the flow velocity information. This method is well established in the clinical routine for the diagnostics of pathological processes in cerebrovascular disease. The present review describes the examination technique, normal and pathological findings, such as stenosis and occlusion of intracranial arteries, as well as intracranial vascular malformations focussing on the advantages of the examination in the axial imaging planes.

The arteries of the circle of Willis can be identified by their anatomic location with respect to the brain stem structures and by determination of the flow direction. For the imaging of intracranial veins, the equipment must be adjusted to a low flow setting; that is, the pulse repetition frequency has to be set at its lowest value, the color box has to be as small as possible, and the frame rate and wall filter have to be adjusted. In cerebral occlusive disease, sonographic diagnosis of an occlusion of a cerebral artery can be made when a color-coded signal cannot be obtained at depths of insonation corresponding to that artery. In such a situation it is important for further diagnostic steps and for therapy to be able to determine whether failure to visualize a cerebral vessel is due to methodological problems or to an occlusion of a cerebral artery.

For technical and methodological reasons, pathological processes, especially those located in the parietobasal, frontobasal and temporobasal subcortical brain regions, are best diagnosed using the axial imaging planes via the transtemporal approach. The main limitation of TCCS, like that of conventional TCD, is the need for an adequate acoustic window which can be overcome with echo contrast agents.
THE IMPACT OF ULTRASOUND IN THE DIAGNOSIS AND MANAGEMENT OF HEAD AND NECK DISEASES

Authors:
Peter Jecker

Affiliation:
Department of head and neck surgery, Bad Salzungen, Germany

Abstract:
There are many diseases of the head and the neck, which can be diagnosed by the use of ultrasound as well as by using other imaging techniques, e.g. fractures of the nose, different kind of neck tumors, lymph node diseases and diseases of the thyroid gland. The presentation gives an impression about the different diseases and it is explained why ultrasound should be the first modality and why other imaging techniques are often quite unnecessary with regard to the adequate treatment of the patient.

Furthermore it is demonstrated, why head and neck surgeons should know the basics of thyroid ultrasound based on different examples of thyroglossal duct cysts.
THE ROLE OF ULTRASOUND IN PEDIATRIC ONCOLOGY

Authors:
György Harmat MD, PhD

Affiliation:
Semmelweis University, Budapest, Hungary

Abstract:
Recently when sophisticated cross-sectional and functional imaging are developed, conventional radiology and ultrasound still play a major role in the initial diagnosis of pediatric malignancies. Both imaging modalities are easy to perform, rapid, and inexpensive, they require no sedation or general anesthesia and deliver no or very little ionizing radiation.

With conventional X-rays, an intrathoracic mass or a bone tumor can be detected, and ultrasound is an excellent method for screening the abdomen, pelvis, neck, superficial soft tissues, and even the brain in young infants.

Once the diagnosis of a malignancy is confirmed, additional imaging studies (CT, MRI, or scintigraphic studies) will be performed for staging. All types of pediatric cancer are treated according to international trials with strict guidelines.

In the last decade, radiologists have been increasingly involved in the creation of these protocols warranting the quality of the imaging workup. The role of imaging is essential during the whole course of the disease as it will be used for monitoring chemotherapeutic treatment, detecting complications, surgery planning, and for follow-up after achieving remission.

Sonography is an extremely important diagnostic tool for the assessment of cancer in children, offering several advantages over other imaging modalities, chief of which is its truly noninvasive nature. In view of the available comparative studies and the risk/benefit and cost/benefit ratios of the imaging procedures available, ultrasound is attractive for use as the initial study of many pediatric mass lesions.

There are several specific infantil and pediatric tumour which are easily diagnosed with ultrasound as Wilms tumor, Neuroblastoma, Haepatoblastoma. Some infantil brain tumours also could diagnosed with transfontanellar examination as Meningeoma, Plexus papilloma, Astrocytoma with brain scanning suspected in case of mild clinical symptoms US is extremely useful for image guided biopsy / and local therapy and follow up the onco-haematological treatment.
THE VALUE OF CEUS IN CROHN’S DISEASE

Autors:
Odd Helge Gilja

Affiliation:
National Centre for Ultrasound in Gastroenterology
Haukeland University Hospital, Bergen, and
Department of Clinical Medicine, University of Bergen, Norway

Abstract:
The GI wall is most often visualized as a layered structure normally consisting of 3-9 layers, depend- ing on the frequency applied, but usually 5 layers are observed. When examining the intestines, it is preferable to use frequencies above 7.5 MHz to enable optimal visualisation of wall layers, thickened bowel walls and target lesions.

Disease activity in Crohn’s disease using bowel wall thickness and Doppler measurements as a marker of inflammation can also be obtained by ultrasound. By adding CEUS, enhancement in different wall layers can be evaluated and quantified in Crohn’s disease and this correlates to clinical activity index (CDAI) with good sensitivity and specificity. Quantitative measurements of bowel enhancement obtained by CEUS also correlate with severity grade determined at endoscopy.

In patients with a stricture of the bowel and resultant bowel obstruction, it is important to determine if there is active inflammation at the site of stricture or if the obstructed segment is fibrotic. Preliminary studies indicate that CEUS appears to be useful in the recognition of a fibrous stenosis in patients with Crohn’s disease. Using CEUS, the active inflammatory components will enhance whereas the fibrotic stricture will enhance less.

To separate abscesses from inflammatory infiltrates is an important clinical task in the management of Crohn’s disease. If the tissue close to an affected bowel loop is completely devoid of microbubble signals, most likely this lesion represents avascular abscesses rather than inflammatory infiltrates. In the upcoming update of EFSUMB guidelines on CEUS, new indications are monitoring of treatment response and follow-up of transplanted patients.

CEUS is a useful clinical tool in the management of patients with Crohn’s disease, particularly to evaluate disease activity and to look for complications.
The ultrasound examination is the basic examination in patients with suspected thyroid disease. There are many different ultrasound classifications of the thyroid lesions. The most popular in Europe is the EU-TIRADS. It divides the thyroid nodules into five groups – from benign to high-risk. The EU-TIRADS 1 classified the ultrasound thyroid feature without any lesions.

The most frequently detected lesions in the thyroid are the colloid cysts – the EU-TIRADS 2. They are benign anechogenic nodules with smooth margins and have very characteristic sonographic feature with comet tail sign. The risk of malignancy in such kind of lesions is close to zero and they do not require the fine-needle aspiration.

The second group of lesions are the low-risk nodules - the EU-TIRADS 3 – izoechogenic, oval shaped with smooth margins, most of them with the thin halo sign. They have a low risk of malignancy and the FNA should be considered only for nodules >20 mm.

The Intermediate-risk category – the EU-TIRADS 4 - are oval-shaped, mildly hypoechogenic lesions with smooth margins. Nodules >15 mm need cytologic evaluation.

The EU-TIRADS mention also the ultrasonographic features which suggest increased malignancy risk f.e.g. abnormal lymph nodes, invasion of surrounding tissues, microcalcifications, solid hypoechogenic nodules, irregular shape and margins. Diagnosing any of them greatly increases the risk of cancer and is an indication for scheduling FNA. These are high-risk nodules - the EU-TIRADS 5. It should be emphasized that the number of accidentally detected thyroid lesions is constantly rising therefore the appropriate selection of the thyroid nodules for the FNA is very important. It should be underlined that the FNA performed under the control of ultrasound image is safe. Thanks to ultrasound we can monitor the thyroid lesions.
Thyroid nodules are frequent and demonstrated more than half of the general population. Given the relatively low prevalence of malignancy (5-15%), characterization of their pathologic nature constitutes a major clinical problem, as well as an important issue of health economics. They exhibit a wide range of different and more recently shown sonoelastographic and contrast-enhanced US characteristics, in addition to well-studied gray-scale and Doppler sonographic features. Although up to now, no single sonographic feature has been shown to be solely successful in this regard, some of them have been widely agreed upon and accepted as strong predictors of malignant nature in a thyroid nodule. These features are irregular margins, a “taller-than-wider” shape, (profound) hypoechogeticity, solidity in composition, presence of internal microcalcifications. In the last 10 years, many scoring and/or risk stratification systems based on collective use of these characteristics have been produced for diagnostic and therapeutic approach to thyroid nodules, while considerably increasing accuracy in characterization. Currently being successfully validated in different retrospective or prospective studies, these systems appear to be contributing to the standardization of the sonographic evaluation processes and examination reports in patients with thyroid nodules.
WORKSHOP 1:
THYROID ULTRASONOGRAPHY AT THE FAMILY DOCTOR PRACTICE - “THYRO”

Autors:
Mihai IACOB, Mateusz KOSIAK, Prof. Adrian SAFTOIU, Dana STOIAN, Remus GEORGESCU.

Affiliation:
1. Dr. Mihai Iacob, MD, dr.iacob@yahoo.com, Department of Research in Primary Care, Ultrasound Working Group / EUVEKUS / AEDUS, Vienna / Timisoara, Austria/Romania.
2. Dr. Mateusz Kosiak, MD, PhD, mateuszkosiak@poczta.fm, Medical Centre in Puck, Poland.
3. Professor Adrian Saftoiu, MD, PhD, MSc, FASGE, (RO), Visiting Clinical Professor Gastrointestinal Unit, Copenhagen University Hospital Herlev, Denmark. Professor of Diagnostic and Therapeutic Techniques in Gastroenterology to the University of Medicine and Pharmacy Craiova, President Elect of EFSUMB, ROMANIA.
4. Assoc. Prof. Dana Stoian MD, PhD, CCD, FECSM, stoian.dana@umft.ro, Senior endocrine consultant, Department of Endocrinology „Victor Babes” University of Medicine and Pharmacy, Timisoara, Romania.
5. Dr. Remus Georgescu, MD, FP, Medical coordinator of „Ärztezentrum Wolfsburg-Heiligendorf”, EUVEKUS member, Germany, Ultrasound Working Group for Family Medicine (UWG).

Abstract:
Background: This project has three main stages. The first step was the development of a computerized diagnostic algorithm, titled “Smart-Thyroid-Ultrasound-Software”, used to stratify the risk in thyroid pathology, based on conventional ultrasound, Doppler, and Elastography. It set the optimum time for thyroid puncture (FNAB) and cytological examination for early diagnosis of malignant lesions. We have used the latest international classifications, as well as a “scoring” made by us, correlated with the cytological or histopathological results as a “Gold-Standard-Method”. The second stage included a targeted thyroid screening in a population with high-risk, conducted in a single medical clinic, statistically significant. At the third stage, we are launching an Interdisciplinary-Multicentric-US-Screening, titled Thyroscreen.

Method: We report a thyroid screening performed on 4386 apparently healthy adults with oncological risk factors+, aged over 20 years, followed for three years. We used the TIRADS classification by Russ-modified and Strain Elastography, with both the elastographic-scores by Rago and semiquantitative-Strain-Ratio(SR), for standardization and to establish if fine-needle-aspiration-biopsy(FNAB) should be performed. We designed an Ultrasound-Scoring-System(USS) for predicting malignancy and a diagnostic algorithm software. All patients were stored and counted into our electronic-database. Finally, we compared our ultrasound scores with the histological results. We have found a tenfold increase both diffuse thyroid pathology and of malignant thyroid focal lesions.

Results: 861 patients with thyroid diffuse disease and 696 with benign and malignant thyroid nodules were found. Prevalence of thyroid pathology was: 38.99%(95%CI: 37.54%to40.45%)with screening sensitivity: 96.49% and specificity: 96.52 % and a high accuracy of 96.51%,PPV:94.66%,NPV:97.73 %, statistically significant,p<0.01. The ROC-analysis of our US-methods confirmed a higher level of diagnostic accuracy of Strain-Elastography,p<0.001,AUC=0.995,95%CI:0.97to1. In the ANOVA-analysis the most significant statistical methods used was USS,p<0.001.

Conclusions: Performing Doppler-US-Screening together with Strain-Elastography, had the best accuracy in analysis of the vascular network and absence of elasticity, for differentiating “benign versus malignant” of the thyroid tumors and for diagnosis of the diffuse thyroid diseases.
TI-RADS

Authors:
Dana Stoian$^{1,2}$

Affiliation:
$^1$ Department of Endocrinology, Victor Babes university of Medicine and Pharmacy, Timisoara, Romania
$^2$ Emergency County Hospital, Timisoara, Romania

Abstract:

Premises: Thyroid elastography is a newer technique used more frequently in the last decade, when dealing with thyroid diagnostic.

Objective: Does thyroid elastography add value in the diagnostic of thyroid disease? Are there situations in which elastography is limited as use or contraindicated? Is strain better than other elastographic technique?

Presentation: The current evaluation is reviewing the place of elastography in the diagnostic algorithm of thyroid diseases. Also there is a differential presentation of ultrasound machines with different ultrasound software versions for interpreting elastography, which can influence the quality of the method. Also a comparison of strain versus shear wave elastography is presented with advantages, flows, false positive and false negative results, respectively limitations, for each strain versus shear wave.

Conclusion: Integrating elastographic information in the diagnostic evaluation of thyroid lesions can be useful for the everyday practitioner.
Type 1 diabetes accounts for over 90-95% of diabetes diagnosis in patients under 18 years of age in majority of developed countries. Clinical manifestation of newly diagnosed type 1 diabetes may vary from mild symptoms to very severe life threatening state requiring intensive therapy. Increased prevalence of type 1 diabetes, particularly in a group of young children, also results in escalation of acute complications among these patients. This is mainly due to delayed diagnosis of diabetes. Diabetic ketoacidosis (DKA) appears to be the most common complication in children with newly diagnosed diabetes type 1. Moreover, it is one of the most serious and life threatening condition in diabetes care.

During the treatment, in children with DKA many clinical parameters and laboratory tests need to be monitored. So far, there are no clinical guidelines for using ultrasound examination in DKA management in children with type 1 diabetes. Despite this, some studies show that the ultrasound examination, in many aspects, may supplement the information obtained about a patient with a physical examination and laboratory tests, especially in evaluating the state of hydration and risk of cerebral edema. That is why ultrasonography can help to prevent the acute complications of DKA.
ULTRASONOGRAPHY OF PARATHYROID LESIONS

Authors:
Süha Süreyya Özbek

Affiliation:
Ege University Faculty of Medicine, Department of Radiology, Izmir, Turkey

Abstract:
The most frequent disease of parathyroid gland is hyperparathyroidism. In most of the cases, the causative factor is a benign overgrowth and excessive secretory activity of a single parathyroid adenoma. Occasionally, it derives from more than one adenoma, hyperplastic parathyroid glands or very rarely a malign parathyroid carcinoma. Surgical resection of the causative factor is the classical treatment of benign primary hyperthyroidism. In recent years, minimal invasive parathyroidectomy has gained popularity owing to lower rates of morbidity, shorter duration of hospital stay and modest cost. This technique requires precise location of the causative lesion and reliable exclusion of other possible etiologic factors. Among other imaging modalities, ultrasonography has been accepted as one of the first-line techniques used for this purpose. Although normal parathyroid glands are not sonovisible in most cases, they assume a typical sonographic appearance, when an adenomateous, hyperplastic or carcinomatous process occurs. Small, but homogenously hypoechoic, hypervascular solid masses can easily be located in the close vicinity of thyroid gland in many of the patients with primary hyperparathyroidism. However, ectopic glandular location and/or atypical sonographic features may result in disappointment in the search of parathyroid lesions. Thick and/or short-necked patients, large size of thyroid gland or regional lymph nodes may further hamper sonographic efforts. To increase the success rate of visualization, precise knowledge of possible ectopic locations and atypical appearances is mandatory, in addition to application of an optimal sonographic technique. Use of Doppler ultrasonography is especially helpful in the detection and differential diagnosis of these highly vascularized lesions. Although research is ongoing about the possible use of sonoelastography and contrast-enhanced ultrasonography, optimal use of gray-scale and Doppler techniques seems to be remain as an effective diagnostic tool for parathyroid lesions in near future.
Thrombectomy preceded by thrombolysis is the standard of care in ischemic stroke (IS) from cerebral large artery occlusion (LAO) with known time of onset up to 6 hours (with some exceptions). Ultrasound examinations in hyperacute IS from LAO can help in decision making regarding thrombectomy. In our hospital all patients with hyperacute ischemic stroke from LAO with known time of onset undergo CT and CT angiography (CTA) in emergency room. Thrombolysis if possible starts immediately after CT. Ultrasound examination (fast track carotid/vertebral duplex and/or transcranial Doppler [TCD]) starts during thrombolysis and does not delay causative treatment.

In our experience from 150 patients there were about 30% doubtful cases in which TCD or/and carotid/vertebral duplex were crucial in decision making to follow or not to thrombectomy. The problems consisted of: lack of adequate large artery contrast filling on CT angio due to severe cardiomyopathy, aneurysm-like occlusions of the M2MCA branches, no idea if one M2 branch MCA is occluded when no information how many M2 are present, differentiation old from recent symptomatic internal carotid artery occlusion, finding fresh thrombus in proximal ICA in tandem (ICA/MCA) occlusions, diagnosis of symptomatic carotid dissections going from aortic arch, MCA reocclusion despite successful thrombolysis and MCA M1 recanalization during thrombolysis alone. In all the doubtful cases ultrasound were crucial to guide adequate management (proceed to or withheld thrombectomy). Additionally in post thrombectomy ultrasound we found hyperperfusion syndrome in 19 patients, in 5 of them looking like a haemorrhagic transformation on follow-up CT, disappearing on next day CT and allowing starting earlier with suitable treatment.

Neurosonological examination is helpful in doubtful patient with AIS from LAO considered to thrombectomy in appropriate decision making and in follow up of the treatment.
ULTRASOUND DIAGNOSIS OF CHILDHOOD PANCREATITIS

Authors:

Rasa Augustinienė 1, Andrius Čekuolis 1, Jan M.L. Bosmans 2

Affiliation:

1 Vilnius Children’s Hospital, Affiliate to Vilnius University Hospital Santariskiu Clinics, Vilnius, Lithuania
2 Ghent University Hospital, Ghent, Flanders, Belgium

Abstract:

PURPOSE
To present the evaluation criteria of childhood pancreatitis and share our experience in the diagnosis and treatment.

BENEFITS
Ultrasound (US) is a fast, non-invasive, painless, widely available diagnostic tool. It does not require sedation and can be repeated as much as needed, which makes it especially suitable for children with the suspicion of pancreatitis.

METHODS
Review of the literature, followed by an overview of our own experience. We performed a retrospective study of the data of the last ten years from all children treated at our hospital for acute or chronic pancreatitis. The clinical data and, if available, the US findings were documented.

RESULTS
In the course of 10 years, we had about 20 new cases of acute and 1 case of chronic pancreatitis per year. The diagnosis was made on the basis of clinical, laboratory, US or other imaging modalities’ findings. US was diagnostic in nearly 100% of cases. The diagnosis of acute pancreatitis depends on clinical findings and laboratory tests. Ultrasound can contribute to the correct diagnosis and differential diagnosis of childhood pancreatitis.

CONCLUSIONS
> Pancreatitis (acute and chronic) is a clinical diagnosis, made by the physician on the basis of clinical examination and laboratory tests.
> US alone is usually not sufficient to diagnose pancreatic pathology.
> Only in the case of pancreatic edema, peripancreatic fluid, ductal changes, it is possible to diagnose pancreatic pathology reliably.
> US however is suitable for the assessment of the evolution of the disease, and for follow-up.
Prostate cancer is a major health care disease as it is the most common diagnosed malignancy in men (besides skin cancer) and the second cause of cancer death in men. Prostate cancer is difficult to detect despite the improvement of biological tests (PSA - prostate-specific antigen dosage), the development of new imaging techniques, and the use of invasive procedures such as biopsy.

Ultrasound elastography is a recent imaging technique capable of mapping tissue stiffness of the prostate. It is known that prostatic cancer tissue is often harder than healthy tissue due to increased cellular density and micro vascularization, as well as changes in glandular architecture (including stromal reaction).

The author will review the available US elastography techniques, strain elastography and the Acoustic Radiation Force Impulse, insisting on real-time shear wave elastography.

Tissue stiffness is an additional information that improves the detection of prostate cancer and provide guidance for biopsy. For each technique, procedure, reproducibility, results and limitations will be analyzed. Recommendations will be given according to the level of evidence of the published literature.
ULTRASOUND IN ACUTE APPENDICITIS AND DIVERTICULITIS

Authors:
Christoph F Dietrich

Affiliation:
Prof. Dr. med. Christoph F. Dietrich, MBA, Caritas Krankenhaus Bad Mergentheim, Germany, 97980 Bad Mergentheim

Abstract:
Acute abdomen is a condition that demands urgent diagnostic evaluation and treatment. Today, gastrointestinal ultrasound (GIUS) is widely used to determine the cause of acute abdominal pain, so that targeted surgical intervention is possible in most cases and unnecessary surgery can be avoided. Intestinal emergency diseases account for more than one third of patients who present with acute abdominal pain. GIUS is frequently used as the initial imaging tool for diagnostic evaluation of these patients with suspected appendicitis and diverticulitis. The presentation will discuss the current use of GIUS for the diagnosis of appendicitis and diverticulitis.

NORMAL PENIS US.
High Resolution Color Doppler Ultrasound (CD US) of the penis is able to show the different structures of the penis anatomy.

PEYRONIE´S DISEASE
A.- CLASSIC CONCEPT
A fibrous plaque is responsible for curvature and retraction of the penis in Peyronie´s disease (PD).

B.- NEW FINDINGS
In cases of nonpalpable plaque, penis US can show septal fibrosis, intracavernosal fibrosis, or sub-tunical calcifications (Smith ET AL. J Sex Med 2009;6:2858–2867)

C.- MODERN CONCEPT
There are different types of lesions in PD´cases (Smith ET AL. J Sex Med 2009;6:2858–2867)

D.- ADVANCED CONCEPT
We have reviewed more than 300 cases of PD, studied with B Mode and CD US, from 2007 till today.
The protocol followed was at 2018:
1. Oriented clinical history including penis photos in erected state. Physical exam of the penis, including careful palpation and description of the findings.
2. B Mode and CD US exam of the penis in short and long axis views along its shaft in the flacid state [Basal Exam].
3. In the presence of Erectile Dysfunction (ED) we recommend the posterior exam under stimulation with intracavernous prostaglandin injection.

WHAT HAVE WE FOUND?
1. Thickening and loss of the homogeneous echogenic pattern of the albuginea. Mostly heteroechoic, but also hyperechoic and few times hypoechoic.
2. Disappearance of the albuginea-erectile tissue interphase [Disappearance of the Normal Interphase Between Albuginea and Erectile Tissue in Peronie’s Disease. Cerezo ET AL. AIUM CONGRESS, NEW YORK, 2018]
3. Alterations in the intercavernosal septum.
5. Calcifications.
6. Changes in US of erectile spongiosum tissue and urethra.
7. Encasement of Buck´s fascia by the thickening of the albuginea.
10. Elastographic changes.
11. Ultrasound post-surgical changes.

CONCLUSION
B Mode and CD US of the penis are mandatory exams in PD, in order to know the lesions present and what treatments better fit the lesions. Also to follow up the evolution.
ULTRASOUND OF CAROTID ARTERIES – EASY OR DIFFICULT?

Authors: Anna Drelich-Zbroja, Maryla Kuczyńska, Łukasz Światłowski, Ewa Kuklik

Affiliation: Department of Interventional Radiology and Neuroradiology, Medical University of Lublin

Abstract:
This work aims to depict the ultrasonographic anatomy of the common carotid artery, its bifurcation and extracranial portions of both the internal and external carotid arteries. Examination technique is discussed, with special emphasis on transducer location, image optimization in B-mode and Doppler presentations, i.e. color-coded and spectral imaging. Normal morphologic and hemodynamic recordings are presented along with the most frequent diagnostic traps and errors.
ULTRASOUND OF GASTROINTESTINAL DUPLICATION CYSTS (GIDC) IN CHILDREN

Authors:
Andrius Cekuolis

Affiliation:
Section of Ultrasound, Department of Radiology
Children’s Hospital (CH), Affiliate to Vilnius University Hospital Santaros Clinics

Abstract:
PURPOSE
To share our experience of ultrasound (US) in diagnosing GIDC: a rare congenital dysplasia of gastrointestinal tract, to show the benefits and pitfalls of US.

METHODS
Retrospective literature review and our clinical experience in management of GIDC, histology of removed cysts.

RESULTS
The clinical symptoms of GIDC are nonspecific: abdominal pain, nausea, vomiting, obstruction of GI bypass. They can be asymptomatic and present as incidentalomas on the US exam. There are no patognomic symptoms.

In CH in 2010-2018 17 new cases of suspected GIDC were treated (all underwent operation). US was performed in 16 – 12 were diagnostic. The main US features of GIDC are the layered wall and association with GI wall.

1 patient underwent surgery without preoperative US fo emergency reasons. In 1 case pancreatic ectopic cyst in omentum and in 1 case Meckel’s diverticulum were diagnosed at operation and histologically. In 2 cases GIDC were not discovered by US, but other problems as ileus diagnosed.

CONCLUSIONS
Ultrasound is an effective tool for diagnostics of GIDC, especially in children, contributing most to the correct diagnosis. Other imaging modalities are less important, but in selected cases can contribute to more precise topical evaluation.
Inflammation is the key process in the development and activity of the disease in rheumatoid arthritis (RA). Its detection and monitoring are therefore of utmost importance for decision-making in the management of patients with RA.

Clinical examination remains the principal method of assessment in patients with RA. Modern imaging methods such as magnetic resonance imaging (MRI) and ultrasound (US) offer new possibilities of insight into the inflammatory process visualizing it directly.

The presentation gives a short overview of the available and employed US scoring systems for grey-scale and Doppler inflammatory changes in RA in and outside the joints, focusing on the synovial changes presenting their validation, efficacy in follow-up and prognostication of the disease severity grade.

Some future research areas are outlined.
URINARY TRACT DILATION CLASSIFICATION OF PEDIATRIC URINARY SYSTEM

Autors:
Süha Süreyya Özbek

Affiliation:
Ege University Faculty of Medicine, Department of Radiology, Izmir, Turkey

Abstract:
Urinary tract dilation (UTD) is common in fetal and pediatric ages. Although it regresses in most of the cases, it may persist or progress. Especially moderate or severe forms of UTD may be associated with “congenital anomalies of the kidney and the urinary tract”, known as the most frequent cause of chronic kidney disease in children. Ultrasonography (US) is the first-line imaging modality used in the evaluation of UTD, both in prenatal and postnatal life. It has inherent advantages especially in pediatric patients, but also some limitations. Due to chronicity of the pathology and strong need for reliable follow-up of these cases, subjective and objective classification / grading systems have been proposed, and are being widely used in clinical practice. However, lack of a single standardized system of evaluation, interpretation and reporting prompted many of the related medical societies from different disciplines to come together and develop a new and common UTD classification system in the light of recent research. Accordingly, UTD cases in fetal and postnatal life have been stratified into different risk categories, each with different and appropriate recommendations for management. Efforts were focused to correlate these categories with possible clinical outcomes, especially those related to serious uropathies. Differing from previous ones, the new system incorporates many important US features in a unified system, including anteroposterior renal pelvis diameter, renal parenchymal characteristics, the status of ureter and urinary bladder. The studies of validation are under way, and confirmation of its success in UTD management may have great impact in the appropriate approach to that frequent pathology of pediatric age.
US GUIDED INSERTION OF UMBILICAL CATHETERS

Authors:
Alina Sobczak, MD, Piotr Kruczek MD, PhD

Affiliation:
University Children’s Hospital of Krakow, Prokocim;
Department of Pediatrics, Jagiellonian University Medical College, Poland

Abstract:
Neonatology offers a unique vascular central access due to the patent umbilical vessels present after birth. A catheter inserted into the umbilical vein (UVC) passes the liver through the left branch of a portal vein and ductus venosus to the right atrium of the heart. A catheter from the umbilical artery (UAC) passes to the internal iliac artery, the common iliac artery and ascends in the aorta in the upstream direction. This catheterization can be a quick and painless procedure performed already in the delivery room, if the child will be in need of intensive care.

Ultrasonography offers the possibility of precise insertion and daily bedside monitoring of the umbilical catheters, which is extremely important regarding the critical surrounding structures (heart, arteries of main organs, liver) and a possible life-threatening situation in case of a thrombi formation or catheter dislocation.
Obtaining a central vascular access is a basic procedure in the intensive care. The presence of a catheter in a central vein allows administration of hyperosmolar parenteral nutrition, long-term hydration and close to the heart intake of resuscitation drugs. A catheter in a central artery permits painless blood sampling and continuous blood pressure monitoring.

Regarding the fact that umbilical vessels differ anatomically and functionally from other central vessels, they generate potentially life-threatening complications seen nowhere else. According to the literature data, 90% of thrombotic events in a neonatal population are related with the presence of an intravascular catheter. Among all pediatric patients, neonates are most prone to develop thrombosis, which in their case can be a life-threatening situation. The presence of patent fetal circulation (patent ductus arteriosus, patent foramen ovale) generates the risk of paradoxical embolism; thrombi dissolvent is impaired due to the immature fibrinolysis. Additionally, small-diameter vessels, immature hemostasis, inability to surgically remove the thrombus nor give pharmacological treatment (risk of IVH) contribute to the lack of therapeutic management when complications occur. Our preliminary data have shown that the thrombi can form already on the day 2. of catheterization, while the international guidelines allow keeping the UAC up to 5 days and UVC up to 14 days of use. Moreover, a regular bedside monitoring of the catheter along with the clinical status in our opinion can allow a safe presence of a catheter for a longer period of time – which is essential for extremely small patients, oedematous patients or other situations when obtaining a vascular access is problematic.

Furthermore, complications of other central catheters will be presented – their bedside detection due to routinely performed ultrasonography allowed a quick clinical intervention resulting in better patients care.
USEFULNESS OF HIGH-FREQUENCY ULTRASONOGRAPHY IN INFLAMMATORY SKIN DISEASES.

Authors: Adriana Polańska 1, Aleksandra Dańczak-Pazdrowska 2

Affiliation:  
1 Department of Dermatology and Venereology, Poznan University of Medical Sciences, Poland  
2 Department of Dermatology, Poznan University of Medical Sciences, Poland

Abstract:  
Besides well-known use of high frequency ultrasonography (HF-USG) in oncological dermatology, the skin USG can be also applied in inflammatory skin diseases as an objective method of evaluation and useful tool to monitor patient response to treatment. The most widely used USG parameter to determine the inflammatory process is so-called SLEB (Subepidermal Low Echogenic Band), which was originally detected in photodamaged skin. In atopic dermatitis or in psoriasis SLEB of varied thickness and decreased echogenicity of the other layers of the dermis may be observed. The thickness of SLEB corresponds to the severity of skin lesions and can be used as an objective parameter in monitoring the course of disease. In skin diseases with increase collagen deposition, like in morphea, HF-USG shows thickening of the skin with increased skin echogenicity. The diagnostic properties of HF-USG maybe useful in circumscribed palmar hypokeratosis. Within affected region of the palm there is lack of double entrance echo, which is observed in healthy skin. Additionally, the measurement of skin thickness can be used to determine the side effects of steroids.
USEFULNESS OF THYROID ULTRASOUND IN THE DIAGNOSTICS OF DIFFERENT TYPES OF THYROIDITIS

Authors:
Ewelina Szczepanek-Parulska

Affiliation:
Department of Endocrinology, Metabolism and Internal Medicine,
Poznan University of Medical Sciences

Abstract:
Besides well-known use of high frequency ultrasonography (HF-USG) in oncological dermatology, the skin USG can be also applied in inflammatory skin diseases as an objective method of evaluation and useful tool to monitor patient response to treatment. The most widely used USG parameter to determine the inflammatory process is so-called SLEB (Subepidermal Low Echogenic Band), which was originally detected in photodamaged skin. In atopic dermatitis or in psoriasis SLEB of varied thickness and decreased echogenicity of the other layers of the dermis may be observed. The thickness of SLEB corresponds to the severity of skin lesions and can be used as an objective parameter in monitoring the course of disease. In skin diseases with increase collagen deposition, like in morphea, HF-USG shows thickening of the skin with increased skin echogenicity. The diagnostic properties of HF-USG maybe useful in circumscribed palmar hypokeratosis. Within affected region of the palm there is lack of double entrance echo, which is observed in healthy skin. Additionally, the measurement of skin thickness can be used to determine the side effects of steroids.
Gastrointestinal ultrasound (GIUS) has become in the last decades an important role as first diagnostic tool for assessing patients with suspected inflammatory bowel disease (IBD) and for the management and follow up of patients with well known Crohn’s disease or ulcerative colitis. Despite the advantages of GIUS are well recognized, also by international guidelines, its use in real life has still some limitations. The main one is the lack of clear standardization of the sonographic feature of several IBD findings, and therefore general disagreement in the definition of some luminal and extra-intestinal features of the disease. This may have a great impact on training and in spreading its use, in particular among those physicians and specialists who look GIUS with skepticism due to its infamous operator-dependence.

For this reason an international team of experts in GIUS, under the umbrella of the European Federation of Societies for Ultrasound in Medicine and Biology, developed GIUS recommendations for assessing IBD, recently published as “EFSUMB Recommendations and Guidelines for Gastrointestinal ultrasound in IBD” in Ultraschall in der Medizin/ European Journal of Ultrasound.

Starting from the analysis of the literature, which has been assessed according level of scientific evidence, and taking into account the each own great experience in intestinal ultrasound, the members of the task force group developed 34 recommendations with correspondent level of evidence, showing for the first time the sonographic criteria for defining and assessing Crohn’s disease and ulcerative colitis and summarises the accuracy of different sonographic modalities for the management of IBD patients.

In particular, luminal and parietal features of IBD, such as bowel wall thickening, echopattern and vascularity, as well as their significance have been discussed. Likewise, the extraintestinal features such as lymphnodes, mesenteric fat hypertrophy and free fluid, and luminal complications of Crohn’s disease and ulcerative colitis have been described.
USG MONITORING IN RSV INFECTIONS – CASE SERIES

Autors:

Agnieszka Ochoda-Mazur¹, Joanna Hurkała², Joanna Pietras³

Affiliation:

¹ Oddział Kliniki Neonatologii, Szpital Uniwersytecki w Krakowie, ul. Kopernika 23, 31-501 Kraków
³ Oddział Neonatologiczny, Specjalistyczny Szpital im. J. Śniadeckiego w Nowym Sączu, ul. Młyńska 10, 33-300 Nowy Sącz

Abstract:

1. Introduction: Ultrasound seems to be more useful tool than X-ray in examining newborns’ lung RSV infection. There are only few researches on this field in this age group. This is the presentation of four different cases of RSV infection which were suspected on the base of ultrasound symptoms and monitored by USG.

2. Material and methods: Four preterm infants with pulmonary exacerbation in the course of RSV infection, who were hospitalized in the University Hospital in Krakow in 2013 and had ultrasound examination performed during the illness. Main symptoms were collected, described and compared to references and standard X-ray picture. Authors grouped characteristic signs in prodromal, developed and recovering phase of the RSV pneumonia.

3. Summary and conclusions: ultrasound should be performed in every exacerbation of the breathing condition on the preterm newborn as it can improve the diagnosis, especially in RSV infection. Triangle-like consolidations, pulmonary interstitial syndrome and pleural line thickening seem to be the typical findings in the prodromal phase of RSV pneumonia in preterm infants.
**VECTOR FLOW IMAGING – A NEW APPLICATION IN MEDICAL ULTRASOUND**

_Autors:_

_Kristoffer Lindskov Hansen_

_Affiliation:*

_Dept. of Diagnostic Radiology, University Hospital of Copenhagen, Denmark_

_Abstract:_

Blood flow can be assessed with Doppler ultrasound, but conventional Doppler method is limited by angle dependency. Vector Flow Imaging (VFI) is an angle independent ultrasound method for flow assessment. VFI has been validated several vessel geometries, and applied in blood flow assessment for different types of patients.

The lecture will explain advantages and limitations of VFI, summarize previous results obtained with VFI, and give an overview of possible future applications for this new method.
VERTEBRAL ARTERY HYPOPLASIA: A PREDISPOSING FACTOR FOR POSTERIOR CIRCULATION STROKE?

Authors:
Prof. Dr. med. Fabienne Perren

Affiliation:
University Hospital and Medical Faculty of Geneva, Dept. of Clinical Neurosciences, Switzerland.

Abstract:
Congenital variations of the caliber of the vertebral arteries or asymmetry of these vessels, known as vertebral artery hypoplasia (VAH), can be detected using duplex ultrasound of the cervical arteries and has been observed in up to 10% of normal individuals. There is no general agreement as to the definition of VAH, however, the relative frequency of this vascular variation, should give rise to following question: Is VAH a risk factor for strokes in the posterior cerebral circulation?

We studied 725 patients (443 men, 282 women; ranging from 21 to 96 years) sequentially admitted for a first acute stroke confirmed by CT/MRI imaging, in whom a full ultrasound examination of the extra- and intracranial arteries was performed. Patients with previous stroke or TIAs, other cerebral lesions, occlusion, stenosis, or atheromatosis of the vertebral arteries or those in whom a comprehensive ultrasound examination of the vertebral arteries was not possible were excluded.

Duplex ultrasound examination of the vertebral arteries was performed using a 7.5-MHz linear array transducer for the V1 and V2 segments and a 2-MHz device for the segments V3 and V4. Diameters of the vertebral arteries were determined in the inter-transverse segment V2 (situated between C2 and C6) of the extracranial vertebral artery. VAH in the patients with posterior circulation stroke was confirmed either by MRA, CTA, or DSA. VAH was predominant on the right side (70%) and was diagnosed in 32 (13%) of posterior circulation strokes as opposed to only 22 (4.6%) in patients with strokes in other territories. This difference was highly significant (p<0.001). We found that VAH is significantly more frequent in first-ever strokes in the posterior circulation as opposed to strokes in other vascular territories.

The results of our study and a review of the literature including ultrasound studies about VAH will be here presented.
WFUMB LECTURE - ULTRASOUND OF RARE INTESTINAL DISEASES FROM AROUND THE WORLD

Authors:
Christoph F Dietrich

Affiliation:
Prof. Dr. med. Christoph F. Dietrich, MBA, Caritas Krankenhaus Bad Mergentheim, Germany, 97980 Bad Mergentheim

Abstract:
About WFUMB: In the second half of the twentieth century various National and International Societies and other groups around the world start to organize meetings devoted to Ultrasound in Medicine and Biology. In 1969 The Societas Internationalis pro Diagnostica in Ophtalmologia, SIDUO organized its Third International Symposium in Vienna, and an International Congress on Diagnostic Ultrasound was included in this Symposium. Based upon efforts to expand the cooperation on an international basis it was decided to create a non-profit scientific organization as a Federation of Organizations with interest in Diagnostic Ultrasound. ... For further reading see www.wfumb.org.

Intestinal ultrasound has become an established and valid diagnostic method for inflammatory bowel disease, diverticulitis, appendicitis, bowel obstruction, perforation and intussusception. However, little is known about sonographic findings in other rarer intestinal diseases. Ultrasound may display the transformation of the intestinal wall from a normal to a pathological state both in inflammatory and neoplastic disease. Besides demonstrating the transmural aspect, it also shows the mesenteric reaction as well as complications such as fistula, abscesses, stenosis, or ileus. Furthermore, in some diseases intestinal ultrasound may serve as a diagnostic clue if typical patterns of the bowel wall and impaired peristalsis can be demonstrated. This may lead to an important reduction of invasive and expensive (follow-up) procedures.

WHAT’S NEW IN B MODE AND DOPPLER ULTRASOUND OF THE PROSTATE

Autors:

Waldemar Białek

Affiliation:

Department of General and Transplant Surgery and Nutritional Treatment, Medical University of Lublin, Poland

Department of Urology, St. John of Dukla Center of Oncology of the Lublin Region, Lublin, Poland

Abstract:

So called standard TRUS performed with 6 to 9 MHz microconvex probes provides unsatisfactory resolution and low accuracy in differentiation between neoplastic, post-inflammatory and benign tissue.

There are some capabilities to improve diagnostic accuracy of TRUS. Use of at least 12MHz probes significantly increases image resolution and better identification of irregularities in glandular architecture. Higher frequency enables to reveal abnormalities in smaller lesions. Enormous improvement in terms of resolution provide probes working with at least 15MHz. 29MHz probe gives possibility to have insight into microarchitecture of the gland almost as good as pathology.

Besides frequency, arrangement of crystal units of the probe head plays a great role. Replacement of microconvex probes with linear enables to maintain high resolution of anterior part of the prostate. High sensitivity of contemporary doppler enables to visualise precisely normal prostatic microvasculature, reveal hypervascularized or ischemic lesions. Revealing of sources of blood supply and flow increase within suspicious lesions may help in focal treatment planning in prostate cancer.

High frequency means not only delineation of architecture disturbances and abnormal echogenicity to guide biopsy needle precisely. During biopsy TRU-CUT needle extracts core of prostatic tissue leaving patent tunnel communicating dissimilar

sometimes distant structures (eg. glandular tissue – vessels – periprostatic structures). Glandular tissue defects are easily detected by high frequency imaging. Patent tunnels flushed with blood may be responsible for rising or persistent PSA after biopsy.

Among non oncologic applications imaging with 15MHz enables to follow tiny ejaculatory ducts to reveal the cause and level of possible obstruction in male infertility.
WILL CEUS CHANGE THE DIAGNOSTIC IMAGING IN PEDIATRIC POPULATION?

Authors:
Martin Stenzel

Affiliation:
Paediatric Radiology, Children’s Hospital Amsterdamer Str., City of Cologne, Germany

Abstract:
Radiation free imaging methods are first choice in children, adolescents and young adults. Although MRI seems to be the „one-stop-shopping” solution there are drawbacks – need for sedation/narcotics in infants and toddlers, limited 24-hour availability and high costs. Licensing of diagnostics solves many problems, still lack of comparing studies, lack of experience, and lack of reimbursement are main obstacles.

The author will discuss in detail the current and future situation regarding use of CEUS in the pediatric population.
Invited Speakers` Lectures
(in alphabetical order)
Polish
CIEMNE STRONY CIĘCIA CESARSKIEGO – IMPLANTACJA CIĄŻY W BLIŹNIE

Autorzy:
Piotr Filberek

Afiliacja:
Klinika Perinatologii i Ginekologii
Uniwersytet Medyczny im. K. Marcinkowskiego w Poznaniu

Streszczenie:
Ciąża w bliźnie po cięciu cesarskim (Cesarean Scar Pregnancy, CSP) jest poważnym, jatrogennym powikłaniem polegającym na implantacji pęcherzyka ciążowego w bliźnie na macicy po uprzednio wykonanej operacji tego typu. Patologia ta dotyczy 1 na około 2000 ciąży prawidłowych z cięciem cesarskim w wywiadzie. Cięcie cesarskie w przeszłości jest właściwie jedynym znanym czynnikiem ryzyka CSP. Ultrasonografia z zastosowaniem funkcji Doppler stanowi podstawę diagnostyki, choć dostrzega się także możliwość wykorzystania funkcji 3D. Kryteria rozpoznania CSP obejmują m.in. obecność pustej lub wypełnionej skrzepami krwi jamy macicy bez pęcherzyka ciążowego, pustego kanału szyjki macicy, umiejscowienie pęcherzyka ciążowego na przedniej ścianie cieni macicy i brak lub defekt echa myometrium pomiędzy pęcherzem moczowym a pęcherzykiem ciążowym. Trzeba także wykluczyć patologiczne echa w rzucie przydatków i płyn w zatoce Douglassa, chyba że dojdzie do pęknięcia CSP. Funkcja Dopplera pulsacyjnego pozwala określić typowy wzrost przepływu krwi w krążeniu moczyno-łożyskowym. Wykorzystywana w funkcji 3D kombinacja wielopłaszczyznowych obrazów ułatwia dokładną lokalizację CSP, określenie jej kształtu i unaczynienia. Nierozpoznana odpowiednio wcześnie lub niewłaściwie leczona CSP może prowadzić do poważnych powikłań na każdym etapie ciąży, takich jak pęknięcie macicy, krwotok, a nawet histerektomia. Wciąż brakuje uniwersalnych wytycznych dotyczących postępowania, jednak wczesna diagnoza CSP pozwala wdrożyć leczenie zachowawcze. W związku ze wciąż rosnącym odsetkiem cięć cesarskich w Polsce, CSP stanowi co raz powszechniejsze wyzwanie kliniczne. Praca przedstawia najważniejsze informacje dotyczące ciąży w bliźnie jako rosnącego problemu klinicznego oraz podstawy diagnostyki tej patologii. Omówienie zagadnienia poparto przypadkiem klinicznym z Ginekologiczno-Położniczego Szpitala Klinicznego Uniwersytetu Medycznego w Poznaniu.
Ultrasonografia płuc jest w literaturze medycznej uznanym narzędziem do diagnozy ostrych i przewlekłych chorób płuc. Lecz mimo udowodnionej w wielu pracach, wysokiej skuteczności klinicznej, dorównującej tomografii komputerowej a biorąc pod uwagę dostępność i bezpieczeństwo użycia przewyższającej tomografię komputerową wciąż jest to metoda raczej mało stosowana. Popularne porównanie do ultrasonograficznego stetoskopu jest obecnie o raczej mylące i powinno być zastąpione „kieszonkowym tomografem”.

Nie jest jasne dlaczego USG płuc natrafiło na taki opór za strony klinicystów. Nasuwa się pytanie: czy jest to opór przed nowością czy też lęk przed utratą atrybutu i symbolu współczesnego lekarza – stetoskopu. Stetoskop spełnia wiele ról w trakcie konsultacji pacjenta – jednak najmniej istotną jest rola diagnostyczna. Uwiarygadnia on osobę, która go trzyma jako lekarza, pomaga budować intymną więź lekarz-pacjent, wreszcie pozwala na chwilę zastanowienia w trakcie osłuchiwania.

W oddziale ratunkowym, jak nigdzie indziej liczy się szybkość postawienia prawidłowej diagnozy. Ultrasonografia Point of Care, w tym ultrasonografia płuc ma potencjał zwiększenia pewności zespodu oddziału ratunkowego w podejmowaniu decyzji, poprawia jakość leczenia w SOR i zmniejsza koszty leczenia na wiele sposobów.

Ultrasonografia płuc, stworzona około 20 lat temu przez Daniela Lichtensteina ma w wielu ośrodkach znaczącą rolę w diagnostyce i monitorowaniu chorych ze schorzeniami płuc. Stosując protokół BLUE czyli prosty, zero-jedynkowy protokół diagnostyczny w ostrej duszności można w ciągu 3 min postawić diagnozę. USG płuc jest także stosowane w oddziałach intensywnej terapii ze względu na swoją wysoką skuteczność i dostępność.

Ostatnio coraz szerzej opisuje się metodę łączącą USG płuc ze skróconym badaniem ECHO czyli USG klatki piersiowej (Thorax Ultrasound). Znacznie zwiększa to skuteczność w różnicowaniu niewydolności oddychania zwiększając czułość na kardiologiczne jej przyczyny. I tak, w pewien sposób zataczając parabolę pozwala to wrócić do schematu badania, znanego nam ze szkół medycznych obejmującego jednocześnie ultra-ostuchiwianie płuc i serca.
Gdy serce płodu bije za szybko – prenatalna diagnostyka arytmii

Autors:
Aleksy Nowak

Affiliation:
SKN Perinatologii i Ginekologii
Klinika Perinatologii i Ginekologii
Uniwersytet Medyczny im. K. Marcinkowskiego w Poznaniu

Abstract:
Arytmie u płodu stanowią powikłanie około 2% ciąży, są również przyczyną nawet 20% skierowań do kardiologów prenatalnych. Przyczynami tachyarytmii mogą być zarówno czynniki matczyne, jak np. nadczynność tarczycy, używki oraz choroby układowe związane z obecnością przeciwiał, jak i płodowe - do najczęstszych z nich należą izolowana wada kardiologiczna oraz zakażenie wewnętrzniczne. Tachyarytmie mogą powodować groźne w skutkach powikłania, takie jak nieimmunologiczny obrzęk płodu, mogą być też przyczyną zgona wewnętrzniczego.

Wraz z postępowem technik obrazowania, możliwe stało się prenatalne diagnozowanie arytmii u płodu. Standardowe badanie ultrasonograficzne obrazuje jedynie mechaniczne następstwa zaburzeń rytmu, jednak z wykorzystaniem technik obrazowania Doppler oraz M-Mode możliwe jest określenie rodzaju tachyarytmii. Zrozumienie i właściwa interpretacja otrzymywanych obrazów stanowią podstawę do wdrożenia odpowiedniego postępowania.

Praca przedstawia najważniejsze informacje dotyczące obrazowania serca płodu oraz jego pracy, a także podstawy ich interpretacji. Zawarto również dwa przypadki kliniczne demonstrujące, jak ważna jest szybka diagnoza i wdrożenie odpowiedniego leczenia.
GUZY KOŚCI U DZIECI – OBRAZ ULTRASONOGRAFICZNY

Autors:
Tomasz Madej

Affiliation:
Dr n.med.
Zakład Radiologii Dziecięcej II Wydział Lekarski Uniwersytetu Medycznego w Lublinie

Abstract:
W przypadku występowania zmian ogniskowych struktur kostnych u dzieci rola ultrasonografii nie jest wyraźnie zdefiniowana i jednoznacznie określona. Podstawową metodą rozpoznania i oceny zmian kostnych jest klasyczne zdjęcie radiologiczne. Znaczna ilość badań ultrasonograficznych wykonywanych u dzieci, bardzo często jako pierwsze, a w części przypadkach jedyne, powoduje, że ultrasonografista badający dzieci powinien znać typowe obrazy sonograficzne guzów kostnych, zwłaszcza o złośliwym charakterze, aby wyciąć pacjentów z tymi patologiami i niezwłocznie skierować ich na odpowiednią w tym przypadku diagnostykę oraz leczenie. W pracy przedstawiono obrazy sonograficzne guzów kostnych koncentrując się przede wszystkim na nowotworach złośliwych. Przedstawiono typowe cechy złośliwych guzów kostnych widoczne w obrazie sonograficznym, które powinny zasugerować prawidłowe rozpoznanie. Porównano również typowe obrazy złośliwych guzów kostnych w innych metodach diagnostycznych (RTG, CT i MR) i odpowiadające im obrazy ultrasonograficzne.


W oparciu o uzyskane z badania ultrasonograficznego dane można uznać resurfacing laserowy za skuteczny zabieg w odmładzaniu skóry twarzy.
Abstract:

Ultrasonografia płuc (LUS) jest stosunkowo prostą i łatwo dostępną metodą oceny stanu pacjenta kardiologicznego, zarówno w stanach ostrzych, jak i leczeniu przewlekłym. Najważniejszym artefaktem w tej grupie pacjentów jest artefakt linii B, uwidaczniany przy pomocy dowolnej sondy – zazwyczaj liniowej lub convex. Powstaje on w obecności zwiększonej ilości płynu w tkance śródmiąższowej płuc, a więc w obecności zastoju. Stwierdzenie linii B wyprzedza wystąpienie klinicznych objawów niewydolności serca. Zgodnie z teorią kaskady wodnej, zwiększone ciśnienie kapilarne w płucach w sytuacji dekompensacji krążenia, spowodowane np. wysiłkiem czy nadmierną podażą płynów, prowadzi do zwiększenia ilości płynu pozakomórkowego i narastającego zastoju i obrzęku, co w konsekwencji prowadzi do jawnego klinicznie niewydolności serca. Proces ten może zostać odwrócony za pomocą leków moczopędnych, dializy, hemofiltacji itd. - ustępowanie zastoju przejawia się zmniejszeniem liczby linii B w pojedynczych przestrzeniach międzyżebrowych i w całych płucach. Liczba linii B, także oceniana półilościowo, koreluje ze stężeniem NT-proBNP oraz parametrami niewydolności rozkurczowej serca i jest niezależnym czynnikiem rokowniczym. Wykazano, że brak lub niedostateczna odpowiedź na leczenie, przejawiająca się obecnością linii B przy wypisie u osób hospitalizowanych z powodu zaostrzenia niewydolności serca, wiąże się z gorszym rokowaniem co do 6-miesięcznego przeżycia, zarówno w grupie pacjentów z obniżoną, jak i prawidłową frakcją wyrzutową. Tak więc monitorowanie liczby linii B w określonych, stałych punktach i w całych płucach pozwala wyodrębnić grupę chorych z niewydolnością serca o podwyższonym ryzyku zgony i rehospitalizacji. Ograniczeniem metody jest niska swoistość linii B – pojawiają się one również w schorzeniach płuc przebiegających ze zwiększeniem gęstości tkanki śródmiąższowej płuc, a więc we włóknieniu i w zapaleniu płuc i w przypadku nakładania się tych chorób na niewydolności serca, LUS ma bardzo ograniczone zastosowanie. Połączenie LUS z echokardiografią klasyczną lub wysiłkową czy 6-minutowym testem chodu pozwala zwiększyć swoistość i precyzję oceny pacjenta kardiologicznego, zarówno w stanach nagłych, jak i w monitorowaniu leczenia.
Łożysko wrośnięte to komplikacja ciąży, której istotą jest nieprawidłowa implantacja trofoblastu, powodująca patologiczną penetrację kosmków Łożyska w miejsie macicy. Jest to jeden z rodzajów nieprawidłowego zagnieżdżenia Łożyska, w piśmiennictwie anglojęzycznym określanego terminem morbidly adherent placenta (MAP). MAP to heterogenna patologia, obejmująca, w zależności od stopnia penetracji kosmków, Łożysko przyrośnięte (placenta accreta), Łożysko wrośnięte (placenta increta) oraz Łożysko przerośnięte (placenta percreta).

MAP to nadal stosunkowo rzadka patologia, jednak jej częstość dramatycznie rośnie, według niektórych badań nawet kilkunastokrotnie w ciągu ostatnich kilkudziesięciu lat. Dane epidemiologiczne różnią się znacznie w zależności od kraju i ośrodka, określając częstość od nawet 1:300 do 1:10000 ciąży. Obserwowany wzrost zapadalności jest w sposób jednoznaczny powiązany ze zwiększeniem częstości wykonywania cięć cesarskich, których obecność w wywiadzie (szczególnie licznych) jest, obok obecności Łożyska przodującego, najważniejszym czynnikiem ryzyka.

Podstawową rolę w diagnostyce MAP odgrywa badanie ultrasonograficzne. Dokładna ocena stopnia penetracji kosmków jest trudna i wymaga od ultrasonografisty znacznych umiejętności oraz doświadczenia. Wśród charakterystycznych objawów w badaniu USG należy wymienić zatarcie hipoechogenicznej granicy między Łożyskiem a mięśniem macicy, obecność lakun naczyniowych, hiperwaskularyzację w obrazie ultrasonografii dopplerowskiej czy zatarcie granicy między mięśniem macicy a pęcherzem moczowym. Pomocniczo w diagnostyce znaczenie ma wykonanie badania rezonansu magnetycznego i cystoskopii.

Leczenie pacjentki z MAP stanowi duże wyzwanie dla współczesnego położnictwa; stan ten może skutkować zagrażającym życiu maszynim krwotokiem i koniecznością wykonania okołoporodowej histerektomii, której MAP jest obecnie wiodącym powodem. Z tego powodu konieczna jest intensywna obserwacja pacjentki oraz dokładne zaplanowanie czasu ukończenia ciąży, która w tym wypadku zawsze powinna zostać zakończona cięciem cesarskim. Ze względu na okaleczający charakter histerektomii oraz związane z nią częste komplikacje, poszukuje się alternatyw metod leczenia, takich jak odroczone usunięcie Łożyska po pozostawieniu go w jamie macicy po porodzie. Znaczenie zyskują również metody radiologii zabiegowej, polegające na balonowej okluzji aorty lub tętnic biodrowych wewnętrznych, nie są one jednak stosowane standardowo.
NOWE TECHNIKI OBRAZOWANIA PIERSI

Autors:
Ewa Gorczyca-Wiśniewska

Affiliation:
Centrum Onkologii - Instytut im. Marii Skłodowskiej -Curie - Warszawa
Zakład Profilaktyki Nowotworów - Poradnia Profilaktyki Chorób Piersi

Abstract:
Główne zadania diagnostyki obrazowej w chorobach piersi to:
- wykrycie zmiany
- wstępne rozpoznanie obrazowe (BIRADS)
- GPS przy precyzyjnym pobraniu materiału do badan mikroskopowych
- określenie stopnia zaawansowania klinicznego
- pomoc w wyborze optymalnego leczenia
- ocena odpowiedzi na leczenie
- kontrola po leczeniu

Właśnie minęło 100 lat od wykonania pierwszych zdjęć rentgenowskich piersi (preparatów chirurgicznych po mastektomii). W ciągu tego stulecia nastąpiła rewolucja w radiologii jak również w obrazowaniu chorób piersi. Dziś trudno mówić o diagnostyce raka piersi, ponieważ poza technikami wykorzystującymi promieniowanie rentgenowskie stosuje się inne metody obrazowania (ultrasonografię USG, rezonans magnetyczny MR czy techniki medycyny nuklearnej PET, SPECT). Należy używać raczej terminu: kompleksowa diagnostyka obrazowa piersi, multimodalne obrazowanie piersi, składające się z wiele różnorodnych, wzajemnie uzupełniających się metod tworzenia obrazów medycznych. W wykładzie przedstawiono nowe techniki morfologiczne i funkcjonalne poprawiające czułość i specyficzność diagnostyczną, posługując się biomarkerami obrazowymi, wpływając na personalizację diagnostyki i leczenia w podstawowych metodach obrazowania:
- Mammografii (ucyfrowanie FFDM, tomosyntezę 2D i 3DBT, mammografię spektralną ze wzmocnieniem kontrastowym CEDM, komputerową automatyczną ocenę gęstości piersi, wysokiej rozdzielczości stożkową tomografię komputerową piersi BCT)
- Ultrasonografii (poprawiające jakość obrazów HR, obrazowanie przestrzenne 3D, czułe perfuzyjne techniki dopplerowskie, elastografię SWE)
- Rezonansie Magnetycznym (perfuzję, obrazowanie dyfuzyjne, spektroskopię).

Zwrócono uwagę na szerokie możliwości pozytonowej tomografii emisyjnej (PET/TK, PET/MR) w obrazowaniu raka piersi

WNIOŚKI:
przyszłość multimodalnego obrazowanie chorób piersi to personalizacja diagnostyki uwzględniająca biomarkery obrazowe (jakościowe i ilościowe) pozwalająca na ocenę biologii raka na każdym etapie leczenia choroby poprzez:
- fuzje obrazów morfologicznych i funkcjonalnych
Średni wiek życia kobiety jest obecnie szacowany na 82 lata, co powoduje, że 1/3 jej życia przypada na czas gdzie status hormonalny odpowiada hypoestrogenizmowi i z tym związanymi zaburzeniami w zakresie narządu rodnego jak i ogólnoustrojowymi schorzeniami (np.: cukrzyca, nadciśnienie, otyłość, osteoporoza itd.). Aż u około 95% kobiet menopauza występuje miedzy 44- 56 rż. Hypoestrogenizm- czyli niedobór estrogenów występujący w tym okresie życia kobiety, w zakresie układu moczo-płciowego powoduje zmiany prowadzące do występowania takich dolegliwości jak: bolesność przy współżyciu, świąd i pieczenie w pochwie, parcia na mocz, nietrzymanie moczu, nocne oddawanie moczu, nawracające infekcje dróg moczowych oraz pochwy.

Według aktualnych badań kobiet pomenopauzalnych pomiędzy 50 a 79 rokiem życia, oceniających zaburzenia z zakresu układu moczo-płciowego najczęstszymi zgłaszanymi dolegliwościami były: suchość 27%, podrażnienie/ świąd 18,6%, nieprawidłowa wydzielina 11%, zaburzenia dyzuryczne 5,2%.

Standardowa diagnostyka zmian w obrębie narządu rodnego w okresie około i pomenopauzalnym opiera się na: badaniu ginekologicznym, badaniach biochemicznych, hormonalnych, pobieraniu wyjmów cytologicznych, i ultrasonografii narządu rodnego w badaniu dopochwowym, a w określonych przypadkach klinicznych w badaniu przezbrzusznym czy przezodbytniczym. W badaniu obrazowym narządu rodnego oceniamy anatomicę: szyjki i trzonu macicy, jajników, narządów sąsiadujących, oraz w określonych przypadkach pochwę.

Celem tej pracy była ocena za pomocą ultrasonografii wysokich częstotliwości (HIFU) struktur ścian pochwy i jej budowy, oraz próba oceny ewentualnych zmian w obrazie pochwy u pacjentek z zaburzeniami atroficznymi.
OCENA ZMIAN W OBRĘBIE SKÓRY PO ZABIEGACH ESTETYCZNYCH PRZY ZASTOSOWANIU ULTRASONOGRAFII WYSOKIEJ CZĘSTOTLIWOŚCI

Autors:
Ewa Dybiec

Affiliation:
Centrum Medycyny Estetycznej Medest, Lublin, Polska

Abstract:
Ultrasonografia wysokiej częstotliwości jest coraz powszechniej stosowana w diagnostyce zmian chorobowych skóry oraz monitorowaniu skuteczności ich leczenia. Coraz częściej znajduje również zastosowanie w medycynie estetycznej, głównie w obrazowaniu powikłań pozabiegowych. Jednak zabiegi z zakresu medycyny estetycznej oceniane są najczęściej subiektywnie przez pacjentów i lekarzy pod kątem ich skuteczności w korygowaniu defektów skóry lub poprawy jej kondycji za pomocą urządzeń diagnostycznych oceniających natłuszczenie, nawilżenie, pogmentację oraz elastyczność skóry. Celem pracy była ocena możliwości uwidocznienia zmian zachodzących w obrębie skóry po wykonanych zabiegach estetycznych takich jak iniekcje preparatów medycznych oraz zabiegów z zastosowaniem energii światła i prądu.

Badania ultrasonograficzne skóry wykonane zostały ultrasonografem Ultrasonix przy zastosowaniu głowicy 40 MHz u 48 pacjentów, u których wykonano zabiegi z zakresu medycyny estetycznej. Badania wykonywano przed zabiegiem, bezpośrednio po zabiegu oraz w okresie do 6 miesięcy od zabiegu. Ocene poddano zmiany w echogeniczności skóry po wykonanych zabiegach, możliwość uwidocznienia podanych preparatów oraz zobrazowania miejsca ich aplikacji. Wyniki badań potwierdzają możliwość uwidocznienia w badaniach ultrasonograficznych zmian zachodzących w obrębie skóry po zabiegach z zakresu medycyny estetycznej.
PODSTAWY ULTRASONOGRAFICZNEJ DIAGNOSTYKI PRENATALNEJ

Autors:
Dawid Gawron, Irmina Pawłowska

Affiliation:
SKN Perinatologii i Ginekologii
Klinika Perinatologii i Ginekologii
Uniwersytet Medyczny im. K. Marcinkowskiego w Poznaniu

Abstract:
Zgodnie ze stanowiskiem Polskiego Towarzystwa Ginekologów i Położników, badanie ultrasonograficzne jest „podstawowym narzędziem diagnostycznym w przebiegu ciąży”. Ma ono nieocenione znaczenie, zarówno w ciąży o przebiegu fizjologicznym, jak i powikłanej. Pozwala na rozpoznanie różnego rodzaju zaburzeń w okresie życia prenatalnego, co daje możliwość odpowiedniego zareagowania lekarzom położnikom, a co za tym idzie, przyczynia się do zmniejszenia komplikacji położniczych. Dzięki starannemu nadzorowi ultrasonograficznemu można wcześnie zdiagnozować nieprawidłowości oraz stany zagrażające życiu płodu, wdrożyć terapię wewnętrzniczą czy też zaplanować optymalny czas oraz sposób ukończenia ciąży.

W nawiązaniu do obowiązujących standardów, każda pacjentka w ciąży o przebiegu prawidłowym powinna mieć wykonane badanie ultrasonograficzne co najmniej trzykrotnie. Zależnie od etapu ciąży zmienia się specyfika oraz cel badania. Badanie przed 10. t. c. pozwala na uwidocznienie i lokalizację jaja płodowego, ocenę obecności i liczby zarodków, kosmówek i owodni, ustalenie wieku ciąży oraz ocenę narządów rozrodczych u ciężarnej. Kolejne badanie, które powinno zostać wykonane po-średnio 11+0 a 13+6 t.c. ma na celu szczegółową ocenę struktury jaja płodowego oraz oszacowanie ryzyka wystąpienia najczęstszych aberracji chromosomowych. Pomiędzy 18 a 22 t.c. oraz 28 a 32 t.c. wykonuje się badania mające na celu ocenę rozwoju płodu. Poddaje się w nich szczegółowej ocenie budowę anatomiczną płodu oraz analizuje odpowiednie parametry biometryczne, co pozwala na oszacowanie masy płodu. Uwagi ultrasonografisty wymaga również tożysko - jego lokalizacja i struktura oraz płyn owodniowy, którego nieprawidłowa ilość świadczyć może o licznych nieprawidłowościach.

Pacjentki, u których w przesiewowym badaniu ultrasonograficznym stwierdzono jakiekolwiek nieprawidłowości, wymagają bardziej szczegółowej kontroli. Badania USG wykonywane są u nich odpowiednio częściej, zależnie od potrzeb także w ośrodkach wyższej referencji. Dla wielu stanów patologicznych w okresie ciąży ultrasonografia jest określana jako złoty standard diagnostyczny. Dodatkowe, szerokie możliwości daje również ultrasonografia dopplerowska, prenatalna echokardiografia czy ultrasonografia trójwymiarowa.
POWIKNIA CIĄŻY BLIŹNIACZEJ NA PRZYKŁADZIE ZESPOŁU PRZETOCZENIA KRWI MIĘDZY PŁODAMI

Autors:
Irmina Pawłowska

Affiliation:
SKN Perinatologii i Ginekologii
Klinika Perinatologii i Ginekologii
Uniwersytet Medyczny im. K. Marcinkowskiego w Poznaniu

Abstract:
Ciąża bliźniaczca stwierdzana jest z częstością 1 na 80 wszystkich ciąży. Jest ona ciązą wysokiego ryzyka, a co za tym idzie, pacjentki w ciąży bliźniaczej powinny pozostawać pod szczególnym nadzorem lekarza położnika. Nieocenionym narzędziem diagnostycznym jest ultrasonografia prenatalna, mająca w tym przypadku dużo większe znaczenie niż w ciąży pojedynczej.

Ryzyko w ciąży bliźniaczej zależy przede wszystkim od jej kosmówkowości i owodniowości, dlatego tak istotne jest określenie tych parametrów na jak najwcześniejszym etapie ciąży. Ryzyko powikłań w ciąży dwukosmówkowej jest czterokrotnie większe w stosunku do ciąży pojedynczej, natomiast w ciąży jednokosmówkowej wzrasta aż dziesięć razy. Szereg komplikacji związany jest typowo z obecnością wspólnej kosmówki – wśród nich należy wymienić: zespół przetoczenia między płodami (twin-to-twin transfusion syndrome – TTTS), zespół odwróconej perfuzji naczyń pępowiennych (twin reversed arterial perfusion – TRAP), selektywne wewnątrzmaciczne zahamowanie wzrastania płodu, kolizję pępowinową oraz bliźnięta nierozdzielone. Dzięki rozwojowi ultrasonografii rozpoznania te mogą być postawione już w okresie prenatalnym, co w części przypadków pozwala na wdrożenie terapii wewnątrzmacicznej oraz zaplanowanie ukończenia ciąży w optymalny sposób.

Zespół przetoczenia między płodami jest konsekwencją istnienia anastomoz pomiędzy łożyskami obu płodów. Tego typu połączenia naczyniowe występują w większości ciąży jednokosmówkowych (blisko 90%), natomiast tylko w części przypadków (10-15%) przepływ krwi między płodami staje się zaburzony, prowadząc do powikłań, jakim jest zespół TTTS. Jedno z bliźniąt staje się dawką krwi, która poprzez anastomozy jest przetaczana drugiemu z płodów. U pierwszego płodu negatywne konsekwencje są skutkiem hipowolemii, natomiast u drugiego, zwanego biorcą, powikłania wynikają z nadmiaru krwi krążącej. Przed erą ultrasonografii rozpoznanie to stawiane było po urodzeniu, dziś może być diagnozowane i leczone prenatalnie. Najważniejszym z objawów, upowodniającym do rozpoznania zespołu TTTS, jest sekwencja matowodzie-wielowodzie. Dalsza diagnostyka ultrasonograficzna, oparta przede wszystkim na ocenie przepływów w badaniu dopplerowskim, pozwala na ocenę stopnia zaawansowania i rokowania oraz zaplanowanie postępowania terapeutycznego.
ROLA OZNACZENIA HORMONÓW ORAZ TYREOGLOBULINY W POPŁUCZYNACH Z BACC POD KONTROLĄ USG U PACJENTÓW Z CHOROBAMI TARCZYCY I PRZYTARCZYC

Autors:
Magdalena Stasiak

Affiliation:
Klinika Endokrynologii i Chorób Metabolicznych, Instytut Centrum Zdrowia Matki Polki w Łodzi

Abstract:
Oznaczenie stężenia kalcytoniny, parathormonu (PTH) i tyreoglobuliny (tg) w popłuczynach z igły biopsyjnej dostarcza szybkich i cennych informacji diagnostycznych. Badanie stężenia Tg w popłuczynach z biopsji aspiracyjnej cienkoigłowej celowanej (BACC) jest pomocne w rozpoznaniu przerzutu zróżnicowanego raka tarczycy (DTC) do węzłów chłonnych, jak również w rozpoznaniu wznowy miejscowej DTC. Czułość i swoistość tego badania sięga 95%. Badanie stężenia kalcytoniny w popłuczynach z igły biopsyjnej wspomaga rozpoznanie raka rdzeniastego tarczycy (MTC) i jego przerzutów. Badanie to ma znacznie większą czułość niż sam cytologiczny wynik biopsji. W wytycznych Amerykańskiego Towarzystwa Tarczycowego pokreślono, że w przypadku kiedy wynik BACC jest nieokreślony bądź wskazujący na MTC, powinno się ocenić stężenia kalcytoniny w popłuczynach z igły biopsyjnej. W przypadku podejrzenia obecności gruczolaka przytarczycy w badaniu USG bardzo pomocne jest oznaczanie parathormonu (PTH) w popłuczynach z biopsji. Badanie to ma wyższą dokładność diagnostyczną niż badanie cytologiczne czy scyntygrafia MIBI.

W wykładzie przedstawiono technikę wykonania badania i sugerowane punkty odcięcia dla stężeń Tg, kalcytoniny i PTH, a przede wszystkim zaprezentowano liczne przykłady chorych, u których badanie to było kluczowe w diagnostyce różnicowej.

Oznaczenie stężeń Tg oraz PTH i kalcytoniny w poptuczynach z igły biopsyjnej stanowi proste i szybkie narzędzie diagnostyczne, dzięki któremu trafne rozpoznanie może zostać postawione nawet kilka godzin po wykonaniu BAC. Ponadto, badanie to daje pewną odpowiedź diagnostyczną w sytuacjach, kiedy wynik BAC jest niediagnostyczny lub nieokreślony.
SONOELASTOGRAFIA TARCZYCY – KTÓRĄ TECHNIKĘ WYBRAĆ

Autors:
Bartosz Migda, Robert Krzysztof Mlosek

Affiliation:
Zakład Diagnostyki Obrazowej, II Wydział Lekarski z Oddziałem Nauczania w Języku Angielskim oraz Oddziałem Fizjoterapii, Warszawski Uniwersytet Medyczny

Abstract:
Od lat osiemdziesiątych zauważalny jest gwałtowny wzrost liczby zachorowań na raka tarczycy. Częstość zachorowania wzrasta do około 7 dekady życia osiągając szczyt odpowiednio dla kobiet 60-64 i mężczyzn 65-69 lat, następnie maleje częstość maleje.

Ultrasonografia jako nieinwazyjna, szeroko dostępna, szybko rozwijająca się metoda obrazowa stanowi ważne narzędzie diagnostyczne zmian ogniskowych tarczycy. Pozwala na uwidocznienie zmian ogniskowych w dużym odsetku populacji sięgającym 30-70%.

Do stale rozwijających się technik wykorzystywanych w diagnostyce guzków tarczycy należy sonoeLASTOGRAFIA.

Aktualnie największej badań dotyczy elastografii odształceń względnych umożliwiającej ocenę jakościową i półilościową. Nowe prace dotyczą również elastografii fali poprzecznej (pSW i 2D-SWE) mającej dodatkową możliwość oceny ilościowej.

Do oceny jakościowej w piśmiennictwie stosowano różne skale od 2- do 6-stopniowych, aczkolwiek najczęściej stosowanymi były 4-stopniowa (Asteria) i 5 stopniowa (Tsukuba).

Celem wystąpienia jest przybliżenie tych technik elastografii odształceń względnych oraz fali poprzecznej z omówieniem ich ograniczeń oraz praktycznego zastosowania w oparciu o własne doświadczenie i najnowszą literaturę.
Badanie ultrasonograficzne układu mięśniowo-szkieleotowego u dzieci w wielu miejscach różni się istotnie od takiego samego badania u osoby dorosłej. Różnice wynikają przede wszystkim z odmiennej budowy struktur kostnych, które zawierają elementy nieobecne w szkieletie osób dorosłych, takie jak jądra kostnienia czy płytki wzrostowe. Struktury układu mięśniowo-szkieleotowego mogą reagować w odmienny sposób na działający czynnik patologiczny niż tkanki osoby dorosłej. W grupie pediatrycznej występują patologie związane z rozwojem kości i niewidoczne w wieku dorostym. Specyfika badań ultrasonograficznych u dzieci wiąże się również z mniejszymi rozmiarami badanych i potrzebą wykorzystywania wysokiej klasy aparatów USG. W pracy przedstawiono najistotniejsze praktyczne wskazówki przydatne w ocenie ultrasonograficznej układu szkieletowo-mięśniowego u dzieci.
TRZUSTKA - ULTRASONOGRAFIA ZABIEGOWA

Autors:
Dr hab. med. Grzegorz Ćwik

Affiliation:
II Katedra i Klinika Chirurgii Ogólnej, Gastroenterologicznej i Nowotworów Układu Pokarmowego, Uniwersytet Medyczny w Lublinie. Polska.

Abstract:
Wstęp. W okresie ostatnich 30 lat ultrasonografia zabiegowa stała się metodą z wyboru dla procedur diagnostycznych i leczniczych. Jest to metoda wygodna, dynamiczna, szybka i stosunkowo tania, pozwala na śledzenie przechodzenia igły, zestawu drenażowego lub operacyjnych elektrod podczas przeprowadzanych zabiegów matoinwazyjnych. Procedura może być również wykonywane przy łóżku chorego.

Materiał i Metoda. Ultrasonografia zabiegowa w obrębie jamy brzusznej obejmuje głównie takie grupy procedur jak: biopsja, zabiegi punkcyjne i drenażowe, endosonografia zabiegowa, ultrasonografia śródoperacyjna (IOUS) oraz złożone procedury wykonywane pod kontrolą USG. Wykład przedstawia wymienione procedury z pokazaniem przykładów w postaci zarówno zdjęć jak i filmów. Biopsja diagnostyczna zmian ognišowych dotyczy głównie trzustki włączając w to biopsję śródoperacyjną oraz z wykorzystaniem EUS. Omówiony został temat drenażu torbieli trzustki zbiorników płynowych po OZT, krwiaków pooperacyjnych, urazowych. Ponadto drenaż ropni jamy brzusznej na różnych jej poziomach, w tym ropni narządowych, głównie wątroby w przebiegu OZT oraz ropni okołotrzustkowych. Kolejnym zagadnieniem jest śródoperacyjna ultrasonografia diagnostyczno-zabiegowa, wykonywana zarówno w powikłanych przypadkach ostrego zapalenia trzustki, wymagającego drenaży zbiorników oraz usuwania martywaków, oceny zmian guzowatych w trzustce oraz przy zabiegach wykonywanych w powikłanych przypadkach przewlektowego zapalenia trzustki (torbiele rzekome, kamica przewodów trzustkowych).

Wnioski. Aspiracyjna biopsja cienkoigłowa, przezskórne zabiegi drenażowe oraz ablacyjne są po-wszechnie stosowanymi zabiegami diagnostyczno-terapeutycznymi u pacjentów, którzy mają zmiany lile, płynowe oraz o charakterze torbieli w jamie brzusznej. Te minimalnie inwazyjne techniki są bezpieczne, precyzyjne, nie zabierają wiele czasu oraz z uwagi na małą liczbę powikłań są szeroko akceptowane przez pacjentów, zarówno hospitalizowanych jak i ambulatoryjnych.
ULTRASONOGRAFIA JAKO PODSTAWOWE NARZĘDZIE W DIAGNOSTYCE I MONITOROWANIU WEWNĄTRZMACICZNEGO ZAHAMOWANIA WZROSTU PŁODU

Author:
Magdalena Błońska

Affiliation:
SKN Perinatologii i Ginekologii
Klinika Perinatologii i Ginekologii
Uniwersytet Medyczny im. K. Marcinkowskiego w Poznaniu

Abstract:
IUGR (intrauterine growth restriction), czyli wewnętrzmaciczne ograniczenie wzrastania płodu, to niezdolność do osiągnięcia pełnego potencjału wzrastania w trakcie życia płodowego. Według standardowej definicji można je rozpoznać, gdy masa dziecka jest mniejsza niż -2SD (<10 centyla) w stosunku do wieku ciąży. Mimo tego, iż jest to dość częste powikłanie ciąży (3-10%), jego definicja i diagnostyka wzbudzają wiele kontrowersji, między innymi z powodu wieloczynnikowej etiologii. Może mieć ona zarówno podłoże matczynie, płodowe, tożyskowe, jak i środowiskowe.

Podstawowym badaniem umożliwiającym ocenę wzrostu płodu jest ultrasonografia. Wiek ciąży określa się na podstawie wymiaru CRL w 11-14 t.c., natomiast kolejne badania ultrasonograficzne pozwalają ocenić tempo wzrastania płodu za pomocą pomiarów wymiaru dwuciemieniowego (BPD), obwodu główki (HC), obwodu brzucha (AC), długości kości udowej (FL) oraz szacunkowej masy ciała (EFW). W celu monitorowania stanu płodu wykonuje się badania dopplerowskie z oceną przepływu w wybranych naczyniach (UA, UV, MCA, DV, ECHO), profil biofizyczny oraz pomiar objętości płynu owodniowego (AFI).

Praca przedstawia zasady diagnostyki i nadzoru stanu płodu ze szczególnym uwzględnieniem ultrasonografii oraz na przykładzie przypadku klinicznego, który odzwierciedla zasadność monitorowania ultrasonograficznego w IUGR.
Wirus RS jest głównym patogenem ostrego zapalenia oskrzelików. Jest też najczęstszym powodem hospitalizacji dzieci w pierwszym półroczu życia. Zwykle u pacjentów z zapaleniem oskrzelików nie ma wskazań do wykonywania badań obrazowych i laboratoryjnych, a rozpoznanie opiera się na obrazie klinicznym. W cięższych przypadkach przydatne może być RTG klatki piersiowej. U pacjentów hospitalizowanych zasadna jest diagnostyka w kierunku zakażenia RSV w celu izolacji pacjentów (ze względu na wysoką zakaźność). Dotychczas nie uwzględniono wykonywania USG płuc w diagnoście zapalenia oskrzelików. W prezentacji przedstawiono wyniki pracy porównującej zastosowanie USG płuc i RTG klatki piersiowej u dzieci z potwierdzonym zakażeniem RSV. Wyniki analizy wskazują na przewagę badania USG płuc pod względem czułości i swoistości badania, a także bezpieczeństwa oraz szybkości wykonania badania.
ULTRASONOGRAFIA W DIAGNOSTYCE PODSTAWOWYCH OBJAWÓW W PEDIATRII- „KATAR, KASZEL, BÓLE BRZUCHA- ZWYKŁY OBJAW DLA MALUCHA”

Autors:
Lek. med. Sławomir Białek

Affiliation:
Prywatna Specjalistyczna Praktyka Lekarska- Pediatria
Medycyna Rodzinna- Sławomir Białek, Piekoszów, Klonowa 4

Abstract:
Główną tezą prezentacji jest zwrócenie uwagi na rolę USG w procesie diagnostycznym dokonywanym przez lekarza pierwszego kontaktu.

Tytuł stanowi agendę prezentacji. Część pierwsza- „kaszel” zawiera przykłady wykorzystania ultradźwięków w chorobach infekcyjnych, ze szczególnym uwzględnieniem różnych typów zapalen pluc. Podkreślono rolę tej metody w diagnozowaniu nieinfekcyjnych przyczyn kaszlu, takich jak deformacje klatki piersiowej, zmiany przerostowe migdałków czy inne możliwe przyczyny kaszlu położone w obrębie szyi / krwawienie do torbieli tarczycy czy duża torbiel środkowej szyi /.

Część druga „katar” – opisuje zastosowanie USG w diagnostyce zaburzeń drożności nosa. Podkreślano różnicę w unaczynieniu pomiędzy alergicznym i niealergicznym nieżytem nosa. Zwraca uwagę na możliwość oceny jednostronnej niedrożności nosa, jak naczyniaki, skrzywienie przegrody nosa czy ciała obce.

Część trzecia – „bóle brzucha” analizuje zastosowania obrazowania ultrasonograficznego zarówno w typowych dolegliwościach brzusznych / jak biegunki/ oraz w mniej typowych jak alergie pokarmowe. Zwrócono uwagę na zespół objawów alergizacji przewodu pokarmowego FPIES, oraz możliwości jego obrazowania w USG. Zakład w części trzeciej prezentacji zamieszczono przykłady mniej typowych obrazów ultrasonograficznych związanych z bólem brzucha jak glikogenoza typ VI czy włóknienie dróg żółciowych. Zamieszczono przykłady roli badania ultrasonograficznego u niespokojnych niemowląt z prawidłowym obrazem narządów jamy brzusznej / zaawansowana dysplazja stawów biodrowych czy krwiak poszczepienny /a.

Prezentację kończy opis przypadku bezobjawowego pierwotnego nowotworu wątroby / hepatoblastoma/ u rocznego dziecka.

Film z wypowiedzią matki powyższego pacjenta stanowi podsumowanie prezentacji.
ULTRASONOGRAFIA ZABIEGOWA W GASTROENTEROLOGII.

AUTORS:
Dr hab. med. Grzegorz Ćwik

AFFILIATION:
II Katedra i Klinika Chirurgii Ogólnej, Gastroenterologicznej Nowotworów Układu Pokarmowego, Uniwersytet Medyczny w Lublinie. Polska.

ABSTRACT:
Wstęp. W okresie ostatnich 30 lat ultrasonografia zabiegowa stała się metodą z wyboru dla procedur diagnostycznych i leczniczych. Jest to metoda wygodna, dynamiczna, szybka i stosunkowo tania, pozwala na śledzenie przechodzenia igły, zestawu drenażowego lub operacyjnych elektrod podczas przeprowadzanych zabiegów matoinwazyjnych. Procedura może być również wykonywane przy łóżku chorego.

Materiał i Metoda. Ultrasonografia zabiegowa w obrębie jamy brzusznej obejmuje głównie takie grupy procedur jak: biopsja, zabiegi punkcyjne i drenażowe, endosonografia zabiegowa, ultrasonografia śródroperacyjna oraz złożone procedury wykonywane pod kontrolą usg. Wykład przedstawia wymienione procedury z pokazaniem przykładów w postaci zarówno zdjęć jak i filmów. Biopsja diagnostyczna zmian ogniskowych jamy brzusznej dotyczy głównie trzustki, wątroby, nerki jak i litych guzów jamy brzusznej, włączając w to biopsję śródroperacyjną oraz z wykorzystaniem EUS. Punkcja dotyczy głównie torbieli wątroby, trzustki, nerek i innych zbiorników płynowych w tym pooperacyjnych i pozapalnych. Omówiony został również temat drenażu torbieli trzustki, wątroby, zbiorników płynowych po OZT, krwiaków pooperacyjnych, urazowych. Ponadto drenaż ropni jamy brzusznej na różnych jej poziomach, w tym ropni narządowych, głównie wątroby i ropni okototrzustkowych. Kolejnym zagadnieniem jest śródroperacyjna ultrasonografia diagnostyczno-zabiegowa, a następnie ablacja guzów nowotworowych, głównie wątroby. W tym wypadku wykorzystujemy zarówno termoablację przeszkloną, śródroperacyjną oraz techniki mieszané o typie termoablacji oraz termoresekcji pod nadzorem usg. Przedstawienie endosonografii diagnostyczno-zabiegowej, głównie w zakresie zmian podśluzówkowych, jak i w ocenie zaawansowania guzów nowotworowych górnego odcinka przewodu pokarmowego.

Wnioski. Aspiracyjna biopsja cienkoigłowa, przeszklone zabiegi drenażowe oraz ablacyjne są po-wszechnie stosowanymi zabiegami diagnostyczno-terapeutycznymi u pacjentów, którzy mają po-wierzchowne lub głęboko położone zmiany lite, płynowe, oraz o charakterze torbieli w jamie brusz-nej. Te minimalnie inwazyjne techniki są bezpieczne, precyzyjne, nie zabierają wiele czasu oraz z uwagi na małą liczbę powikłań są szeroko akceptowane przez pacjentów, zarówno hospitalizowanych jak i ambulatoryjnych.
USG KLATKI PIERSIOWEJ W CHOROBACH REUMATYCZNYCH U DZIECI

Authors:
Tomasz Madej

Affiliation:
Zakład Radiologii Dziecięcej II Wydział Lekarski Uniwersytetu Medycznego w Lublinie

Abstract:
W młodzieńczym idiopatycznym zapaleniu stawów (MIZS) może dojść do zmian śródmiejszowych w płucach. Podstawą rozpoznania zmian płucnych jest tomografia komputerowa (TK), wiąże się ona z narażeniem pacjentów na promieniowanie rentgenowskie. Monitorowanie pacjentów w oparciu o badanie ultrasonograficzne mogłoby znacznie zmniejszyć narażenie na negatywne skutki promieniowania rentgenowskiego. W pracy przedstawiono obraz USG śródmiejszowych zmian płucnych w przebiegu MIZS oraz odpowiadające mu zmiany w badaniu TK.
USG KLATKI PIERSIOWEJ W CHOROBACH REUMATYCZNYCH U DZIECI

Autors:
Tomasz Madej

Affiliation:
Zakład Radiologii Dziecięcej II Wydział Lekarski Uniwersytetu Medycznego w Lublinie

Abstract:
W młodzieżnym idiopatycznym zapaleniu stawów (MIZS) może dojść do zmian śródmiąższowych w płucach. Podstawą rozpoznania zmian płucnych jest tomografia komputerowa (TK), wiąże się ona z narażeniem pacjentów na promieniowanie rentgenowskie. Monitorowanie pacjentów w oparciu o badanie ultrasonograficzne mogłoby znacznie zmniejszyć narażenie na negatywne skutki promieniowania rentgenowskiego. W pracy przedstawiono obraz USG śródmiąższowych zmian płucnych w przebiegu MIZS oraz odpowiadające mu zmiany w badaniu TK.
ACCESORY RENAL ARTERY IN CHILDHOOD
- A HARMLESS ANATOMICAL VARIANT ONLY?

Autors:
Robert Krzysztof Mlosek 1, Sylwia Malinowska 2, Witold Woźniak 3, Katarzyna Dobruch –Sobczak 1

Affiliation:
1 Warszawski Uniwersytet Medyczny, Zakład Diagnostyki Obrazowej, II Wydział Lekarski, Warszawa,
2 Klinika Zdrowia i Urody Malina-med w Grodzisku Mazowiecki,
3 Warszawski Uniwersytet Medyczny, I Klinika i Katedra Chirurgii Ogólnej i Naczyniowej, II Wydział Lekarski, Warszawa

Abstract:
W ciągu ostatnich kilkunastu lat, dzięki rozwojowi technologii doszło do upowszechniania się ultrasonograficznych badań skóry. Świadczy o tym stale wzrastająca liczba doniesień naukowych z tego zakresu, pojawienie się na rynku oferty szkoleniowej oraz gabinetów lekarskich oferujących takie usługi. Obecnie ultrasonografia skóry znajduje zastosowanie w wielu obszarach tj. dermatologia, flebologia, medycyna estetyczna, kosmetologia. Obrazowanie skóry możliwe jest za pomocą ultrasonografów wysokich częstotliwości wyposażanych w jednoelementowe głowice mechaniczne pracujące na częstotliwościach od 20 -100 MHz oraz przy użyciu klasycznych ultrasonografów z głowicami liniowymi o częstotliwościach od 12 do 22MHz.

Celem niniejszej pracy jest wskazanie obszarów gdzie ultrasonografia wysokich częstotliwości jest stosowana i ocena jej użyteczności. W pracy oparto się na najnowszych doniesieniach z literatury oraz na doświadczeniach płynących z własnej praktyki. Wykazano użyteczność badań wysokich częstotliwości w: ocenie skóry zdrowej i monitorowaniu zmian w niej zachodzących pod wpływem różnych zmienności, diagnozowaniu zmian ogniskowych skóry, w tym zmian o podłożu naczyniowym, monitorowaniu i ocenie chorób skóry np. twardzina, diagnozowaniu powikłań po zabiegach medycyny estetycznej – głównie po stosowaniu wypełniaczy tkankowych (depozyty wypełniacza, ziarniniaki), monitorowaniu skuteczności terapii z zakresu kosmetologii i medycyny estetycznej. Ponadto wskażano na ograniczenia i wady metody spowodowane typem stosowanego ultrasonografu oraz brakiem jednolitych standardów badań.

Wnioski płynące z doniesień naukowych oraz z badań własnych pozwalają uznać ultrasonografię wysokich częstotliwości za użyteczną metodę do badań skóry, która może być wykorzystywana w wielu obszarach. Konieczne jest jednak dalsze prowadzenie badań w celu wypracowania jednolitych standardów i techniki badania.
ZASTOSOWANIE ULTRASONOGRAFII
W DIAGNOSTYCE ZAPALEŃ TARCZYCY

Autors:
Ewelina Szczepanek-Parul ska

Affiliation:
Klinika Endokrynologii, Przemiany Materii i Chorób Wewnętrznych
Uniwersytetu Medycznego w Poznaniu

Abstract:
Celem wykładu jest prezentacja charakterystycznych cech ultrasonograficznych różnych rodzajów zapaleń tarczycy (ostrego, podostrego i przewlekłego) możliwych do zaobserwowania w konwencjonalnej ultrasonografii. Dodatkowo, zaprezentowana zostanie przydatność sonoelastografii w rozpoznawaniu, diagnoście różnicowej i monitorowaniu terapii zapaleń tarczycy. Sonoelastografia pozwala na łatwą, szybką i obiektywną ocenę elastyczności tarczycy zarówno w skali jakościowej jak i ilościowej, również w grzbietowej części gruczołu. Elastyczność miąższu tarczycy jest nieznacznie zmniejszona u pacjentów z przewlekłym autoimmunologicznym zapaleniem tarczycy (ang. chronnic autoimmune thyroiditis, CAT) i nie ulega istotnej zmianie pomimo włączenia leczenia. Jednakże szeroki zakres nakładania ogranicza możliwość zastosowania oceny elastyczności miąższu tarczycy w diagnoście różnicowej pomiędzy CAT a zdrową tarczycą. Obserwowano pozytywną korelację pomiędzy zapotrzebowaniem na leczenie L-tyroksyną, stężeniem przeciwciał przeciwtarczycowych oraz sztywnością miąższu tarczycy. Sonoelastografia również okazała się przydatna w różnicowaniu tzw. guzków i pseudoguzków u pacjentów z CAT, co przyczynia się do zmniejszenia częstości nakłuc biopsytowych u tych pacjentów. Istotnie zmniejszoną elastyczność miąższu tarczycy stwierdza się u pacjentów z podostrym zapaleniem tarczycy (ang. subacute thyroiditis, SAT), która ulega normalizacji pod wpływem terapii. Ocena elastyczności może być przydatna w diagnoście różnicowej SAT i CAT oraz monitorowaniu odpowiedzi na leczenie u pacjentów z SAT (z potencjalnym wpływem na redukcję dawki). Ponadto, może być przydatna w wyborze miejsca do nakłucia w niejednoznacznych przypadkach podejrzenia SAT. Podobnie, istotnie zmniejszenie elastyczności miąższu tarczycy obserwuje się w przebiegu ostrego zapalenia tarczycy i zapalenia typu Riedle’a. Zmiany elastyczności tarczycy w przebiegu ostrego i podostrego zapalenia tarczycy mogą istotnie zaburzać ocenę elastyczności towarzyszących zmian ogniskowych w tarczycy. Zatem ocenę ryzyka złośliwości zmian na podstawie zaburzeń elastyczności zmian powinno być odłożone do czasu uzyskania pełnej remisji zapalenia.
Qualified Oral Presentations
Abstract:
Aim: To compare the feasibility and the liver stiffness values obtained by means of a 2D-SWE technique with a propagation map and Transient Elastography.

Material and methods: Our study included 142 subjects with or without chronic liver disease, in which LS was evaluated in the same session by means of Transient Elastography (FibroScan, EchoSens) and a 2D-SWE technique with a propagation map from Toshiba, implemented on the Aplio I900 system. TE was used as a reference method for classification of different fibrosis stages, with the following cut-off values: F2: 7 kPa, F3:9.5 kPa and F4: 12 kPa [1]. Reliable LS measurements were defined for TE as the median value of 10 measurements with a success rate 60% and an interquartile range/median ratio (IQR/M)<30%, and for 2D-SWE as the median value of 10 measurements acquired in a homogenous area and an IQR/M<30%.

Results: Reliable LS measurements by means of 2D-SWE were obtained in 131/142 cases (92.2%), and by TE in 138/142 cases (97.1%), so the final analysis included 124 subjects where both methods had reliable LS measurements. The mean LS values obtained by 2D-SWE were significantly lower than those obtained by TE. For F0-1: 4.81±1.7 kPa vs 5.60±0.69 kPa, p=0.001; for F2-3: 7.22±2.9 kPa vs 8.81±1.6 kPa, p=0.007; and for F4: 15.85±4.8 kPa vs 33.7±18.8 kPa, p<0.001. A direct, significant correlation (r=0.65), was obtained between LS values assessed by means of 2D-SWE and TE (p<0.001). The cut-off value for 2D-SWE for diagnosing significant fibrosis (F2) was >6.4 kPa (AUROC=0.85, Se=75.7%, Sp=93.1%, PPV=92.6%, NPV=77.6%) and for F4 was >10.6 kPa (AUROC=0.95, Se=90.9%, Sp=93.4%, PPV=83.3%, NPV=96.6%).

Conclusion: 2D-SWE with a propagation map has a very good feasibility for liver fibrosis assessment, a good performance for predicting the presence of significant liver fibrosis and an excellent performance for predicting cirrhosis.

INTER-OBSERVER REPRODUCIBILITY OF VTQ (ARFI TECHNIQUE) FOR THE EVALUATION OF FOCAL LIVER LESIONS STIFFNESS

Authors:
Ana-Maria Ghiuchici, Anda Pascaru, Alina Popescu, Roxana Sirli, Ioan Sporea, Mirela Danila

Affiliation:
Department of Gastroenterology and Hepatology “Victor Babeş”
University of Medicine, Timişoara.

Abstract:

Background: Several studies showed that VTQ (Virtual Touch Quantification) provides additional information regarding FLLs diagnosis and it is useful when differentiating between malignant and benign FLLs.

AIM: to evaluate inter-observer reproducibility of a point shear wave elastography- pSWE [using Acoustic Radiation Force Impulse Quantification (ARFI)]: VTQ (Siemens) for the evaluation of focal liver lesions stiffness.

Material and methods: We performed a prospective study including 44 patients diagnosed with focal liver lesions (FLLs) after an ultrasound examination between January 2017-December 2017: men 52.3%, mean age 65.3±11.1 years. A total of 48 FLLs were examined. Elastographic measurements (EM) were obtained in 48 FLLs using VTQ (Siemens). Two examiners (an expert and a novice) performed EM using VTQ on each subject: 10 measurements in the liver parenchyma and 10 measurements in each FLL. Medians and interquartile ranges (IQRs) were calculated (m/s). We used the interclass correlation coefficient (ICC) with 95% b lower and upper limits of agreement (LOA) to assess the inter-observer reproducibility of VTQ.

Results: A total of 48 lesions were evaluated. The lesions were: 72.7% (32/48) hepatocellular carcinomas, 14.5% (7/48) hemangiomas, and 18.7% (9/48) metastases. The mean VTQ values obtained were: 1.62 m/s in HCCs, 2 m/s in hemangiomas and 2.62 m/s in metastases. The agreement between the novice and the experienced examiner was excellent: 0.950 (95% CI: 0.91-0.972)

Conclusions: The excellent ICCs for the median values show that ARFI technique with VTQ for evaluating FLL stiffness is a reproducible method and could provide significant complementary information regarding the tissue stiffness, useful for the differential diagnosis of focal liver lesions.

Keywords: VTQ, focal liver lesions, reproducibility.

Background: Ultrasound elastography is a non-invasive method assessing liver stiffness (LS) to estimate fibrosis. However, the various elastography systems may yield different values for any given liver reflecting technological differences, hence system-specific reference values are warranted. To establish normal liver stiffness values in healthy livers is a prerequisite in order to differentiate normal liver stiffness from pathological values corresponding to increasing fibrotic stages.

Objective: We aimed to define normal liver stiffness using two novel elastography methods for different age, BMI and gender segments, and to assess inter- and intraobserver variability and reproducibility. To our knowledge, this is the first study to evaluate liver stiffness in healthy liver subjects using 2D shear wave elastography (2D-SWE) from GE S8 and SWE from Samsung RS80A.

Methods: 100 healthy subjects, aged 20-70 years were included and divided into 5 age groups: 20-30 years (n=20), 31-40 years (n=20), 41-50 years (n=20), 51-60 years (n=20) and 61-70 years (n=20). Subjects fasted at least 4 hours prior to the investigation. Their medical history, height and weight was recorded, and all subjects underwent B-mode ultrasound examination and biochemical laboratory analyses, including viral markers, to exclude signs of liver pathology. We prospectively evaluated two novel elastography methods (Samsung RS80A SWE and GE S8 2D-SWE) compared to Fibroscan (TE) by obtaining head-to-head liver stiffness measurements for each method on all subjects. Interobserver was performed in a subset (n=24), two observers individually obtained LS measurements with 2D-SWE and SWE. Results were given as the median of 10 valid acquisitions and measurements were excluded if interquartile range (IQR)/median ≥30% or (for TE) a success rate <60%. Data were normally distributed and paired t-test was used.

Results: All methods showed excellent feasibility. Median LS was significantly higher for 2D-SWE (4.5 0.8 kPa) compared to TE (4.2 1.1, p<0.001) and Samsung RS80A (4.1 0.8 kPa, p<0.001). The coefficient of variation (CV) was significantly higher for TE compared to both GE S8 and Samsung RS80A (p=0.001 and p=0.005, respectively), whereas similar for the ultrasound based SWE methods (p=0.026). The intraclass correlation coefficient (ICC) was good for both Samsung RS80A and GE S8 2D-SWE (r=0.85 vs. r=0.78, respectively) and the methods were reproducible. Median LS was significantly higher for males than for females for GE S8 2D-SWE and TE (p=0.006 and p=0.006, respectively), whereas a similar trend for Samsung SWE did not reach significance. No significant differences were found across age- and BMI groups. There was no significant difference in LSM-mean based on 5 vs. 10 measurements for either Samsung RS80A SWE or GE S8 2D-SWE.

Conclusion: Median LS was significantly higher for GE S8 2D-SWE compared to Samsung RS80A or TE. There was no significant difference in LS between age or BMI groups, however, males had higher LS. Using 5 or 10 liver stiffness measurements did not significantly affect results.
Objective: The objective of the present study was to assess the severity of liver fibrosis and steatosis in a cohort of type II diabetic patients, using non-invasive methods: Transient Elastography (TE) and Controlled Attenuation Parameter (CAP) before and after the CAP adjustment algorithm was applied.

Material and methods: The study included 576 type II diabetic patients, who were prospectively randomized. All were evaluated by means of TE and CAP (FibroScan EchoSens). A cut-off value of 10.5 kPa [1] was used to define clinically relevant fibrosis (F≥3). We used the following cut-off values [2]: for S2 (moderate steatosis) - 255 dB/m, and 290 dB/m for S3 (severe steatosis) - We corrected the CAP values according to the presence of diabetes (we deducted 10 dB/m) and according to the degree of obesity (we deducted 4.4 dB/m for each BMI >25 kg/m2 and added 4.4 dB/m for each BMI< 25 kg/m2) [1, 3].

Results: Out of 576 diabetics screened, we excluded those with associated viral hepatitis, those with an AUDIT-C score ≥8 and those with unreliable LSM. The final analysis included 403 subjects (59.3% women, BMI=31.6± 6 kg/m2) with reliable LSM obtained using both probes. Moderate and severe steatosis by means of CAP was found in 18.9% and 61.5% cases respectively. After correction, we found moderate steatosis in 22.1% cases and severe steatosis in 52.6% cases. We found no significant differences regarding the proportion of patients with moderate steatosis after the algorithm was applied (18.9 vs. 22.1%, p=0.26), but we found significant differences regarding the proportion of severe steatosis, (61.5% vs 52.6%, p=0.01). Clinically relevant fibrosis was detected by means of TE in 13.6% (55/403) of subjects.

Conclusions: In type 2 diabetes patients it is necessary to use an algorithm for correction in order to avoid over-estimation of the degree of steatosis and fibrosis.

References:
Elastopgraphy in Gastroenterology

STEATOSIS SEVERITY AFFECTS THE DIAGNOSTIC PERFORMANCE OF ARFI IN SIGNIFICANT LIVER FIBROSIS.

Authors:

Affiliation:
Giovanni Galati, g.galati@unicampus.it, * Internal Medicine, Geriatrics, and Hepatology Unit, University Campus Bio-Medico, Rome, Italy.

Abstract:

Background: The impact of steatosis on liver stiffness (LS) evaluation by Acoustic Radiation Forced Impulse (ARFI) is not clear. Aim: To evaluate the effect of significant steatosis on diagnostic performance of ARFI in liver diseases of different etiology. Methods: We screened 92 consecutive patients in two University Hepatology Units, over a period of 15 months. All patients underwent abdominal ultrasound, liver biopsy and ARFI examination of the liver on the same day (Siemens ®, Munich, Germany).

Results: Finally 60 patients were included with an overall median value of ARFI of 1.32 m/sec (0.82-2.92). Cirrhosis were excluded. The more prevalent etiology was NASH 35/60 (58.3 %), other than viral 12/60 (20 %) and autoimmune 13/60 (21.7%). According the international scoring system for NASH we found steatosis grade 2 (≥ 33 % of hepatocytes) in 5 cases (8.3 %) and grade 3 (≥ 66 % of hepatocytes) in 19 cases (31.7 %). Otherwise, we found fibrosis grade 2 in 19 cases (31.7 %), grade 3 in 16 cases (26.7 %). The median value of LS for fibrosis ≥ F3 (1.38) was significantly higher than the LS for fibrosis ≤ F2 (1.18) [p <0.001]. We performed an AUROC for ARFI in the two groups (≥ F3 and ≤ F2) and we analyzed the effect of significant steatosis (≥ grade 2) on ARFI diagnostic performance in the patients with fibrosis F>3 at the best cut off of 1.38 m/sec (AUROC 0.82).

We showed that the diagnostic accuracy of ARFI for fibrosis F>3 was significantly decreased in the presence of steatosis ≥ grade 2, lowering the ARFI sensitivity to 33 % (Vs 80 % in absence of steatosis). Conclusions: Our data showed that the presence of significant steatosis, decreases the reliability of ARFI in ruling in the advanced fibrosis.
CHARACTERIZATION OF DIFFERENT RENAL PATHOLOGICAL CHANGES USING THE MULTIPARAMETRIC POSSIBILITIES OF ULTRASOUND

Authors:

Mirjana Brvar, MD, Anja Brodnjak, MD

Affiliation:
Radiological Department, University Medical Centre Maribor, Slovenia

Abstract:

Our experience in evaluation of solid and liquid renal lesions is presented. Morphology, vascularization and enhancement patterns after intravenous contrast injection were analyzed using the multiparametric possibilities given by ultrasound.

Solid and cystic renal lesions as well as infective or posttraumatic changes are often found by ultrasound. The European Federation of Societies for Ultrasound in Medicine and Biology (EFSUMB) recommends the clinical use of contrast enhanced ultrasound (CEUS) for kidneys.

Over 30 patients that were referred for imaging of kidney pathology underwent the conventional B-mode ultrasound, color and power Doppler flow imaging, superb microvascular imaging (SMI) and CEUS. Size, location, morphology, echogenicity, and vascularity of the lesions were evaluated. Doppler helps to characterize the renal blood flow, with limitations due to attenuation, poor sensitivity for the very slow blood flow, and angle dependency. SMI technology provides the visualization of the low velocity microvascular flow, and the vascularization of cystic or solid lesions was sometimes seen by SMI even without contrast injection. The imaging advantages of CEUS include the ability to detect microvasculature in high temporal resolution, with continuous dynamic imaging after contrast injection.

Pathological changes in patients with complicated urinary tract infections and abscesses, complex cysts, hypervascular or hypovascular tumors and lymphoma. An important advantage was that the contrast agent we used was a non-nephrotoxic one. Using US we demonstrated better resolution and differentiation of hypovascular tumors from cysts with dense content than the CT. High temporal resolution allowed us to better analyze the enhancement patterns.

Following our first experience several interesting cases from our daily clinical practice will be presented to stress the importance of correct diagnostic algorithm and confirm the advantages of multiparametric possibilities of US.
THE PERFORMANCES OF CONTRAST ENHANCED ULTRASONOGRAPHY IN PANCREATIC LESIONS IN A TERTIARY GASTROENTEROLOGY DEPARTMENT

Authors:
Apetrei C, Ardelean M, Popescu A, Danila M, Moga T, Bende F, Sporea I, Sirli R

Affiliation:
Department of Gastroenterology and Hepatology
“Victor Babes” University of Medicine and Pharmacy, Timisoara, Romania

Abstract:
The aim of this study was to evaluate the spectrum of pancreatic lesions and the performance of contrast enhanced ultrasonography (CEUS) for their diagnosis in our Gastroenterology Department.

Material and Methods: We performed a retrospective study that included pancreatic lesions evaluated by CEUS in our Department from October 2009 to July 2018. Focal pancreatic lesions as well as cases of acute pancreatitis have been included. After conventional ultrasonography (US), CEUS was performed.

Results: A total of 369 pancreatic lesions have been evaluated by CEUS, and in 86.9% (321/369) cases it was able to reach a diagnosis. From the 321 cases in which CEUS was diagnostic, 33% (106) were pancreatic carcinomas, 39.5% (127) were acute pancreatitis, 18.1% (58) cases had pseudocysts, 4% (13) were neuroendocrine tumors, 3.7% (12) were cystic tumors and 1.6% (5) had other pathologies (chronic pancreatitis, abscesses, etc).

Conclusion: CEUS is a sensitive imaging method and plays a well-established role in the evaluation of pancreatic lesions. CEUS was conclusive in 86.9% cases, and should always be performed immediately when a pancreatic lesion is detected in conventional ultrasound.

Keywords: contrast-enhanced ultrasonography, pancreatic lesions
VALUE OF CONTRAST-ENHANCED ULTRASOUND IN DIAGNOSIS AND DIFFERENTIAL

Autors: Shaoshan Tang, Xiaoyue Zhang

Affiliation: The department of ultrasound, Shengjing hospital of China Medical University, Shenyang, China

Abstract:

Objective: To evaluate the usefulness of contrast-enhanced ultrasound (CEUS) in the diagnosis and differential diagnosis of apophysis lesions of the gallbladder (ALG) with the diameter > 1 cm.

Methods: A retrospective analysis was performed on 180 patients who suffered from ALG > 1 cm. All the patients underwent the conventional ultrasound (US) and CEUS examinations. 175 cases were proven by the pathological diagnosis. The characteristics of the lesions on US and CEUS enhancement pattern, the integrity of GB wall and the infiltration of liver were recorded to analyze the key factors in determining the nature of GB lesions.

Results: There were significant differences between benign and malignant ALGs in enhancement pattern during both arterial phase ($\chi^2=79.220, P=0.000$) and venous phase ($\chi^2=82.808, P=0.000$). The malignant lesion usually performed “fast-in and fast-out” enhancement pattern, while the enhancement pattern between different types of benign ALGs showed no difference. There was no difference of AT (arrival time) between malignant and benign ALGs, while if HET (hypo-enhancement time) $\leq 40$s as a diagnostic standard for malignant lesions, the sensitivity, specificity and accuracy was 88.24%, 85.62% and 86.11%, respectively. The destroy of GB wall was a particularly important indication for malignant ALGs, and the sensitivity, specificity and accuracy was 93.33%, 92.12% and 92.22%, respectively. The accuracy rate of CEUS in the diagnosis of ALGs, as well as malignant and benign lesions, was 92.22%, 92.47% and 91.17%, respectively.

Conclusion: On CEUS, the enhancement pattern, HET $\leq 40$s, GB wall destruction and hepatic parenchyma infiltration are the characteristic findings of malignant ALGs. However, there is no usefulness of CEUS in differential diagnosis between the benign lesions.
**Comparative Characteristics of the Spleen Mass Coefficient in Children Living in Territories with Different Man-Made Loads**

*Authors:* Olga Vozgoment, Andrey Nadtochiy

*Affiliation:* Central Research Institute of Dentistry and Maxillofacial Surgery, Moscow, Russia

**Abstract:**

**Background:** The man-made loads are very critical parameter of living territory.

Objective: Studying of the impact of spleen mass coefficient (SMC) in children and determination of an opportunity for using of the SMC mean group value for assess the man-made loads of the residence territory.

**Methods:** 813 patients 3-17 years old (48.6% boys, 51.4% girls) living in the territories with different man-made loads (resort zones, mining and industrial processing zone (potassium salts), metallurgical zone, organic compounds synthesis zone) were examined. All children undergone ultrasonic examination (US) of spleen with the spleen mass coefficient (SMC) calculation (the ratio of the spleen mass to the body weight). More than 6550 laboratory tests of the blood for the concentration of metals and organic compounds determination were obtained in 450 children. A comparative analysis of the SMC mean group value in children living in territories with different man-made loads was carried out. Mathematical analysis was applied for demonstration of dependence of changing SMC value and chemicals concentration in the blood.

**Results:** The increase of organic compounds and metals concentration in blood caused the growth of SMC value (p<0,05). The significant differences in SMC mean group value (p<0,05) between children living in resort zones (2.99 ± 0.21) and in industrial zones (mining and industrial potassium salts processing zone = 3.45 ± 0.15, metallurgical zone = 3.75 ± 0.19, organic compounds synthesis zone = 3.57 ± 0.17) were revealed.

**Conclusion:** SMC value is the reflection of reactive lymphoid tissue hyperplasia as reply on the man-made loads in the living territory. The SMC value may be a criterion of immune system adaptive changes to environmental factors. It may be used both for individual evaluation of the child’s immune system condition and – at the population level – for comparative assessment of the man-made loads in the territory.
COMPLEX ULTRASOUND EVALUATION OF LYMPHOID ORGANS CONDITION IN CHILDREN WITH CHRONIC PARENCHYMAL PAROTITIS

Authors:
Olga Vozgoment, Andrey Nadtochiy, Eugenia Kostenko

Affiliation:
Central Research Institute of Dentistry and Maxillofacial Surgery, Moscow, Russia

Abstract:

Background: Chronic parenchymal parotitis (CPP) is the most common inflammatory disease of parotid glands in children with persistent course with exacerbations and remissions and great difficulties in treatment.
Objective: Determination of lymphoid organs condition in children with CPP based on complex ultrasound examination (USE).

Methods: 50 patients 3.5-10 years (29 boys and 21 girls) with different stages of CPP were undergone USE of parotid glands (PG), neck and mesentery lymph nodes (LN), spleen. Evaluated LN parameters: linear size and L/S ratio, cortical layer thickness, gate LN artery peak velocity (Vmax). Evaluated spleen parameters: lymphoid follicles number, size and distribution; spleen mass coefficient (SMC) – ratio of the spleen mass and the body weight. The relationships of LN and SMC parameters were analyzed mathematically.

Results: Bilateral CPP was detected in 39 (78%) patients: the activity of the inflammatory process was the same in both PG in 12 (30.8%) patients.

LN analysis:
- jugulodigastral LN:
  linear size 24.7mm to 31.5mm [27.4 ± 1.2mm];
  cortical layer thickness: 1.1 - 1.5 mm [1.3 + 0.14 mm];
  Vmax: 11.7-18.5 [14.5 + 2.1 cm/s].
- mesenteric LN:
  linear size: 11.7mm to 15.6mm [14.0 + 0.9mm];
  cortical layer thickness: 0.7 - 1.0mm [0.85 + 0.1mm];
  Vmax: 4.1-8.5 [6.4 + 1.7 cm/s].
- L/S ratio of cervical and mesenteric LN: 2.1: 1 - 3.2: 1 [2.74 + 0.31];

Spleen analysis:
- SMC ranged from 3.9 to 5.7 [mean group = 4.4 ± 0.4] [norm = 2-4].
- lymphoid follicles: number and size increased together with SMC.
Mathematical analysis confirmed the direct relationship of LN and SMC parameters.

Conclusion. The systemic lymphoid organs (cervical and mesenteric LN, spleen) hyperplasia in CPP patients was revealed. This indicates the immunocompromise of these patients. The obtained data show the important role of the immune system in CPP pathogenesis.
POSSIBILITIES AND LIMITS OF ENDOCRINE IMAGING IN CHILDREN

Authors:
Ramona Stroescu, Teofana Bizerea, Otilia Mărginean, Simona Cerbu, Gabriela Doroş

Affiliation:
Stroescu Ramona, ramona.giurescu@gmail.com, „Louis Țurcanu” Emergency Hospital for Children, Timişoara, România, University of Medicine and Pharmacy „Victor Babeş” Timişoara, România

Abstract:
In recent years ultrasound (US) has become a very useful and accessible method for exploring the pediatric endocrine pathology. Study objective: Assessing the need to perform an US in the neonate and infant, as a complementary exploration of the endocrine system.

Methods: US were performed on 169 patients with endocrine diagnoses hospitalized in our hospital during July 2016- June 2017. The patients were aged between 0-18 years, with an average of 13 ± 2.5 years. Results: Thyroid US was the most used scan, detecting absence/thyroid hypoplasia in 5 cases, autoimmune thyroiditis in 43 cases and thyroid carcinoma in 2 cases. Abdominal US was very effective in demonstrating the presence or absence of a uterus in newborns with ambiguous genitalia in 7 cases, congenital adrenal hyperplasia in 10 cases and in 7 cases of genetic disorders (Turner, Rokitansky and McCusick-Kaufmann). Testicular US was performed in 6 cases of precocious puberty and 2 cases of male pseudohermaphroditism. Head US revealed in an infant the absence of cavum septum pellucidum and septooptic dysplasia. Conclusions: US in the pediatric population is important in order to establish a complete diagnosis and subsequent monitoring. Because of its innocuousness, simplicity, and reliability, US is very useful in infants and children. In cases of complex anomalies when US findings are incomplete or inconclusive, MRI provides precise demonstration of anatomic features in multiple planes.

Key words: ultrasound, endocrine disease, pediatric population
THE ROLE OF ULTRASOUND IN ABDOMINAL TRAUMA IN CHILDREN

Authors:
Cerbu Simona, Ramona Stroescu, „Louis Țurcanu” Emergency Hospital for Children, Timișoara, România

Affiliation:
Stroescu Ramona, ramona.giurescu@gmail.com, „Louis Țurcanu” Emergency Hospital for Children, Timișoara, România University of Medicine and Pharmacy „Victor Babeș” Timișoara, România

Abstract:

Introduction: The main cause of morbidity and mortality in the pediatric population is trauma. The abdomen is the third most anatomically injured region in children, head and extremities, and is the most common unrecognized lethal cause since the trauma. It is necessary to know the anatomical and physiological particularities of the growing child.

Material and method: Patients with abdominal trauma admitted in „Louis Turcanu” Emergency Hospital for Children were evaluated between January 2017 and April 2018.

Results: Abdominal trauma was first ranked by road crash, followed by the bicycle accident. Hepatic and splenic dilaceration was the most common, then hugging the pancreas, the duodenum and the small intestinal tract. From 115 abdominal trauma, 12 were hepatic laceration, 5 were splenic laceration, 3 renal laceration, 1 pancreatic rupture and 1 duodenal. Discussions: The management of abdominal lesions in pediatrics is a challenge, a team work from the entrance of the small patient in the emergency service to the late posttraumatic monitoring, with complications at a distance from the time of trauma.

Conclusions: Ultrasound examination plays an important role, being non-irradiant and can be used in evaluation and monitoring patients with abdominal trauma.
Urinary tract infections (UTIs) have been considered to be the principal cause of permanent renal parenchymal damage and scarring in children. Vesicoureteral reflux (VUR) is found in 30% to 40% of children with UTI; reflux, especially of higher grades, increases the risk of recurrent UTIs and renal scarring, with associated sequelae in later life (proteinuria, hypertension, eclampsia and end-stage renal disease).

Aim: Assessing the need to perform voiding urosonography as a screening method for VUR in young children with UTIs. Material and methods: Renal ultrasounds were performed on 179 patients with UTIs hospitalized during April 2016 –December 2017. The patients were aged between 0.4 months – 10 years, with an average of 3 years ± 2.8 months. Of these, 109 patients (60.9%) had a normal renal ultrasound report. Results: Patients with history of more than 2 infections (58 patients -32.5%) underwent voiding urosonography. Secondary VUR due to posterior urethral valve was found in 6 patients. 32 patients had grade 3, 4 or 5 VUR, and were transferred to the surgery department. 15 (25.8%) patients detected with reflux had no pelvic or distal ureteral dilatation on renal ultrasound. In 5 patients VUR could not be detected.

Discussions: Patients with no pelvic renal dilatation on ultrasound had a history of more frequent UTIs; normal ultrasound findings delayed exploring for VUR and establishing prevention treatment for UTIs. Conclusions: Renal ultrasound is important in order to establish a complete diagnosis and subsequent monitoring of UTI in children. Voiding urosonography is a reliable, sensitive, safe and radiation-free method of investigation of vesicoureteral reflux in children.

Key words: urinary tract infections, vesico-ureteral reflux, voiding urosonography
ULTRASOUND ELASTOGRAPHY VALUES OF THYMUS IN HEALTHY CHILDREN

Authors:
Ali Mahir Gündüz

Affiliation:
Van Yüzüncü Yıl University Faculty of Medicine, Department of Radiology

Abstract:

Purpose: Elastography is an imaging technique that evaluates the elastic properties and stiffness of tissues. In children, UE is used for liver, spleen, kidney, thyroid, testis, lymph node and muscle tissue. In this study, we aimed to find the mean stiffness of the thymus tissue examined with the UE in healthy children and thus an average value of the shear wave velocity (SWV).

Materials and methods: We performed a thymus examination with the UE in addition to the children whose ultrasonography and laboratory findings were normal in our hospital. We performed our investigations with a Philips Affiniti 70 G 5 MHz convex probe. We calculated the shear wave velocities of all children in m/s and obtained an average value.

Results: We included a total of 54 children, 31 boys and 23 girls between 6 months and 12 years of age. The mean SWV was 0.59 m/s for girls and 0.64 m/s for boys. In one case, accessory thymic tissue appearance was observed in the right lobe of the thyroid.

Discussion and conclusion: The thymus located in the anterosuperior mediastinum continues to grow until puberty and regresses after puberty. Radiologist plays an important role in differentiating normal thymic variants, ectopic thymic tissue, nonneoplastic changes and thymic hyperplasia from neoplastic changes.

Detection of UE values of thymus in healthy children may be useful in comparison with healthy controls in the diagnosis of ectopic thymus or diffuse thymic pathologies. However, since US Elastography techniques are very diverse, it is difficult to compare studies. There are no thymic UE studies in thymus pathologies or healthy children in the literature. In healthy children and those with thymic pathology, there is a need for studies that show that the number of cases is high.
Urinary tract infections (UTIs) have been considered to be the principal cause of permanent renal parenchymal damage and scarring in children. Vesicoureteral reflux (VUR) is found in 30% to 40% of children with UTI; reflux, especially of higher grades, increases the risk of recurrent UTIs and renal scarring, with associated sequelae in later life (proteinuria, hypertension, eclampsia and end-stage renal disease).

Aim: Assessing the need to perform voiding urosonography as a screening method for VUR in young children with UTIs. Material and methods: Renal ultrasounds were performed on 179 patients with UTIs hospitalized during April 2016 –December 2017. The patients were aged between 0.4 months – 10 years, with an average of 3 years ± 2.8 months. Of these, 109 patients (60.9%) had a normal renal ultrasound report. Results: Patients with history of more than 2 infections (58 patients -32.5%) underwent voiding urosonography. Secondary VUR due to posterior urethral valve was found in 6 patients. 32 patients had grade 3, 4 or 5 VUR, and were transferred to the surgery department. 15 (25.8%) patients detected with reflux had no pelvic or distal ureteral dilatation on renal ultrasound. In 5 patients VUR could not be detected.

Discussions: Patients with no pelvic renal dilatation on ultrasound had a history of more frequent UTIs; normal ultrasound findings delayed exploring for VUR and establishing prevention treatment for UTIs. Conclusions: Renal ultrasound is important in order to establish a complete diagnosis and subsequent monitoring of UTI in children. Voiding urosonography is a reliable, sensitive, safe and radiation-free method of investigation of vesicoureteral reflux in children. 

Key words: urinary tract infections, vesico-ureteral reflux, voiding urosonography
ULTRASOUND ELASTOGRAPHY VALUES OF THYMUS IN HEALTHY CHILDREN

Authors:
Ali Mahir Gündüz

Affiliation:
Van Yüzüncü Yıl University Faculty of Medicine, Department of Radiology

Abstract:

Purpose: Elastography is an imaging technique that evaluates the elastic properties and stiffness of tissues. In children, UE is used for liver, spleen, kidney, thyroid, testis, lymph node and muscle tissue. In this study, we aimed to find the mean stiffness of the thymus tissue examined with the UE in healthy children and thus an average value of the shear wave velocity (SWV).

Materials and methods: We performed a thymus examination with the UE in addition to the children whose ultrasonography and laboratory findings were normal in our hospital. We performed our investigations with a Philips Affiniti 70 G 5 MHz convex probe. We calculated the shear wave velocities of all children in m/s and obtained an average value.

Results: We included a total of 54 children, 31 boys and 23 girls between 6 months and 12 years of age. The mean SWV was 0.59 m/s for girls and 0.64 m/s for boys. In one case, accessory thymic tissue appearance was observed in the right lobe of the thyroid.

Discussion and conclusion: The thymus located in the anterosuperior mediastinum continues to grow until puberty and regresses after puberty. Radiologist plays an important role in differentiating normal thymic variants, ectopic thymic tissue, nonneoplastic changes and thymic hyperplasia from neoplastic changes.

Detection of UE values of thymus in healthy children may be useful in comparison with healthy controls in the diagnosis of ectopic thymus or diffuse thymic pathologies. However, since US Elastography techniques are very diverse, it is difficult to compare studies. There are no thymic UE studies in thymus pathologies or healthy children in the literature. In healthy children and those with thymic pathology, there is a need for studies that show that the number of cases is high.
IMPACT OF A ROUTINE POINT-OF-CARE ULTRASOUND SCREENING ON THE CARE OF OLDER-ADULTS

Autors: Nicolas AZULAY, MD; Cyprien ARLAUD, MD; Emilie FERRER, MD; Sébastien GONFRIER, MD; Jean-Michel TURPIN, MD; Luc VAN ELSLANDE, MD; Alain FRANCO, MD, Ph.D; Olivier GUERIN, MD, PhD; Charles RAFFAELLI, MD

Affiliation: Ultrasound’s Department; Universitary teaching hospital of Nice, CHU Pasteur II, 30 Avenue Voie Romaine; Nice; France

Abstract:

Background: The ageing of the population raises new challenges to geriatric care. New screening procedures must be developed to facilitate early diagnosis of chronic and evolving diseases in this group of patients.

Objectives: Our objective was to evaluate the value of using point-of-care ultrasound (POCUS) as a screening test in geriatrics.

Method: We performed a prospective, observational study in a short-term geriatric unit in the University Hospital of Nice from November 2, 2016 until April 30, 2017.

Participants: All patients admitted in the unit were proposed for inclusion, regardless of their history and the reason of their admission.

One operator, blinded to the patient’s history, performed all the POCUS scans using a hand carried ultrasound device. A strict protocol was followed, screening a total of 13 organs.

Expert committees of geriatricians judged the impact of the screening for each patient: positive impact (short-term or long-term), no impact, or negative impact. We collected the medical history data and calculated the Charlson’s comorbidity index, to search for predictive factors of positive impact.

Results: In our population of 501 patients, the POCUS screening had a short-term impact for 177 patients (35%), a long-term impact for 116 patients (23%), and a total of 293 with a positive impact (58%). Negative impact only concerned 4 patients (1%). No predictive factors of positive impact were found in the data we collected. Our protocol did not increase the length of stay of the patients (P=0.62).

Conclusion: A POCUS protocol can efficiently screen 13 organs in less than 15 minutes, and proved to have a positive impact on the care of 58% of the patients. Geriatricians should seize the opportunity to include POCUS as a part of their daily practice to improve diagnostic accuracy in routine geriatric care.

Keywords: Geriatrics, older-adults, ultrasonography, screening, pocket device
POCUS ASSISTED CLINICAL EXAM (PACE) IN UNDERGRADUATE EDUCATION: A PILOT STUDY

Authors:
Sara Nikolic MD¹, Tjaša Banović², Vigor Arva², Gregor Prosen MD, FEBEM³

Affiliation:
¹Department of Gastroenterology, University Clinical Center Maribor, Slovenia
²Faculty of Medicine University of Maribor
³Emergency Department, Community Health Center Maribor

Abstract:

Introduction: Point-of-Care ultrasound (POCUS) is an irreplaceable tool in patient care. However, we have not yet fulfilled its full potential. The purpose of PACE is to teach medical students the basic ingredients of POCUS within the clinical exam and give them the necessary mindset to properly contextualize their findings.

Methods: PACE participants (n=16, 3rd or 4th year of medical school) were provided with didactic materials a month in advance to study basic POCUS concepts related to cardiac, pulmonary and abdominal clinical examination. Theoretical knowledge was tested on the day of the event with a pre-test and post-test consisting of short answer questions and single best answer multiple-choice questions (MCQ) of mixed format (recall questions, clinical vignettes with pictures). The event consisted of 2 hours of lectures and 6 hours of hands-on training (HOT), conducted by certified clinicians. HOT was not just about scanning. It was equally essential to stress the importance of clinical reasoning through the ritual of a thorough clinical examination. PACE was concluded by students completing a 5 point Likert scale questionnaire.

Results: Students were successful at pre-test and post-test with the mean results of 72.1% and 89.6%, respectively. On the post-event survey students agreed that PACE learning outcomes were fulfilled (4.47). They were highly motivated to further learn about PACE (5.00), find PACE highly relevant for their further studies (4.70), were very satisfied with both instructors (5.0) and flipped classroom method (4.0) and felt that more time should be allotted to teaching PACE (3.8). Self-assessment of the participants POCUS knowledge was 2.47 before and 3.67 after PACE. Also, students were feeling confident to perform a bedside exam in the future (4.27).

Conclusions: Much like we teach students how to detect and contextualize holosystolic murmurs, we should give them the knowhow to detect and contextualize B-lines. Students were successful at theoretical PACE and left the workshop very motivated to learn more about it. The mindset shift, the fact that POCUS findings are now moving next to the physical exam findings, inline, was achieved. The exciting, dynamic, almost poetic nature of POCUS connects us with the patient and brings clinical examination to the next level, which undoubtedly is PACE.
Analysis of Neovascularization of the Patellar Tendon in Patients with Patellar Tendinopathy

Authors:
José Luis Arias-Buría1,2,3 PT, MSc, PhD; Samuel Fernández-Carnero3,4 PT, MSc; Félix Raúl Albalate-Barbero3,5,6 PT, MSc; María Palacios-Ceña1,2 PT, MSc; Stella María Fuensalida-Novo1,2 PT, MSc; César Fernández-de-las-Peñas1,2 PT, MSc, PhD.

Affiliation:
1 Departamento de Fisioterapia, Terapia Ocupacional, Rehabilitación y Medicina Física, Universidad Rey Juan Carlos, Alcorcón, Madrid, España.
3 Member of the Sociedad Española de Ecografía en Fisioterapia: SEEFi.
4 Departamento de Fisioterapia, Universidad Francisco de Victoria, Pozuelo de Alarcón, Madrid, España.
5 Clinician, Department of Physical Therapy, Hospital Universitario 12 de Octubre, Madrid, Spain.
6 Physical Therapy in Fisiovitally Clinical Center, Collado Villalba, Madrid, Spain.

Abstract:

Background: The etiology of patellar tendinopathy is not completely understood.

Objective: To compare the vascular changes in the insertion of the patellar tendon between subjects with patellar tendinopathy and healthy subjects. METHODS: A case-control study including subjects with patellar tendinopathy (PT) and healthy matched controls (HC) was conducted. Quantification data were obtained with Shenzhen Mindray Co. Ltd, China, M7 model, linear array 50 mm foot print, optimized 10 MHz. Long and short axial images were taken. Doppler study was conducted in short axial. Pressure pain thresholds (PPT) at the symptomatic point were obtained. Related-disability was assessed with the VISA-P. RESULTS: Ten patients with PT (age: 45 ±5 years) and 10 matched controls (age: 38 ±2 years) participated. Patients showed lower PPT (227.4±41.5 kPa) and VISA-P (44.2/100) than HC (PPT: 610.80±100.3 kPa, VISA-P: 100/100, P<0.001). Sixty percent patients showed a hypo-echoic area and heterogeneous tendon matrix. The qualitative analysis (Öhberg scale) showed that 60% patients do not have vessels in the inferior pole of the patella, 10% had one or more vessels and the remaining 30% had 2 to 4 tortuous and irregulars vessels. On the contrary, all healthy subjects did not exhibit any vessel in the inferior pole of the patella. Accordingly, the Del Buono Scale quantitative analysis showed that the 60% did not have vessels, 10% had Grade I and the remaining 30% Grade II. Therefore, significant differences between PT patients and healthy control were observed for both Öhberg score and Del Buono Scale (P<0.001) to detect structural changes in the patellar tendon.

Conclusion: Sonography can be a good screening tool for detecting qualitative and quantitative changes in vessels produced in the patellar tendon in subjects with chronic PT. It should be considered than 60% of patients with PT did not exhibit any vessels, albeit the presence of symptoms.
Background: The increase of elderly in our society requires simple tools for quantification of sarcopenia (reduction in muscle mass) in patients. Muscles are among the soft tissues one of the best adapted to ultrasound examination.

Objective: To analyse and characterise the muscle in elderly individuals by ultrasound and to verify muscle changes with age.

Methods: 40 elderly participants were submitted to an ultrasound examination for muscle characterisation. The quadriceps and brachial biceps muscles were evaluated in a longitudinal view, using the same parameters in all acquisitions. All the images were analysed by Image J software and the results were obtained using SPSS v.24 software.

Results: The quadriceps muscle and brachial biceps in elderly individuals showed an increase in echo-intensity values and a decrease in thickness values when compared with an young population. In participants with more advanced age the values were more evident.

Conclusion: The aging significantly affects human skeletal muscle architecture. These structural alterations are expected to have implications for muscle function in old individuals.
PROPERTIES AND USEFULNESS OF NEW CURRENTLY AVAILABLE ULTRASOUND HYDROGEL STAND-OFF PAD

Autors: Małgorzata Serafin-Król¹,², Ewa Mizia³, Radosław Król²

Affiliation: Warsaw Medical University¹, Private Medical Practice dr Król, Warszawa, Poland², Katedra Anatomii, Collegium Medicum UJ, Kraków, Poland³

Abstract:

Objectives: to evaluate the proprieties and usefulness of hydrogel pad during different US examinations.

Method: 1st step: 14 MHz probe examination of dorsal aspect of hand with extensor tendon using 6 and 10mm thick pads put directly on the skin, on the US gel and after pouring saline on the skin. We do the examination without and with US gel on the outer layer of pad. We looked at the quality of the US image. 2nd step: same trials with 18, 24 MHz transducers. 3rd step: examination with dynamic assessment of different structures- flexor and extensor tendons of a hand, Achilles tendon, tendons at the ankle, thyroid.

Results: the best images were obtained after direct or on saline application of the pad. There were some artefacts obtained when using US gel between skin and pad. In all cases without US gel the image was equally good for all types of transducers. The enhancement phenomenon was noticed behind the pad giving better contrast resolution of tissues. Additional advantages of HydroAid include its elasticity and flexibility well surrounding uneven, bumping surfaces making close touch to examined structures. It is easy to cut to obtain a different shape. It is plazma sterilized it reduces risk of infections. It does not stick to the skin, can be used on open wounds.

Conclusion: HydroAid has very good proprieties and increases quality of the US image even when applying high frequency transducers. It can be apply to any area of interest. It increases contrast resolution in all superficial structures. It is also easier to do stress-free examination in very painful area. Sponsored by Kikgel Comp. Poland
SCANNING IN PAIN. SURVEY OF MUSCULOSKELETAL SYMPTOMS CONNECTED WITH SONOGRAPHY

Autors: Paweł Wareluk, Wiesław Jakubowski

Affiliation: Diagnostic Imaging Department, 2nd Faculty of Medicine, Medical University of Warsaw

Abstract:

Background: Thanks to its wide availability, relatively low cost and safety, ultrasound has become the most commonly used imaging modality. However, scanning for increasingly long periods of time tends to negatively affect sonographers’ health, especially concerning musculoskeletal system, as multiple muscles and joints are engaged during scanning.

Objective: The aim of this study was evaluating the prevalence and type of musculoskeletal symptoms among diagnostic medical sonographers, as well as identifying their professional profile.

Methods. The study covered 553 Polish sonographers who responded to an online survey comprising 27 questions, including open, as well as branching questions allowing to provide more detailed information depending on the answers given. The survey was geared towards identifying the type and frequency of the experienced symptoms, and determining additional contributing factors.

Results: 83% of the respondents have experienced work-related musculoskeletal disorders. The research presents the detailed characteristics of the symptoms experienced by sonographers in their work, and their professional profile.

Conclusions: A majority of physicians performing ultrasound experience musculoskeletal pain. Deeper analysis of the underlying causes and potential correlations with given contributing factors (variables) that could be effectively addressed may facilitate introduction of some preventive measures and occupational hygiene rules in the field of ultrasound diagnostics, as well as help to implement interventions aimed at relieving the symptoms and improving the health of the examining specialists.
SONOGRAPHIC CHANGES ON HISTOGRAM IN PATIENTS WITH ACHILLES TENDINOPATHY

Authors:
José Luis Arias-Buría1,2,3 PT, MSc, PhD; Samuel Fernández-Carnero3,4 PT, MSc; Félix Raúl Albalate-Barbero3,5,6 PT, MSc; Gracia María Gallego-Sendarrubias7 PT, MSc, PhD; Ricardo Ortega-Santiago1,2 PT, MSc, PhD; César Fernández-de-las-Peñas1,2 PT, MSc, PhD.

Affiliation:
1 Departamento de Fisioterapia, Terapia Ocupacional, Rehabilitación y Medicina Física, Universidad Rey Juan Carlos, Alcorcón, Madrid, Spain.
3 Member of the Sociedad Española de Ecografía en Fisioterapia: SEEFi.
4 Departamento de Fisioterapia, Universidad Francisco de Victoria, Pozuelo de Alarcón, Madrid, Spain.
5 Clinician, Department of Physical Therapy, Hospital Universitario 12 de Octubre, Madrid, Spain.
6 Physical Therapy in Fisiovitally Clinical Center, Collado Villalba, Madrid, Spain.
7 Department of Physiotherapy, Camilo José Cela University, Madrid, Spain.

Abstract:

Background: Achilles tendinopathy is a condition characterized by localized pain over the Achilles tendon usually associated with physical activity/sports.

Objective: To investigate differences on histograms of the Achilles tendon body between patients with non-insertional Achilles tendinopathy and healthy controls.

Methods: A case-control study including subjects with Achilles Tendinopathy (AT) and healthy matched control (HC) was conducted. An ultrasound machine M7 (Shenzhen Mindray Co. Ltd, China) was used with a linear array with a footprint 50mm in to quantify the effect. Using B-Mode long axial images were obtained at short axial at 4.5 cm from the upper part of the heel, with a frequency of 12 MHz, a depth of 3 cm, a placement of the focus to 1.5 cm, gain of 50%, a probe pressure at 100 KPa. and an angle of 90º of the probe. Ultrasound measurements were analyzed in a post-acquisition process using the “ImageJ” software. Pressure pain thresholds (PPT) at the calcaneous bone were obtained. Related-disability was assessed with the VISA-A. RESULTS: Ten patients with AT and 10 matched controls were included. Patients with AT showed lower PPT (232 ±34.1 kPa) and VISA-A (64/100) than HC (PPT: 466.8 ±31.4 kPa, VISA-P: 100/100, P<0.001). Patients with AT exhibited greater cross-sectional area (CSA: 2.61cm²), perimeter (mean: 6.60 cm), thickness (mean: 2.96 cm), and width (mean: 2.961cm) of the tendon compared to healthy controls (CSA: 1.32cm²; perimeter: 4.14cm; thickness: 1.11cm; width: 1.339cm, all P<0.001). The histogram’s gray scale was not significantly different (P=0.39) between patients with AT (41.08) and healthy controls (67.15), but a kurtosis of the patient group to the left corresponding to greater quantity and intensity of the tendon tissue grey was observed. CONCLUSION: Sonography can be a good screening tool for detecting qualitative histogram changes in the body of Achilles tendon in individuals with non-insertional AT.
THE ECHOTEXTURE OF SPASTIC MUSCLE IN STROKE PATIENTS USING LOCAL BINARY PATTERN WITH SONOELASTOGRAPHIC IMAGING

Authors:
Peng-Ta Liu, Ta-Sen Wei, Huihau-Kenny Chiang

Affiliation:
Changhua Christian Hospital / National Yang-Ming University

Abstract:

Background: Muscle properties changes early after stroke. Accurately characterizing and quantifying the stiff muscle is clinically important to better understand the altered muscle function and movement control.

Objective: The aim of this study was to investigate the feasibility of sonoelastography to determine the muscle stiffness and the echotexture in poststroke. We also tested the relationship among sonoelastography findings, muscle echotexture features and functional performance in the spastic muscle.

Methods: A total of 22 men with stroke were studied. The intrinsic stiffness of biceps brachii muscles (BBM) on both arms were assessed at rest by shear wave velocity and echotexture features (entropy & energy) were extracted by Local Binary Pattern (LBP) of ultrasound imaging. The scanning images of BBM were acquired in both the transverse and the longitudinal planes. The Fugl-Meyer Assessment (FMA) and Functional Independence Measure (FIM) were used to assess the functional performance of upper arm.

Results: The shear wave velocity was significantly faster in paretic BBM, compared to non-paretic BBM in the transverse and the longitudinal planes. The echotexture (entropy & energy) was more in-homogeneous in the paretic BBM than in the non-paretic side on both scanning planes. The shear wave velocity was correlated to entropy \( r = -0.44, P = 0.04 \) and energy \( r = 0.49, P = 0.02 \) in the longitudinal plane. The energy was correlated to FMA \( r = -0.46, P = 0.03 \), FIM \( r = -0.55, P < 0.01 \) in the longitudinal plane, and age \( r = 0.49, P = 0.03 \), duration from stroke onset \( r = -0.53, P = 0.02 \) in the transverse plane.

Conclusion: The echotexture of LBP is capable to be a useful biomarker for quantitative assessment of the spastic BBM in patients with early stroke.
THE LORDOGENETIC MIDLINE SYNDROME - A NOVEL CONCEPT OF ALL ABDOMINAL VASCULAR COMPRESSION SYNDROMES

Authors:
Thomas Scholbach

Affiliation:
Thomas Scholbach, praxis.scholbach@posteo.de, Leipzig Ultrasound Institute, Professor Dr. med. habil., Leipzig, Germany

Abstract:

Background: All abdominal vascular compression syndromes (AVCS) are regarded rare and independent entities. In the author’s experience, having diagnosed many hundreds of patients, the opposite can be proven. Their isolated perception is the reason for failed treatments.

Objectives: A unifying concept – the Lordogenetic Midline Syndrome is presented and explained. It traces back all so far known abdominal vascular compression syndromes to the development of an aggravated lumbar lordosis as a human evolutionary trait that is responsible for the mismatch of the (originally quadruped) human anatomy and the unique bipedal way of human locomotion which differs fundamentally from other forms of bipedalism.

Methods:
1. Dynamic color Doppler sonography in different positions of the trunk, hip joints and diaphragm and before and after a meal
2. Doppler sonographic pressure gradient measurements
3. Dynamic Tissue Perfusion Measurement with the PixelFlux-method

Results: The widening of the female pelvis increases the tractive force of the psoas muscles onto the lumbar vertebrae and its enlarging anterior-posterior dimension causes an anterior tilt of the female pelvis. Both mechanisms provoke an increased lumbar lordosis as an evolutionary adaptation to the increasing human fetal brain.

1. Celiac trunk compression is caused by the increased traction of the bulging lordotic lumbar spine onto the diaphragmatic crura, thus reducing the width of the aortic hiatus
2. Lumbar lordosis directly compresses the left renal vein in Nutcracker Syndrome and left common iliac vein in May-Thurner-Syndrome, the duodenum in Superior Mesenteric Artery Syndrome as well as the Vena cava in its compression
3. Pelvic congestion syndrome is the direct consequence of May-Thurner-Syndrome and aggravated by collateralized blood from the congested left renal vein in Nutcracker Syndrome
4. Femoral vein compression against the pubic bone is caused by overstretching the hip joint to enable lumbar lordosis and thus bipedal gait.
5. Lumbar artery compression syndrome is a sequel of lordotic tightening of the surrounding muscular tissue of the diaphragmatic crura
6. Central nervous disorders are caused by the congestion of the epidural plexus. Lumbar lordosis enforces the tunneling of left sided venous blood to reach the right sided caval system

Conclusions: The human hip joint is primarily not well suited for an upright gait. What today is regarded its “physiological” range of motion can be achieved only by “over”-stretching the joint thus enforcing the lumbar lordosis. All AVCS can be traced back to the effect of an aggravated lumbar lordosis and must be looked for. They cause pain from head to toe, vegetative symptoms as nausea, diarrhea, constipation, vomiting, tachycardia, fainting, dysuria, menstrual pain, dyspareunia, hemorrhoids, diplegia and hematuria.
EVALUATION OF THE EFFECTIVENESS OF ULTRASONOGRAPHY IN THE DIAGNOSIS OF VISCERAL ARTERY ANEURYSM

Authors:
Jaromir Kargol1, Katarzyna Lipińska1, Marcin Bąk1, Magdalena Komajda1, Małgorzata Nowakowska1, Ewa Piasek1, Łukasz Światłowski 1, Jan Sobstyl 2, Anna Drelich-Zbroja2

Affiliation:
1 Students Scientific Society at the Department of Interventional Radiology and Neuroradiology, Medical University of Lublin
2 Department of Interventional Radiology and Neuroradiology, Medical University of Lublin

Abstract:
Background: Visceral artery aneurysms (VAA) are rare, often asymptomatic entity, but can present as life-threatening ruptures that require emergency treatment.
Objective: The aim of this study was to present the effectiveness of ultrasonography in VAA diagnosis.

Materials and methods: During the 8 years (2010-2017) ultrasound evaluation of visceral vessels was performed in a group of 7650 patients (4135 men and 3515 women), aged 16-82. All patients underwent fasting examination on GE LOGIQ9, GE LOGIQ7 or ALOKA ProSound systems. For each case, a morphological assessment in B-mode presentation with additional hemodynamic evaluation with colour and pulse Doppler were made. Power Doppler and B-Flow were used in specific cases. 3D reconstructions were not used routinely.

Results: Of the 7650 patients examined, aneurysm were diagnosed in 42 (24 men and 18 women). No case of multiple aneurysms has been detected. None of the 42 subjects presented characteristic symptoms, while 15 of them reported non-specific abdominal pain. There were 23 cases of splenic, 7 hepatic, 6 celiac trunk, 2 gastro-duodenal, 3 superior mesenteric and 1 inferior mesenteric artery aneurysms. In 26 cases (61%) the diameter of aneurysm exceeded >2 cm. Each of 12 symptomatic patients who presented as emergency admission underwent a CT scan. All of the ultrasound examinations performed afterwards turned out to be non-diagnostic.

Conclusions: Ultrasound examination is non-inferior to CT in terms of diagnostic effectiveness of non-ruptured VAAs of a diameter >2 cm. Appropriate presentations, including B-Flow and Doppler techniques (colour, pulse, power) allow for an accurate assessment of both the vessel morphology and hemodynamic parameters of the blood flow. However, sonographic methods are not efficient in cases of the vessel wall rupture, when the evaluation of vascular morphology is hindered by the presence of free abdominal blood and the patient’s severe condition makes the cooperation between patient and diagnostician difficult.
THE UTILITY OF ULTRASOUND EXAMINATION IN DIAGNOSIS OF COMPLICATIONS FOLLOWING PERIPHERAL ARTERY CATHETERIZATION

Autors:
Marcin Bąk¹, Małgorzata Nowakowska¹, Jaromir Kargol¹, Magdalena Komajda¹, Ewa Piasek¹, Ewa Kuklik², Maryla Kuczyńska², Anna Drelich Zbroja²

Affiliation:
¹ Students Scientific Society at the Department of Interventional Radiology and Neuroradiology, Medical University of Lublin, Poland
² Department of Interventional Radiology and Neuroradiology, Medical University of Lublin, Poland

Abstract:

Background: The number of percutaneous procedures is constantly increasing due to their minimally invasive nature, which directly translates into lower complication rates compared to cardiac or vascular surgical operations. Endovascular procedures are embraced by a wide variety of operators, including interventional cardiologists, interventional radiologists as well as vascular surgeons. Arterial catheterization is a minimally invasive and relatively safe procedure when performed by an appropriately skilled practitioner. Nevertheless, like any other invasive procedure, it carries a risk of complications. The most common are: hemorrhage or hematoma formation at the puncture site, occurrence of pseudoaneurysm or arteriovenous fistula, infection and artery occlusion.

Objective: The aim of this study was to evaluate the utility of ultrasound examination in diagnosis of complications following the arterial catheterization for endovascular diagnostic and therapeutic procedures.

Methods: During 48-month period, 306 patients with a suspected pathology at the arterial (femoral, brachial or radial) puncture site were referred for the doppler ultrasound (US) examination. All the subjects were scanned with GE LOGIQ 9 ultrasound system. The morphology of a puncture site was evaluated using B-mode, whereas triplex imaging with additional B-flow mode were used for hemo-dynamic assessment of the potentially injured vessels.

Results: The US examination revealed hematoma in 78 patients, pseudoaneurysm in 32 cases (25 in femoral artery and 7 in brachial artery), arteriovenous fistula in 11 cases (8 femoral and 3 brachial) and radial artery occlusion in 6 cases. 3 patients were diagnosed with pseudoaneurysm of the brachial artery coexisting with arteriovenous fistula. 13 patients with pseudoaneurysm were qualified to treatment with percutaneous thrombin injection.

Conclusion: Doppler ultrasound examination is the method of choice for the assessment of potential vascular complications following the arterial catheterization. By providing immediate and accurate diagnosis, it enables patient qualification for further treatment.
Vascular

USG DOPPLER IN MONITORING PATIENTS AFTER ENDOVASCULAR TREATMENT OF ABDOMINAL AORTA ANEURYSM

Authors:
Małgorzata Nowakowska¹, Marcin Bąk¹, Ewa Piasek¹, Monika Zbroja¹, Weronika Cyran³a¹, Maryła Kuczyńska², Łukasz Światłowski², Anna Drelich-Zbroja²

Affiliation:
¹Students Scientific Society at the Department of Interventional Radiology and Neuroradiology, Medical University in Lublin
²Department of Interventional Radiology and Neuroradiology, Medical University in Lublin

Abstract:

Background: The indication for treatment aneurysms is the diameter of abdominal aorta greater than 55 mm or an aneurysm growth exceeds 10 mm/year. Abdominal aorta aneurysms (AAA) may be treated endovascularly (EVAR) or by open surgery.

Objective: To assess the value of USG Doppler examination in monitoring patients after endovascular treatment of AAA

Material and methods: 350 patients with AAA underwent stentgraft implantation. Every patient was examined 12 months after procedure, first using USG Doppler, power Doppler, B-flow and then Angio-CT was performed.

Results: In control examinations both USG and CT showed: in 1 patient thrombosis of the right leg of stentgraft and in 2 patients thrombosis of the left leg, furthermore in 3 patients perimural thrombus in main body was detected. USG indentified 26 endoleaks (blood flow within the aneurysm sac): in 4 patients type Ia, in 5 patients type Ib, in 9 patients type IIa and in 8 type IIb. However in ANGIO-CT endoleak was detected in 31 cases: in 4 patients Ia, in 5 patients Ib, in 12 patients IIb and in 10 patients IIa.

Conclusion: USG examination as well as angio-CT achieves the same results in assessment of stent graft legs and main body patency. However Angio-CT has got the higher sensitivity comparing to USG in detecting endoleaks, especially type II.
ULTRASOUND BIOMICROSCOPY IN THE DIAGNOSIS OF GIANT CELL ARTERITIS

Autors:
Nicolas Azulay, Alexandra Hombreux, Nathalie Tieulié, Sandra Lassalle, Stéphanie Baillif, Pascal Giordana, Charles Raffaelli

Affiliation:
Ultrasound’s Department; Universitary teaching hospital of Nice, CHU Pasteur II, 30 Avenue Voie Romaine; Nice; France

Abstract:

Background: Giant cell arteritis (GCA) is the most common vasculitis with particular affinity for temporal artery and eye-supplying arteries. Temporal artery biopsy (TAB) remain the invasive gold standard for diagnosis. Non invasive temporal artery imaging as conventional high frequency ultrasound has not a sufficient accuracy for replacing TAB. Introducing new therapeutics as biotherapies need the development of new non invasive imaging tools. Biomicroscopy ultrasound (BMU) use very high frequency probes (till 70 MHz) with a spatial resolution around 20 µm which allows an access to the entire temporal artery wall.

Objective: The purpose of this study was to evaluate the value of ultrasound biomicroscopy (UBM) in the diagnosis of GCA.

Methods: 19 patients with classical clinical criterias of GCA were included. Both temporal arteries were explored using an ultra-high frequency transducer (Vevo MD, Visualsonics, 70 MHz) providing an axial resolution of 20 µm. Wall artery analysis relayed on (i) Wall thickness and ratio artery diameter/wall thickness (ii) Characteristic GCA features as intima hyperplasia. All the patients underwent a temporal artery biopsy as a gold standard with histologic and biomicroscopic correlations.

Results: The feasibility of UBM was complete in all the patients. 11 patients were diagnosed with GCA by TAB. The UBM wall thickness ratio \( p = 0.001 \) and intimal hyperplasia \( p = 0.001 \) were highly correlated with GCA. A wall thickness ratio > 2 had an accuracy of 100%.

Conclusion: The UBM seems a new and promising device for early diagnosis and monitoring of GCA. Further studies are required.
DIFFERENT TRANSRECTAL PROSTATE BIOPSY TECHNIQUES - WHICH ONE IS THE BEST?

Autors:
Mateusz Mokrzyś¹, Andrzej Lewicki¹, Magdalena Zagrodzka², Katarzyna Sklinda³, Michał Pyzlak⁴, Joanna Ostrowska⁵, Jakub Dobruch¹

Affiliation:
¹ Department of Urology, Centre of Postgraduate Medical Education, Orlowski Public Clinical Hospital, Warsaw, Poland
² CT/MR Imaging Department, Voxel Medical Centre, Warsaw, Poland
³ Department of Radiology, Central Clinical Hospital of the Ministry of Interior, Warsaw, Poland
⁴ Department of General & Experimental Pathology, Medical University, Warsaw, Poland
⁵ Department of Pathology, Centre of Postgraduate Medical Education, Orlowski Public Clinical Hospital, Warsaw, Poland

Abstract:
Introduction: Multifocal transrectal ultrasound guided prostate biopsy (TRUScore Bx) is still standard procedure in the diagnosis of prostate cancer (PCa). Multiparametric-MRI (mpMRI) has high sensitivity for clinically significant PCa (CS PCa). Apart of systematic TRUScore Bx (SBx) new MRI-TRUS registration biopsy techniques like cognitive (CBx) or software-based fusion (FBx) are available in clinical practice.

Objective: The aim of this study was to compare the detection of CS, clinically insignificant (CI) and any PCa in SBx versus CBx versus FBx.

Methods: Study group included thirty nine consecutive men subjected to primary (25 men-64%) and repeated (14 men-36%) TRUScoreBx due to suspicion of PCa. The median age was 66 (50-78) yo, PSA level 6,6 ng/ml, PSAD 0,11. All men underwent 1,5T (23 men -59%) or 3T (16 men-41%) mpMRI. During the same procedure study protocol consisted of: SBx performed by the first operator blinded for mpMRI results (mean 12 cores), CBx performed by the first operator after reviewing mpMRI results (mean 2 cores) and finally FBx performed by the second operator using BioJet System biopsy platform (mean 2,2 cores).

Results: Combining all three modalities detection reached: 51,3% for PCa, 48,7% for CS PCa and 2,6% CI PCa. Detection for each technique reached: SBx 33,3%, CBx 33,3% and FBx 41% for PCa; SBx 25,6%, CBx 25,6% and FBx 35,9% for CS PCa; and SBx 7,7%, CBx 7,7% and FBx 5,1% for CI PCa. Only systematic biopsy would miss 47% of CS PCa (9/19). Combining all three modalities the only one CI PCa was found by systematic biopsy.

Conclusions: We found that FBx targeted biopsy using fewer cores than SBx detects 21% more cancer than SBx in CS PCa group, respectively. Performing only systematic biopsy misses very high number of CS PCa.
KIDNEY SHEAR WAVE SPEED IS LOWER IN PATIENTS WITH CHRONIC KIDNEY DISEASE COMPARED TO NORMAL CONTROLS- A META-ANALYSIS

Authors:
Flaviu Bob, Iulia Grosu, Ioan Sporea, Alina Popescu, Roxana Sirli, Adalbert Schiller

Affiliation:
Department of Internal Medicine 2, University of Medicine and Pharmacy “Victor Babes” Timisoara, Romania

Abstract:

Background: Data regarding the use of elastography in the assessment of the kidneys is quite scarce so far, however it seems that kidney shear wave speed (KSWS) is decreased in the presence of renal disease.

Objective: We performed therefore a meta-analysis of the studies using renal elastography in order to find if there is a difference between KSWS in normal subjects compared to patients with chronic kidney disease.

Methods: Databases (PubMed, Medline, Medscape) were searched for all studies, published until June 23rd, 2018, that evaluate stiffness using elastography of the native kidneys (studies performed in transplanted patients have been excluded). Because the results obtained using different types of elastography are not comparable, we have chosen to include only studies that used point shear wave elastography (Virtual Touch Quantification -VTQ system), this one being the most commonly used system until now.

Results: Seven studies (full-length articles) including 639 patients with CKD and 640 normal controls were included in the analysis. We found that patients with CKD show a lower KSWS compared to normal controls with a standardized mean difference of -0.349. We have found also a positive correlation between KSWS and eGFR with a pooled correlation coefficient of 0.3 (Z=7.7, p<0.001). Across the studies the pooled area under ROC curve for SWS to predict mild renal disease was 0.77 (95% CI, p<0.001). However the published studies show an increased heterogeneity (Q= 164.6, p<0.0001).

Conclusion. Our meta-analysis shows that KSWS is decreased in patients with CKD, and there is a decrease of KSWS with the progression of CKD (decrease of eGFR). However the number of studies using VTQ, published so far is small and the results show an increased heterogeneity.
STRAIN ELASTOGRAPHY AND SHEAR-WAVE ELASTOGRAPHY IN THE DIAGNOSIS OF PROSTATE CANCER OF CLINICAL IMPORTANCE

Autors:
Przewor Przewor PhD, Department of Urology and Urologic Oncology in Masovian Regional Hospital, Siedlce, Poland
Slapa Z. Rafal Prof. Assistant, Diagnostic Imaging Department, 2ND Faculty of Medicine in Medical University of Warsaw, Warsaw, Poland

Affiliation:
Slapa Z. Rafal Prof. Assistant, Diagnostic Imaging Department, 2ND Faculty of Medicine in Medical University of Warsaw, Warsaw, Poland e-mail: rz.slapa@gmail.com

Abstract:
Background: Prostate cancer is the most often recognizable cancer among men. Nowadays a systematic 12-core biopsy is a diagnostic standard in the diagnosis of cancer. However, the sensitivity of this method does not exceed 70%, and with 30-45% of cases, the assessment of cancer stage after a biopsy is underestimated in comparison to preparations after surgical treatment. An ideal diagnostic method is the method which detects only tumours having clinical importance, ignoring tumours without clinical importance, avoiding overdiagnosis and overtreatment. The aim of this study is to assess the use of strain elastography (ES) and shear-wave elastography (SWE) in the diagnosis of prostate cancer of clinical importance.

Objective and Methods: 160 men with suspicion of prostate cancer were examined. Finally, 146 men underwent complete assessment at all diagnostic stages. The ill were divided into two groups. The first 102-person group were examined with ES, the second 44-person group were examined with SWE. All patients underwent a systematic biopsy.

Results: 52 neoplastic lesions were recognised in the first group. The sensitivity of guided biopsy with ES was 80.8%, and in the group of clinical importance was 85.7%. In the second group, 21 tumours were recognized. The sensitivity of SWE was estimated at 85.7%, in the group of cancer of clinical importance at 90%. The sensitivity ES and SWE were increasing together with the degree of tumour malignancy.

Conclusion: Elastosonographic evaluation seems to be a valuable tool in the diagnosis of prostate cancer. The sensitivity of SWE is higher than ES sensitivity (80.85 vs 85.75). It has been also stated that this is the method with the highest sensitivity in the group of tumours of clinical importance (90%). It appears that SWE can replace a systematic biopsy as a standard in the diagnosis of prostate cancer.
Background: The Nutcracker-Syndrome is perceived as a compression of the left renal vein between two branches of a nutcracker – the aorta and the superior mesenteric artery. This concept influences treatment considerations.

Objectives: It is demonstrated, that there is no real nutcracker. That’s why attempts to open the presumptive clamp of aorta and SMA must fail. Therefore, a new concept of left renal vein compression is presented.

Methods: Patients with Nutcracker Syndrome were evaluated before and after removal of the overlying superior mesenteric artery. Color Doppler ultrasound videos of the left renal vein were recorded. Pressure gradients were measured at different sites inside the vein. Renal perfusion measurements were carried out with the PixelFlux-method (www.chameleon-software.de).

Results: Removal of the anterior branch of the so-called nutcracker has no effect on the pressure gradient in the left renal vein and perfusion of the left kidney. The ongoing compression is exerted by the aorta which is uplifted by an exaggerated lumbar lordosis. In other cases the left renal vein is compressed by the arching origin of the right renal artery or between the right renal artery and the hepatic artery.

Conclusions: A differentiated approach to the syndromes of the left renal vein compression is recommended. Successful treatment considerations must take into account that the entire force to compress the vein comes from the lordotic spine. Moreover, the transport capacity of the collateral pathways must be elucidated in detail. The removal of obstructions of these pathways is an important building block to remove all symptoms of the patient.
THE RELATIONSHIP BETWEEN KIDNEY SHEAR WAVE SPEED MEASURED USING THE VTQ TECHNIQUE AND NOVEL BIOMARKERS USED IN CHRONIC KIDNEY DISEASE

Autors: Flaviu Bob, Iulia Grosu, Ioan Sporea, Alina Popescu, Roxana Sirli, Georgeta Bujor, Ligia Petrica, Adalbert Schiller

Affiliation: Department of Internal Medicine 2, University of Medicine and Pharmacy “Victor Babes” Timisoara, Romania

Abstract:

Background. The results published so far regarding the use of elastography in the assessment of the kidneys show a decrease of kidney shear wave speed (KSWS) with the progression of renal disease, this relationship being probably due to multiple factors.

Purpose. The present study aims to find a relationship of KSWS measured using Virtual Touch Quantification (VTQ) with specific biomarkers of mineral bone disorder (CKD-MBD): fibroblast growth factor 23 (FGF23), parathormone (iPTH); with markers of inflammation: interleukin 6 (IL6) and C reactive protein (CRP) and with a marker of tubular injury – kidney injury molecule 1 (KIM-1).

Material and methods. Our study included 63 patients with diabetic kidney disease (stages 1-5, mean eGFR 65.15 +/- 32.45 ml/min) with a mean age 58.13 +/- 12 years. In all patients KSWS was measured using VTQ (Siemens) and median values of 5 valid KSWS measurements were calculated and expressed in meters/second (m/s). In all patients we assessed renal function- glomerular filtration rate (eGFR), CRP and using an ELISA method, serum levels of: FGF23, iPTH, IL-6, KIM-1.

Results. Because the mean KSWS were similar in both kidneys (2.23 0.583 m/s vs. 2.18 0.63 m/s, p = 0.8), further analysis were performed using KSWS obtained in the left kidney. We found a statistically significant negative correlation of KSWS with FGF23 (r=-0.36, p=0.02), however no correlation with iPTH. Regarding inflammation we found a negative statistically significant correlation with CRP (r=-0.41, p=0.02) and no correlation with IL6. We found also a significant negative correlation with KIM-1 (r=-0.42, p=0.02)

Conclusion. Our study shows that decreased levels of KSWS are associated to inflammation (CRP), renal tubular injury (KIM-1), but there is also an indication of a possible relationship with vascular calcifications (FGF23).
**WHAT IS THE ROLE OF ULTRASOUND IN COGNITIVE MRI TARGETED BIOPSY? WHERE TO LOOK FOR PROSTATE CANCER?**

**Autors:**

Mateusz Mokrzyś¹, Andrzej Lewicki¹, Magdalena Zagrodzka², Katarzyna Sklinda³, Michał Pyzlak⁴, Joanna Ostrowska⁵, Jakub Dobruch¹

**Affiliation:**

1 Department of Urology, Centre of Postgraduate Medical Education, Orlowski Public Clinical Hospital, Warsaw, Poland  
2 CT/MR Imaging Department, Voxel Medical Centre, Warsaw, Poland  
3 Department of Radiology, Central Clinical Hospital of the Ministry of Interior, Warsaw, Poland  
4 Department of General & Experimental Pathology, Medical University, Warsaw, Poland  
5 Department of Pathology, Centre of Postgraduate Medical Education, Orlowski Public Clinical Hospital, Warsaw, Poland

**Abstract:**

**Background:** Multifocal transrectal ultrasound guided prostate biopsy (TRUScore Bx) is still standard procedure in the diagnosis of prostate cancer (PCa). Multiparametric-MRI (mpMRI) is routinely used in the assessment of focal prostatic lesions.

**Objective:** The aim of this study was to assess the role of ultrasound imaging in detection of suspected lesions and PCa in cognitive TRUScoreBx in relation to PIRADS score. Moreover we assessed the most common tumor location in primary and repeated biopsy.

**Methods:** Study group included thirty nine consecutive men subjected to primary (25 men – 64%) and repeated (14 men – 36%) TRUScoreBx. All men underwent 1.5T (23 men – 59%) or 3T (16 men – 41%) mpMRI and cognitive TRUScoreBx of index lesion. In total we defined 81 suspected lesions on MRI images (PI-RADS v.2): 6 lesions – PIRADS 5 (7.4%), 33 lesions – PIRADS 4 (41%); 41 lesions – PIRADS 3 (51%); 1 lesion – PIRADS 2 (1%).

**Results:** Suspected index lesions visible in ultrasound imaging regarding PI-RADS score were seen in: PI-RADS 5– 50%, PI-RADS 4– 45%, PI-RADS 3– 18% cases, regarding PCA histopathological results: Gleason score (Gls.) 6 (3+3) - 25%(1/4); Gls. 7(3+4)- 40%(2/5), Gls.7 (4+3)- 75%(3/4), ASAP-100%(3/3). PCA detection rates with lesion visible in ultrasound compared to not visible depending on the PI-RADS score reached: PI-RADS 5– 67%(2/3) vs 67%(2/3), PI-RADS 4 – 30%(3/10) vs 33%(4/12), PI-RADS 3– 50%(1/2) vs 11%(1/9). Suspicious foci with confirmed cancer were more often located in posterior parts in primary biopsy and anterior parts in repeated biopsy.

**Conclusions:** In this study, we found positive correlation between visibility of lesion in ultrasound, PIRADS score and PCa histopathological grading of PCa. Visibility of lesion in ultrasound didn’t improve PCa detection rate regarding PI-RADS score. The probability of PCa detection was lower than reported in the literature. In repeated biopsy PCa is more often located in the anterior parts. Further studies on this topic are warranted.
LIVER LOBES AND SPLEEN VOLUME ESTIMATION FORMULAS BASED ON LINEAR AND SURFACE ORGAN DIMENSIONS

Authors:
G. Stavridis, I. Gatos, I. Theotokas, P. Drazinos 1, E. Panteleakou 1, A. Soultatos, P.S. Zoumpoulis,

Affiliation:
1. Diagnostic Echotomography S.A., 317C Kifissias Ave., GR 14561, Kifissia

Abstract:

Background: There is correlation between the volume of the Liver Left Lobe (LL), Caudate Lobe (CL) and Right Lobe (RL) and the progress of Chronic Liver Disease (CLD). The degree of Portal Hypertension is also correlated with spleen size. Liver lobes and spleen volumes estimation seem more reliable in defining CLD and PH severity than their conventional longitudinal measurements.

Objective: The aim of this study is to assess Liver Lobes and Spleen volumes by defining mathematical formulas that relate them to parameters derived by examination.

Methods: A clinical dataset of 30 patients who underwent CT examination was compiled. For each patient, the volume of RL, LL, CL and SP was calculated through CT-Volumetry. Additionally, for each patient’s RL, LL, CL and SP a longitudinal diameter (L), two diameters on a predefined axial plane (TR, AP), as well as the organ’s surface (A) on the predefined axial plane, were measured based on CT-imaging. Through statistical analysis based on the previous dimensions, the following mathematical formulas for the volume estimation of RL, LL, CL and SP were defined. Finally, linear regression was performed to evaluate the volume estimation of liver lobes and spleen formula, and compare the estimation with the corresponding CT-volumetry results.

Results:
Mathematical formulas:
VRL = 0.42 LRL * TRRL * APRL
VLL = 0.65 * LLL * ALL
VCL = 0.80 * LCL * ACL
VSP = 0.64 * LSP * ASP
There was an excellent correlation (R²>0.96, p<0.00001) between the formula derived and the corresponding CT-Volumetry volume for all liver lobes and spleen. For RL, LL, CL and SP the mean absolute error (%) was 3.48% (± 45.8ml), 7.76% (± 24.3ml), 11.5% (± 4.5ml) and 7.87% (± 26.9ml) respectively.

Conclusion: A safe estimation of the liver lobes and spleen volume is possible with the use of the proposed formulas.
OMENTAL INFARCTION IN US AND CT.

Autors:
Andrzej Smereczynski¹, Katarzyna Kolaçzyk²

Affiliation:
¹ Genetics and Pathomorphology Department of Pomeranian Medical University, Self-education club of Ultrasonography; Szczecin, Poland
²Westpomeranian Oncological Center, Szczecin, Poland

Abstract:
Background: The greater omentum is a four-layered fold of peritoneum arising from the greater gastric curvature, covering the colon and small bowel, descending down to the symphysis. It contains fat, vascular and lymphatic structures, acting as a barrier to the spread of intraperitoneal infection or tumor. Omental infarction is a rare cause of acute abdominal pain. It occurs when there is an impairment of blood supply to the omentum, possibly due to torsion, trauma, venous insufficiency or spontaneous thrombosis of the omental veins.

Material and methods: We present sonographic appearances of omental infarction in 15 patients (8 male and 7 female). All reported cases were collected over a 20-year-period. All the examinations were performed according to the guidelines approved by the Polish Society of Ultrasonography, initially with analogue and later with digital US scanners. All the lesions were evaluated using 3-6 MHz convex transducers and 6-12 MHz linear-array transducers. Each time the size, compressibility and painfulness were assessed. In 9 patients color and power doppler imaging was also applied. We also present few cases of omental infarction on CT images, all depicted in control examinations after surgical interventions.

Results: The typical sonographic appearance of omental infarction include: hyperechoic, painful, non-compressible and avascular mass-like lesion, usually located in the right upper abdomen. On CT it presents as a well circumscribed, focal, hazy, nonenhancing, heterogenous and high-attenuating fatty mass.

Conclusions: Omental infarction is a rare cause of abdominal pain, but should always be taken into consideration. Unlike other reasons of acute abdomen, the entity is self-limited in most cases and does not require surgery. Omental infarction also occurs in patients after surgical interventions and then conservative treatment is also indicated.
POSTOPERATIVE WOUND ASSESSMENT WITH THE USE OF HIGH-FREQUENCY ULTRASONOGRAPHY AND CLASSICAL ULTRASONOGRAPHY WITH AN OPTION OF ELASTOGRAPHY - PRELIMINARY REPORTS

Autors: Krauze Agnieszka 1, Mlosek Robert Krzysztof 1, Woźniak Witold2

Affiliation:
1 Department of Imaging Diagnostics, Medical University of Warsaw, Warsaw, Poland
2 First Department and Clinic of General and Vascular Surgery of the Second Faculty of Medicine, Medical University of Warsaw, Warsaw, Poland

Abstract:

BACKGROUND: So far, there is no objective method for objective evaluation of fresh postoperative wounds. Therefore, it is difficult to classify wounds and choose the proper treatment method at the very beginning of the tissue healing process.

OBJECTIVE: The aim of this study was to analyze postoperative wounds with the use of high-frequency ultrasonography and classical ultrasonography with the option of elastography.

METHODS: The study was conducted on a group of 40 patients of the I Department of General and Vascular Surgery of the Medical University of Warsaw. All patients underwent postoperative ultrasound examination of the wound during the first two days after a surgery. The examination was conducted with a Philips EPIQ5 machine equipped with a 18-5MHz linear probe, DRAMIŃSKI DermaMed machine with a 48MHz mechanical probe and were additionally photographed with a camera. Firstly, the optical evaluation of the wound was made and the wound was photographed. Next, during the ultrasound examination, changes in the dermis (its thickness, echogenicity and vascularization) were assessed. Finally, elastographic assessment was carried out.

RESULTS: The obtained data were analyzed and differences in thickness, echogenicity, vascularization and stiffness of postoperative wounds were observed. It allowed to evaluate postoperative wounds objectively. Also, the problems associated with this investigation were identified: in the first days after the operation the large amount of free gas in the wound obscures the ultrasound image.

CONCLUSION: High-frequency ultrasonography and classical ultrasonography with the option of elastography are methods that allow for accurate imaging of postoperative wounds. They objectify the wound assessment before choosing a treatment method that allows the reduction of postoperative scars. However, it is necessary to continue research, in the form of a follow-up study, with patients undergoing different forms of wound treatment.
BACKGROUND: Wide and common use of ultrasound has enabled the detection of thyroid lesions in up to 70% of the population, most of which are benign. However, around 10% of all the lesions turn out to be malignant. Ultrasound B-mode examination is characterized by high sensitivity in detecting thyroid lesions but its accuracy in differentiating malignant from benign tumors is not sufficient. Therefore, there is a need to search for noninvasive diagnostic methods with higher sensitivity and specificity in detecting malignant lesions.

OBJECTIVE: The aim of our study was to evaluate the utility of quasi – static real-time elastography (Strain Elastrography – SE) in diagnosing thyroid cancer.

METHODS: We examined 135 patients with 165 thyroid lesions. B-mode ultrasound and strain elastography (SE) using IU-22 scanner (Phillips) with linear array transducer (3 – 12 MHz frequency) was performed. We analysed echogenicity and echostructure of the nodules, margins, height to width ratio (H/W), microcalcifications and vascular pattern in color doppler (intranodular/perinodular). In SE examination, we assessed stiffness of the lesions qualitatively, using 4 - point imaging strain scale based on Asteria’s criteria and semi-quantitatively with the strain ratio (SR) which is defined as the ratio of strain of surrounding tissue to the strain of the lesion.

RESULTS: From 165 lesions, 119 were benign and 46 were malignant. B – mode analysis using multifactorial logistic regression revealed 63.04% sensitivity and 91.06% specificity. In SE examination and SR analysis the results were 50%, 90.76% and 21.74%, 93.28% respectively. When the two modalities were combined, the sensitivity was 65.22% and specificity 90.76%.

CONCLUSION: The study showed that SE alone or in combination with B-mode does not improve significantly the differentiation of thyroid nodules when compared to the evaluation carried out with B-mode only.
THYROGLOSSAL DUCT ANOMALIES IN THE ROOT OF THE TONGUE AS AN OCCASIONAL ULTRASOUND FINDINGS

Authors:
Andrey Nadtochiy, Olga Vozgoment

Affiliation:
Central Research Institute of Dentistry and Maxillofacial Surgery, Moscow, Russia

Abstract:

Background: Thyroglossal cysts and fistulas – congenital thyroglossal duct anomaly (TGDA) constitute significant part of maxillofacial pathology. TGDA clinical manifestations usually provoked by inflammation. The main method of TGDA treatment is surgery but the relapses occur in 5-40% of cases.

Objective: Evaluation the incidence of preclinical forms of TGDA in population and also to identify and systematize the „unconscious complaints” of patients associated with this pathology.

Methods: Ultrasound screening of tongue root (TR) was performed in 3681 patients (aged 2-73 years) with no related maxillofacial and neck diseases. If asymptomatic TGDA revealing the purposeful study of the patient’s feelings was applied to identify „unconscious complaints”.

Results: Asymptomatic TGDA in the TR were revealed in 316 (8.6%) patients: hypoechoic line structures (HELS – fistulas or unreduced fibrous cords) –247 (6.7%/78.2%); cysts –44 (1.2%/13.9%); cysts in combination with fistulas –27 (0.7%/8.5%). Thus, asymptomatic cysts were detected in 71 patients: 1.9% of patients in population and 22.4% of patients with clinically asymptomatic TGDA. In 31 (43.7%) patients cysts had contact with hyoid bone, 35 (49.3%) – to the TR mucosa, in 5 (7%) – located in TR center. Most often „unconscious complaints” in patients with „asymptomatic” TR cysts: periodic appearance of mucus in the throat and its coughing –49 (69%) pts, periodic difficulties in swallowing and tongue articulation –27 (38%) patients. Variants of HELS localization were revealed: in 153 (61.9%) patients HELS had contact with hyoid bone, 82 (33.2%) – with TR mucosa, and 12 (4.9) - the localization was mixed; in 211 (85.4%) revealed single HELS, in 36 (14.6%) – multiple.

Conclusion: Ultrasound examination of the tongue root allowed to determine the population frequency of preclinical forms of TGDA. Careful study of patient’s anamnesis allows to reveal „unconscious complaints” indicating the presence of „asymptomatic” thyroglossal cysts of the tongue root.
UTILITY OF TRANSTHORACIC LUNG ULTRASOUND IN ASSESSING PULMONARY SARCOIDOSIS

Authors:
Piprek Marek1, Kryger Magdalena3, Kosiak Wojciech3, Dubaniewicz-Wybieralska Mirosława2, Skotarczak Monika3, Słomiński Marek Jan1, Dubaniewicz Anna1

Affiliation:
1) Dept. of Pulmonology Dębinki 7 Gdańsk 2) Dept. of Radiology, Dębinki 7 Gdańsk 3) Dept. of Paediatrics, Haematology and Oncology Dębinki 7 Gdańsk

Abstract:

Background: A transthoracic lung ultrasound (TLUS) is a non-invasive and non-radiation diagnostic exam that produces images, which is used to assess abnormal structures within lungs and mediastinal lymph nodes. Although it is not commonly used as a device in diagnostic and monitoring of sarcoidosis (SA) activity.

Objective: Attempt to assess the utility of TLUS in diagnostic and monitoring sarcoidosis activity.

Methods: We evaluated TLUS in 88 patients with SA (I-IV stages), using linear and convex probe. Right (R) and left (L) lung was divided into 5 fields: ANTERIOR - upper (RA1, LA1) and lower (RA2, LA2), POSTERIOR - upper (RP1, LP1) and lower (RP2, LP2), and AXILLARY (AR, AL). Ultrasound findings were assessed as abnormal: lymph nodes (in long axis >10mm), irregular pleural line, multiple (≥ 6) B lines, consolidations and fluid in pleural cavity. The correlation between HRCT scans and TLUS scans was assessed. In group of 21 patients conducted monitoring of sarcoidosis activity.

Results: During TLUS examination irregular pleural lines occurred in all lung fields, but the most frequent in RP2 (in 42%), small consolidations in (>5mm) most frequent in RA1 (in 31%) and big consolidations (>5mm) most frequent in RA1 (in 13%). B line artefacts ≥ 6 occurred most frequently in RA1 and RA2 (in 4%). A fluid in pleural cavity occurred most frequent in LP2 (in 17%). According to HR-CT scan, TLUS revealed lymph nodes: paratracheal (in 33%), in upper mediastinum (57%). TLUS revealed progression of sarcoidosis in 11 patients and in 4 patients regression of SA.

Conclusion: According to HRCT scans, TLUS examination revealed subpleural findings and lymph nodes of upper mediastinum. Most of abnormal findings were in anterior-lower fields of RL. TLUS seems to be useful in monitoring of sarcoidosis activity. Study founded by grant (ST-02-0127/07/232).
VALUE OF MACHINE LEARNING TECHNIQUE IN THE DIFFERENTIATION OF CYSTIC
(INCLUDING ATYPICAL) AND SOLID BREAST LESIONS AT ULTRASONIC IMAGES

Autors:
D.V. Pasynkov¹, I.A. Egoshin², A.A. Kolchev³, I.V. Kliouchkin⁴, O.O. Pasynkova²

Affiliation:
¹OncologyDispenser of Mari-El Republic, Yoskhar-Ola, Russia; ²Mari State University,
Yoskhar-Ola, Russia; ³Kazan Federal University, Kazan, Russia; ⁴Kazan State Medical
University, Kazan, Russia

Abstract:

BACKGROUND: The first part of the differentiation process for breast lesions usually involves the di-

stinction between cystic and solid ones. At the same time complex cysts and hypoechoic solid lesions

often mimic each other during the standard visual image assessment that leads to the significant drop

of specificity.

OBJECTIVE: We tried to develop the automatic method of cystic and solid breast lesions differentia-

tion based on the quantitative machine learning technique.

METHODS: The input data were the standard ultrasound digital images of 107 cystic (including 53

atypical, difficult for bare eye differentiation) and 110 solid lesions exported from the following com-

mercial ultrasound systems: Medison SA8000SE, Siemens X150, Esaote MyLab C. All lesions were
cytologically and/or histologically confirmed. Visual identification was performed by trained specia-

list in breast ultrasonography. For quantitative assessment we used the software of our own design

based on machine learning technique. Its outputs were the mean and maximal percent value of cyst

threshold exceeding. Therefore for cysts these values were the positive ones, for solids equaled 0.

RESULTS: Our system correctly distinguished all (107, 100%) typical cysts, 107 of 110 (97.3%) solid

lesions and 50 of 53 (94.3%) atypical cysts. On the contrary, with the bare eye it was possible to iden-
tify correctly all (107, 100%) typical cysts, 96 of 110 (87.3%) solid lesions and 32 of 53 (60.4%) atypical

cysts. The corresponding overall specificity values were 98% and 87%.

CONCLUSION: Machine learning approach surpasses the visual assessment performed by trained

specialist. The difference is especially large for atypical cysts and hypoechoic solid lesions with clear

margin. This data may have a clinical significance.
ESTABLISHMENT OF AN ULTRASOUND PROTOCOL TO EVALUATE MUSCLE STRUCTURE AND FUNCTION BEFORE AND AFTER PULMONARY REHABILITATION IN PATIENTS WITH OBSTRUCTIVE PULMONARY DISEASE

Authors:
Paula Martins¹,²,³, Alexandra André⁴, Silvia De Francesco¹,³, Cátia Paixão²,⁵, Patrícia Rebelo²,⁵, Alda Marques¹,²,⁵

Affiliation:
¹School of Health Sciences (ESSUA), University of Aveiro, Aveiro, PT, ²Institute for Biomedicine (iBiMED), University of Aveiro, Aveiro, PT, ³Institute of Electronics and Informatics Engineering of Aveiro (IEETA), Aveiro, PT, ⁴Coimbra School of Health, Polytechnic Institute of Coimbra, Coimbra, PT, ⁵Respiratory Research and Rehabilitation Laboratory (Lab3R), School of Health Sciences (ESSUA), University of Aveiro, Aveiro, PT

Abstract:
BACKGROUND: Pulmonary rehabilitation (PR) is fundamental for the management of patients with chronic respiratory diseases known for its many benefits, namely in patients’ muscle strength. Although muscle strength is commonly measured in PR, much less is known about the changes occurring in muscles’ structure and function. Ultrasound can contribute to knowledge in this field due to its accessibility, non-use of ionising radiation and low costs.

OBJECTIVE: This study aimed to establish and test a comprehensive US protocol to evaluate the effects of a PR program on the structure and function of the diaphragmatic, quadriceps and biceps muscles in patients with obstructive pulmonary disease.

METHODS: An US equipment with linear (11L) and convex (4C) probes was used. B-mode measurements of Rectus Femoris and Biceps Braquial thickness (RFTK, BBTK) and their cross-sectional areas (RFCSA, BBCSA) as well as right diaphragmatic thickness at maximal inspiration (DTKI) and end expiration (DTKE) were obtained. Diaphragmatic excursion was measured during normal breathing (DE_NB) and maximal inspiration (DE_max_insp) using M-mode. Quadriceps and biceps muscle strength (QMS and BMS) was assessed with a hand-held dynamometer and exercise tolerance with the 6min walk test (6MWT) before (T0) and after (T1) a 12weeks PR program (1hour/session, 2times/week). The protocol was tested in 4 patients (3 male, 3 COPD/1 asthma, 70±8.5yrs; BMI=28.1±4.4 kg/m²)

RESULTS: Improvement from T0/T1 in QMS (29.90KgF±6.50; 36.20KgF±4.88), BMS (19.73KgF±6.30; 24.95KgF±3.82) and 6MWT (481.73m±68.61; 546.63m±63.71) and an increase in RFCSA (6.03cm²±2.15; 6.61cm²±1.91) and BBCSA (8.41cm²±1.53; 9.09cm²±1.86) were observed after PR program. A slight increase in DE_NB and DE_max_insp was verified.

CONCLUSION: The proposed protocol is feasible and the preliminary results are encouraging to enhance our knowledge of the effects of PR on the structure and function of several muscles. This protocol will be implemented in a larger sample and full data analysis will be performed.
Qualified Posters
(in alphabetical order)
A Certain Fraction Of Active Established Rheumatoid Arthritis Patients With Significant Joint Destruction Is Misclassified As Boolean Remission: A Cross-section Study Using Ultrasonography

Y. Fujii 1, S. Nakabo 2, Y. Tsuji 1, M. Inagaki 1, H. Tsuji 2, T. Nakajima 2, M. Hashimoto 3, T. Mimori 2

1. Department of Human Health Sciences, Clinical Physiology and Ultrasound Labo, Kyoto University Graduate School of Medicine
2. Department of Rheumatology and Clinical Immunology, Kyoto University Graduate School of Medicine
3. Department of the Control for Rheumatic Diseases, Kyoto University Graduate School of Medicine

author's contact email: fujii.yasutomo.6c@Kyoto-u.ac.jp
background

The goal of the treatment of rheumatoid arthritis (RA) is remission. But the remission induction for established RA (eRA) patients with long disease duration and significant radiographic damage is difficult. One of the reasons is that their Patient Global Assessment scores (PtGA) continue to be high after the synovitis disappears by appropriate treatment because of the disability or the pain from the structural damage. Although such high PtGA of eRA patients is thought to be acceptable, there are few evidence which support this concept.

The purpose of this study is to evaluate whether high PtGA of eRA patients is acceptable by assessing the synovitis using sonography (US).
**material and methods**

Bilateral 2-5 MCP, wrist, ankle, and 2-5MTP joints were scanned by using the Aplio500 (TOSHIBA, Japan) with 12 MHz transducer. Power Doppler (PD) images were obtained by Superb Micro-vascular Imaging (SMI). Gray scale (GS) and PD images were scored using 0-3 semi-quantitative scale.

Clinical information was obtained from Kyoto University Rheumatoid Arthritis Management Alliance (KURAMA) database. We defined “Semi-Boolean remission (SBR)” as the condition which is composed of 3 elements of Boolean remission (BR) criteria except PtGA. All the patients were classified into 1-4 Steinbrocker stages according to their joint X-ray.

**Definition of Remission (Boolean-based)**

- Tender joint count \( \leq 1 \)
- Swollen joint count \( \leq 1 \)
- C-reactive protein \( \leq 1 \text{mg/dl} \)
- **Patient global assessment (PtGA) \( \leq 1 \text{cm} \) [0-10cm]**
### Characteristics of BR & SBR group

<table>
<thead>
<tr>
<th></th>
<th>Total N=259</th>
<th>BR N=118</th>
<th>SBR N=141</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age, mean±SD, 年</td>
<td>61.4 ± 12.0</td>
<td>62.5 ± 14.1</td>
<td></td>
<td>0.27 *</td>
</tr>
<tr>
<td>Gender, female / male</td>
<td>95 / 23</td>
<td>110 / 31</td>
<td></td>
<td>0.62 ‡</td>
</tr>
<tr>
<td>Disease Duration, mean±SD, year</td>
<td>11.1 ± 10.6</td>
<td>11.4 ± 10.5</td>
<td></td>
<td>0.53 *</td>
</tr>
<tr>
<td>Stage, I / II / III / IV</td>
<td>46 / 35 / 14 / 23</td>
<td>36 / 43 / 24 / 38</td>
<td></td>
<td>0.02 †</td>
</tr>
<tr>
<td>PtGA, mean±SD, cm</td>
<td>0.42 ± 0.31</td>
<td>3.41 ± 2.01</td>
<td></td>
<td>&lt;0.01 *</td>
</tr>
<tr>
<td>Rate of Administration of MTX, %</td>
<td>68.6</td>
<td>67.6</td>
<td></td>
<td>0.83 *</td>
</tr>
<tr>
<td>Rate of Administration of Biologics, %</td>
<td>42.4</td>
<td>49.6</td>
<td></td>
<td>0.24 *</td>
</tr>
<tr>
<td>Total GS Score, median (IQR)</td>
<td>12.0 (8.0-16.0)</td>
<td>11.0 (8.0-16.0)</td>
<td></td>
<td>0.98 *</td>
</tr>
<tr>
<td>Total PD Score, median (IQR)</td>
<td>0.50 (0.0-2.0)</td>
<td>1.0 (0.0-3.0)</td>
<td></td>
<td>0.06 *</td>
</tr>
</tbody>
</table>

* Mann–Whitney U test † Cochran-Armitage trend test ‡ Chi-Square test
PtGA and total PD score showed no correlation in BR+SBR patients, or in each of the stages.

Spearman’s rho = 0.11, p = 0.33
Spearman’s rho = 0.07, p = 0.56
Spearman’s rho = 0.10, p = 0.54
Spearman’s rho = 0.19, p = 0.14
In not only BR+SBR group but also BR group, where the patients were strictly defined as remission, more number of patients who had residual synovitis were found in the higher stage.
conclusion

✓ A certain fraction of active eRA patients with significant joint destruction is misclassified as Boolean remission.

✓ In the eRA patients, more application of US, which can bring us accurate information on disease remission, may lead in providing better quality of medical care.
A study on measurement of acoustic properties by applying frequency sweep to ultrasonic interference method

author/authors
Seiya Ishikura¹ †, Norio Tagawa¹, Masasumi Yoshizawa², Kohei Shinoda², Takasuke Irie³,⁴

affiliation
¹System Design, Tokyo Met. Univ.; ²Tokyo Metropolitan College of Technology;
³Microsonic Co, Ltd.; ⁴Tokyo Met. Univ.

author's contact email: ishikura-seiya@ed.tmu.ac.jp
background

In the clinical field, a minimally invasive pathological diagnosis method is desired in a short time, and for the purpose, we are developing a puncture needle-type ultrasonography. Unlike observation by staining, this system can directly measure the acoustic and physical properties of living tissue as useful information for pathological diagnosis in vivo.

Fig.1. Image of pathological diagnosis by ultrasonic image.
material and methods

In the ultrasonic interference method, the interference wave between the echoes from the sample to be measured and from the tip of the ultrasonic propagation rod is observed as a standing wave. In order to determine the complex acoustic impedance of the sample, the standing wave ratio and the phase difference in the standing wave are measured while varying the distance between the sample and the tip.

However, varying the distance in this way is difficult for in vivo microscopy application. Instead, in this study, we investigate the possibility of realizing the same measurement while sweeping the frequency with fixing the distance between the sample and the tip.

Fig.2. Image of ultrasonic interference method using frequency sweep.
Simulation

Simulations were conducted to confirm the effectiveness of the proposed method using samples with different elasticity and viscosity.

- FEM simulator: PZFlex
- Transducer: PZT5h
- Center frequency: 44.9 MHz

Condition of applied electrical burst wave

- Amplitude: 10 Vpp
- Frequencies: 40.0 MHz – 50.0 MHz
  - In increments of 1.0 MHz
- Pulse width: 40 cycles

Fig.3. Simulation model.
### Results

#### Table 1: Ultrafast Ultrasonic 

<table>
<thead>
<tr>
<th>Name</th>
<th>Density (kg/m²)</th>
<th>Q Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>PZT5h</td>
<td>7500</td>
<td>65</td>
</tr>
</tbody>
</table>

#### Table 2: Density and Sound Velocity

<table>
<thead>
<tr>
<th>Name</th>
<th>Density (kg/m²)</th>
<th>Sound velocity (m/s)</th>
<th>Viscosity (Pa·s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sample1</td>
<td>1030</td>
<td>1579</td>
<td>1.0</td>
</tr>
<tr>
<td>Sample2</td>
<td>1030</td>
<td>1579</td>
<td>50.0</td>
</tr>
<tr>
<td>Sample3</td>
<td>1030</td>
<td>1579</td>
<td>100.0</td>
</tr>
<tr>
<td>Sample4</td>
<td>1000</td>
<td>1500</td>
<td>1.0</td>
</tr>
</tbody>
</table>

#### Table 3: Density and Sound Velocity of Common Materials

<table>
<thead>
<tr>
<th>Name</th>
<th>Density (kg/m²)</th>
<th>Sound velocity (m/s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water</td>
<td>1000</td>
<td>1496</td>
</tr>
<tr>
<td>Quartz</td>
<td>2650</td>
<td>5750</td>
</tr>
</tbody>
</table>

#### Fig. 4: Simulation Result

(a) The amplitude of the interference signal.
(b) Phase difference of viscous material.
It was confirmed that the amplitude of the standing wave changes at most frequencies when the elasticity is different.

When the viscosity is changed, the amplitude does not change greatly. However, it was confirmed that the displacement of the phase difference increased as the difference in viscosity increased.

In the future work, complex acoustic impedance must be derived from the two parameters used for imaging in this study in order to accurately distinguish samples by difference in acoustic characteristics, i.e., stiffness and viscoelasticity.
An acoustic radiation force impulse and ultrasound contrast agent evokes arrhythmias in the rabbit heart

K. Rifu¹, H. Sasanuma¹, N. Takayama², W. Takano³, Y. Ishiguro¹, Y. Ogata⁴, I. Akiyama³, A. K. Lefor¹, N. Taniguchi²

¹) Department of Surgery, Jichi Medical University, Tochigi, Japan
²) Department of Clinical Laboratory Medicine, Jichi Medical University, Tochigi, Japan
³) Faculty of Life and Medical Sciences Medical Ultrasound Research Center, Doshisha University, Kyoto, Japan
⁴) Department of Cardiology, Jichi Medical University, Tochigi, Japan

E mail: m03097kr@jichi.ac.jp
Background

Acoustic Radiation Force Impulse (ARFI) uses shear waves for elasticity imaging.

ARFI is clinically used for confirming elasticity of mammary gland, liver, etc. ARFI meets criteria of FDA and WFUMB.

ARFI is different from diagnostic ultrasound in terms of longer pulse duration.

Pulse duration:

- Acoustic Radiation Force Impulse: Pushing beam 0.1-0.5ms
- Typical diagnostic ultrasound: Tracking beam 0.5-3μs
Background

- We previously reported that arrhythmias were observed at a mechanical index (MI) of 1.8 with ARFI and concomitant administration of an ultrasound contrast agent (UCA) in rabbits.

- The previous transducer could not create B-mode images for visualizing the area exposed to ARFI. We introduce a new system which can generate an ARFI while imaging the heart.
Materials and Methods

Power amp., Function generator

Focus transducer

Japanese white rabbit
BW3kg, male

Ultrasound Contrast Agent
perfluorobutane (Sonazoid™)

MI:0.84-1.16, Pulse Duration = 1ms

Three points were used for ARFI:
① Right Ventricle → AV node
② Right Atrium → Sinus node
③ Left ventricular wall → Purkinje Fiber
## Results

### Exposure conditions

<table>
<thead>
<tr>
<th>N</th>
<th>MI</th>
<th>Depth of Focus</th>
<th>Infusion of UCA</th>
<th>Extrawaves (Range)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>0.84~1.16</td>
<td>10, 20, 30 mm</td>
<td>None</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>200 ms delay from Rwave, Pulse Duration 1 ms</td>
<td>Thirty exposures were synchronized with one exposure per three heart beats.</td>
<td></td>
</tr>
</tbody>
</table>

### Table 1. The frequency of the evoked extra systolic waves with ARFI

<table>
<thead>
<tr>
<th>Site</th>
<th>Depth of Focus</th>
<th>MI</th>
<th>Infusion of UCA</th>
<th>Extrawaves (Range)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Right ventricle</td>
<td>20 mm</td>
<td>1.16</td>
<td>None</td>
<td>0</td>
</tr>
<tr>
<td>Right atrium</td>
<td>30 mm</td>
<td>0.84</td>
<td>Single infusion</td>
<td>5 (5-6)</td>
</tr>
<tr>
<td>Left ventricular wall</td>
<td>10 mm</td>
<td>1</td>
<td>None</td>
<td>0</td>
</tr>
<tr>
<td>Left ventricular wall</td>
<td>10 mm</td>
<td>1</td>
<td>Single infusion</td>
<td>2 (2-7)</td>
</tr>
</tbody>
</table>

*Arrhythmias were single ventricular or supraventricular extra-systolic waves. No fatal arrhythmia was observed.*
Results

ARFI to Right Heart System (AV node, Sinus node)

ARFI to Left Heart System (Purkinje Fiber)

*Arrhythmias observed from the right heart and left heart had a reversed shape, which suggests that the arrhythmia was from a different origin.
Conclusion

◆ Extra-systolic activity of different origin was observed under similar clinical conditions of an ARFI with infusion of an UCA.
◆ Ultrasound practitioners should know this adverse reaction, even if the MI is below the previously determined value of 1.9.
Analysis of A-line Patterns Seen on Lung Ultrasound Scans in Healthy Volunteers Following Spontaneous Breathing and on High Flow Nasal Cannula Therapy

author/authors: Jing Yi Kwan, Dr Wojciech Wierzejski

Affiliation: University of Manchester, Lancashire Teaching Hospitals NHS Trust

author's contact email: kwan_jing_yi@hotmail.com, wierzej@gmail.com
On a lung ultrasound scan, A-lines are artefacts identified as horizontal lines arising at regular intervals from the pleural line (Figure 1). These regular intervals are equivalent to the distance between the skin and the pleural line. A-lines indicate that the lungs are aerated.

In the Bedside Lung Ultrasound in the Emergency protocol (BLUE), visualization of A-lines are used to confirm an exacerbation of chronic obstructive pulmonary disease (COPD) or asthma, or a pneumothorax.

It is worth noting that COPD and asthma are conditions associated with lung hyperinflation and air trapping within the lung parenchyma, while pneumothorax is associated with excessive air trapping within the pleural space.
material and methods

The aim of this prospective interventional study is thus to determine if hyperinflation of the lungs results in a difference in the number and echogenicity of A-line artefacts present on lung ultrasound scans.

This is a prospective interventional before-and-after trial carried out across four days. We enrolled 37 healthy University of Manchester medical students and Lancashire Teaching Hospital staff between the ages of 18 to 45.

Exclusion criteria include any diagnosed acute or chronic lung/bronchial disease, any previous thoracotomy, a BMI of > 40kg/m2, current or ex-smokers, a clinical diagnosis of anxiety, having performed a heavy exercise in the past 24 hours and a peak expiratory flow < 80% predicted for age, height and gender.

To replicate the physiological state of hyperinflation of the lungs, 15 minutes of room air was delivered to each participant via High Flow Nasal Cannula (AirvoTM 2, Fisher & Paykel Healthcare). The temperature of the air was set to a constant of 37°C, and the flow of air was also constant at 60l/min. Subjects were requested to breathe with their mouths closed if possible.
material and methods

The participants were asked to lie down in a semi-recumbent position. The ultrasound scans were performed using a GE Healthcare LOGIQ e ultrasound machine with a GE C1-5-D-2D convex probe. The scans of the lungs were performed in longitudinal view at the basal region of the right lung. The upper border of the liver at the level of the 5th or 6th rib and the midaxillary line were used as guidelines for probe placement (Figure 2).

Two scans were performed on each participant, one before the initiation of HFNC and one at the 15-minute mark on HFNC. The position of the probe was marked on the skin to ensure that both scans were performed in the same region.

Fig 2: Location of the probe is indicated by the grey striped rectangle. The mid-axillary line is marked out by the horizontal black dotted line and the upper border of the liver is marked out by the vertical black dotted line. The probe is placed right above the upper border of the liver (red triangle).
results

Number of A-line Artefacts

Out of 37 pairs of results, 28 (75.7%) showed a significant increase in the number of A-line artefacts, 7 (18.9%) showed no change in the number of A-line artefacts and 2 (5.4%) showed a decrease in the number of A-line artefacts.

When compared to the spontaneous breathing of ambient air, the mean number of A-lines generated with an increase in lung volume raised from 3.95 to 5.22 by 1.27, [95% confidence interval 0.82 – 1.72; paired t-test two-sided P<0.001] (Figure 3).

Figure 3: Number of A-line artefacts before and during the 15-minute mark of HFNC.
results

Echogenicity of A-line Artefacts

Echogenicity of A-lines was categorised using the code shown in Table 1.

Out of 37 sets of results, the majority of participants - 19 (51.4%) showed no change in echogenicity, 14 (37.8%) showed an increase in echogenicity, 3 (8.1%) showed a reduction in echogenicity and 1 was not applicable due to the absence of A-lines in the initial ultrasound scan.

A sign test was performed on these results. For 17 observations with 14 on one side, a two-sided P value of $P=0.0127$ ($P<0.05$) was calculated.

Table 1: A-lines echogenicity coding.

<table>
<thead>
<tr>
<th>Echogenicity</th>
<th>Appearance</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Isoechogenicity</td>
<td>Darker than rib surface</td>
<td>1</td>
</tr>
<tr>
<td>Light hyperechogenicity</td>
<td>Comparable to rib surface</td>
<td>2</td>
</tr>
<tr>
<td>Strong hyperechogenicity</td>
<td>Brighter than rib surface</td>
<td>3</td>
</tr>
</tbody>
</table>
Hyperinflation of the lungs results in a statistically significant increase in the number of A-line artefacts on a lung ultrasound scan. The study showed that there is unlikely to be a change in echogenicity of A-lines with hyperinflation of the lungs. However, if a change is present, it is significantly more likely to be a change in the positive direction – meaning an increase in echogenicity is more likely to be observed.

Lung ultrasonography has additional benefits over other traditional forms of imaging, as it is a bedside tool that has the ability to generate consistent images that can be reproduced easily by different sonographers and has a high inter-observer agreement. It is also free of ionising radiation.

Thus, A-lines analysis should be further investigated for utilisation as a monitoring tool for the patients with pathological hyperinflation of the lungs like COPD patients, patients presenting with an acute asthma attack or patients receiving mechanical ventilation on the Intensive Care Unit that are at a risk of developing ventilator induced lung injury (VILI).
Case Presentation of Atypical Calcific Tendinitis Involving the Biceps Long Head Tendon: A Rare Cause of Hemiplegic Shoulder Pain

Jungtaek Park, Jang Hyuk Cho

Department of Emergency Medicine, Uijeongbu St. Mary's Hospital, College of Medicine, The Catholic University of Korea

1Department of Rehabilitation Medicine, Daegu Veterans Health Service Medical Center, Daegu, Republic of Korea

trainfunnel@gmail.com
Background

• Calcific tendinitis is a common disease affecting the rotator cuff. The pathogenesis remains ambiguous. It affects the other three tendons of the rotator cuff less frequently, and seldomly the biceps long head tendon (BLHT).

• In patients with stroke, weakness of the affected shoulder girdle muscles results in hemiplegic shoulder pain and soft tissue injury, wherein the BLHT involvement is observed often.

• To the best of our knowledge, calcific deposition in the BLHT resulting in hemiplegic shoulder pain after stroke has not been previously reported. In this presentation, we present a patient with atypical calcific tendinitis involving the BLHT as a rare cause of hemiplegic shoulder pain.
Objective I

- A 63-year-old man with a known right sided weakness after left thalamic infarction had experienced intractable pain in the right hemiplegic shoulder for more than 6 months with a waxing and waning course. Subjective pain on the Visual Analogue Scale (VAS) was 7 at rest and 9 during motion.

- On physical examination, gentle palpation around the shoulder joint intensified the tenderness to an intolerable degree of pain at the biceps tendon adjacent to the bicipital groove.

- Plain radiographic anteroposterior view of the right hemiplegic shoulder with subluxation shows the humeral head located at the level of the inferior margin of the glenoid, while the left shoulder is normal.
Objective II

- Axial and coronal computed tomography scans demonstrate a long calcification in the BLHT site distal to the bicipital groove. The arrows indicate the calcific deposit.
Results I

- Ultrasonography at the time of diagnosis through the long axis of the biceps tendon reveals a blade-shaped calcific deposit in the BLHT site distal to the bicipital groove with effusion of the tendon sheath. The arrows indicate the calcific deposit.
Results II

- Follow-up US 4 weeks after corticosteroid injection at the posterior intra-articular joint shows a similar sized calcification remaining (A). Two weeks after additional injection into the biceps tendon sheath, follow-up US demonstrates mild diminution by absorption in the previously noted calcific deposit (B). The arrows indicate the calcific deposit.
Conclusion

- We present the case of a patient who experienced severe hemiplegic shoulder pain caused by calcific tendinitis in the BLHT site distal to the bicipital groove and was managed with US-guided corticosteroid injection.

- Repetitive microtraumatic stresses at the BLHT are associated with hemiplegic shoulder, which might have caused localized tendon damage, deterioration of blood circulation, and calcific tendinitis in the BLHT.

- We believe that calcific tendinitis of the BLHT should also be considered in the differential diagnosis of hemiplegic shoulder pain.
Change of proliferation of germ according to preservation temperature of Ultrasound gel

author/authors: First name: Seung Ah Lee (Ultrasound Sonographer / radiation technician)

Affiliation: Seoul National University Bundang Hospital (Seoul, South of Korea)

author's contact email: 20339@snubh.org
Ultrasound gel is stored at 25–40°C, which is similar to the body temperature used to reduce patients’ discomfort when the gel is applied. However, the importance of ultrasound gel management has increased recently because skin rashes and infections through tiny skin wounds have developed when using gel stored under inappropriate management, as bacteria thrives under such conditions.
material and methods

This study used “D” company’s ultrasound gel, which was recognized for its stability of ingredients by the Ministry of Food and Drug Safety, as samples. The samples were stored at room temperature, 40°C, 50°C, and 60°C for 48 hours in a heating cabinet.

- purified water 97.469%
- triethanolamine 0.76%
- carboxyvinyl polymer 0.54%
- hyaluronic acid 1%
- sodium benzoate 0.06%
- glycerin 0.12%

heating cabinet (DSGW – 3000)
Temperature range: 25°~60°C
material and methods

The samples were inoculated in a fluid thioglycolate medium (FTM) and soybean casein digest medium (SCDM) by quartering.
material and methods

The inoculated samples were grown in an incubator for 14 days, and the degree of germ proliferation in the samples was observed. The results were recorded via semi-quantitative determination. If the germs proliferated to three quarters of the tablet, it was labeled as “many”, if proliferated to half of the tablet, it was labeled as “moderate” and If proliferated to only a quarter of the tablet, it was labeled as “rare.”

Incubator (BARNSTEAD LAB-LINE Li CO2 INCUBATOR)
At room temperature and at 40℃, a “moderate” number of germs were found, a “rare” number at 50℃, and none at 60℃.
Therefore, it is recommended that ultrasound gel should be stored at over 60°C to minimize bacterial growth, which could further prevent skin infections caused by bacterial growth due to inappropriate storage. Furthermore, establishing a temperature standard for ultrasound gel storage may be necessary as a preventative method.
Combined Screening Test vs Ultrasound-based Screening for Trisomy 21

Author: Wiechec Marcin¹,², Nocun Agnieszka², Matyszkiewicz Anna¹, Rajs Bartosz¹

Affiliation: ¹Dpt of Gynecology and Obstetrics, Jagiellonian University in Krakow, Poland
²MWU DOBREUSG Centre of Ultrasound Diagnostics, Krakow, Poland

author's contact email: marcin.wiechec@uj.edu.pl
background

It has been suggested that inclusion of maternal age excessively increases the false positive rate of screening for trisomy 21 in the advanced maternal age group. This aspect is important to investigate, especially with the current increase in the proportion of women who are delaying childbearing until the age of 35 and beyond.

The aim of the study is to compare two first trimester screening strategies: traditional CST and the strategy that is based on NT, secondary ultrasound markers and early anomaly findings. We also analyzed how the performance of the two strategies is affected by the inclusion of the maternal age.
material and methods

It was a prospective observational multicentre non-randomized study based on non-selected mixed-risk population of 11,653 pregnant women referred for first-trimester screening. Pregnant volunteers were offered to choose between traditional combined screening test (nuchal translucency and biochemistry)-Combined Screening Group (CSG) and ultrasound-based screening – Ultrasound-based Screening Group (nuchal translucency and secondary ultrasound markers).

Table 1. Screening tests for trisomy 21 used in the study. Abbreviations: CST 1/300 and CST 1/100=combined screening test risk with cut-offs 1/300 and 1/100; AR CST= absolute risk of combined screening test; NT+= adjusted risk by NT and secondary ultrasound markers with the cut-off 1/100; AR NT+= absolute risk of combined screening test; MA=maternal age; NT= nuchal translucency; FHR=fetal heart rate NB= nasal bone, TR=tricuspid regurgitation; DV=ductus venosus velocimetry; free beta subunit of human chorionic gonadotropin (fβhCG); and pregnancy-associated plasma protein A (PAPP-A).

<table>
<thead>
<tr>
<th>Study Arm</th>
<th>Screening test</th>
<th>Components</th>
</tr>
</thead>
<tbody>
<tr>
<td>Combined Screening Group (CSG)</td>
<td>CST 1/300</td>
<td>MA, NT, FHR, fβhCG, PAPP-A and major anomaly findings</td>
</tr>
<tr>
<td>Combined Screening Group (CSG)</td>
<td>CST 1/100</td>
<td>MA, NT, FHR, fβhCG, PAPP-A and major anomaly findings</td>
</tr>
<tr>
<td>Combined Screening Group (CSG)</td>
<td>AR CST</td>
<td>NT, FHR, fβhCG, PAPP-A and major anomaly findings</td>
</tr>
<tr>
<td>Ultrasound-based Screening Group (USG)</td>
<td>NT+</td>
<td>MA, NT, FHR, NB, DV, TR, and major anomaly findings</td>
</tr>
<tr>
<td>Ultrasound-based Screening Group (USG)</td>
<td>AR NT+</td>
<td>NT, FHR, NB, DV, TR, and major anomaly findings</td>
</tr>
</tbody>
</table>
results

• Figure 1. Study population diagram. Abbreviations: T21=trisomy 21; IUFD=intrauterine fetal demise; TOP=termination of pregnancy.
results

93.3% of patients fulfilled inclusion criteria. Our study population comprised 10,878 pregnancies: 5,145 in combined screening group including 51 cases of trisomy 21, and 5,733 in ultrasound screening group including 87 cases of trisomy 21. The mean maternal age in combined screening group was 34.8 (range 15-48) compared to 30.5 (range 16-46) in ultrasound screening group, (p<0.05). For fixed 3% and 5% false positive rate, detection rates of combined screening test protocol for the given false positive rates presented detection rates of 78% and 84%, respectively. To compare ultrasound-based method showed higher detection rates of 90% and 94%, respectively. DR and FPR of the tests used in this study according to the maternal age subgroups are presented in charts in Figures 2 and 3.

Figure 2. Detection rates (DR) and false positive rates (FPR) of the “adjusted risk for trisomy 21 by Combined Screening Test (CST) with the cut-off 1/100”; “adjusted risk for trisomy 21 by CST with the cut-off 1/300”, and “absolute risk (AR) of CST for trisomy 21” depending on maternal age ranges in the Combined Screening Group.

Figure 3. Detection rates (DR) and false positive rates (FPR) of the “adjusted risk for trisomy 21 by nuchal translucency plus (NT+)”, and “absolute risk (AR) of nuchal translucency plus (NT+) for trisomy 21” depending on maternal age ranges in the Ultrasound-based Screening Group. Detection rate values of tests “adjusted risk for trisomy 21 by NT+” and “AR NT+ for trisomy 21” are the same.
conclusion

Our findings are important for several reasons. They suggest that first trimester screening using multiple fetal markers is associated with high DRs of trisomy 21 and low FPRs. In our study, this approach outperformed the CST approach. This is important, as most of the recent series in this field have been on developing contingent strategies using additional biomarkers rather than investigating the power of ultrasound parameters. Our findings are especially important for patients from countries with lower socioeconomic status, who cannot afford NIPT and for populations like ours, which demonstrate suboptimal screening performance of CST.

Ultrasound-based screening for trisomy 21 is an effective alternative for combined screening test. Independently on the policy, screening performance is improved when maternal age background risk is excluded from the individual risk assessment.
DAMAGE OF MUSCULOSKELETAL SYSTEM IN PATIENT WITH ULCERATIVE COLITIS

Gaynullina G., Kirillova E., Abdulganiyeva D.

Federal State Budgetary Educational Institution of Higher Education "Kazan Medical University" Kazan, Russian Federation

nice.gaynullina@bk.ru
Background

Musculoskeletal system pathology is one of the most common extraintestinal manifestations of inflammatory bowel diseases. In the framework of it, peripheral arthritis and lesions of periarticular tissues, including entheses, are considered. Detection of entheseseal involvement is important to prevent disability because initial acute oedema, inflammatory infiltration and fibrocartilage microlesions may evolve into chronic endochondral ossification and bone erosions in late disease.
Material and methods

- 28-year-old woman, suffering from UC for two years, was studied clinically and with ultrasound (US) of peripheral joints and limbs tendon insertion (entheses)

- LEI and MASES scoring systems were used for clinical examination of entheses

- Entheses thickness and presence of enthesophytes, bursitis and erosions at bone insertion were recorded and scored with US according to GUESS, MASEI и BUSIES scoring systems

- Vascularity, studied at insertion of enthesis at the cortical bone, was semi-quantitatively graded: no flow (Grade 0), mild (Grade 1), moderate (Grade 2), severe (Grade 3)
### Ultrasound examination

**RESULTS:**

- **Joints:** synovitis in the right knee joint

- **Entheses:**
  - GUESS 2 points (from 36), MASEI 6 points (from 136) and BUSES 8 points (from 132)

- **Erosions:**
  - Patellar tendon distal entheses on both sides, vascularized (Grade 2) erosion (1.8 x 0.6 mm) of the right medial collateral ligament, erosion (3.2x1.3 mm) of gluteus minimus muscle tendon distal entheses on the left side

### Clinical examination

- **Joints:** anamnesis - no complaints of pain, physical examination - painless on palpation

- **Entheses:** LEI 1 point (from 6) and MASES 3 points (from 13)
Conclusion

In patients with UC joints and entheses may be affected without significant clinical manifestations, which requires additional attention to these patients.
Diagnostic accuracy of three non-invasive methods to evaluate fibrosis in patients with hcv compensated liver cirrhosis

Alin Lazar, Raluca Lupusoru, Roxana Sirli, Alina Popescu, Felix Bende, Ruxandra Mare, Ana-Maria Stepan, Anda Pascaru, Virgil Ardelean, Isabel Dan, Alexandra Deleanu, Alexandru Popa, Cristina Apetrei, Ioan Sporea

Department of Gastroenterology and Hepatology,
"Victor Babes" University of Medicine and Pharmacy Timisoara, Romania

lazaralin1990@yahoo.com
Non-invasive methods used to evaluate liver fibrosis may be elastographic or serologic.

**The purpose of the study** was to determine the diagnostic accuracy of three non-invasive methods to assess liver fibrosis in a group of patients with hepatitis C virus (HCV) compensated liver cirrhosis:

- **TE** (Transient Elastography) (Fig. 1),
- **FibroTest** (Biopredictive) – a serologic method (Fig. 2)
- **VTQ** (Virtual Touch Quantification) (Fig. 3)
material and methods

• A retrospective study was conducted which included 102 HCV-compensated cirrhotic patients evaluated in our department by all three non-invasive methods.

• Using TE, 10 valid liver stiffness measurements (LSM) were obtained in each session either by M or XL probes, depending on the body mass index of each patient.

Reliable LSM were defined as median value of 10 measurements with Interquartile range/median \( (IQR/M) \leq 30\% \), and a Success Rate \( (SR) \geq 60\% \).
material and methods

• In each patient **10 measurements** were performed using the VTQ elastographic method and **median values** were calculated.

• We used the following **cut-off values** to diagnose cirrhosis: TE \( \geq 12 \text{ kPa} \), VTQ \( \geq 1.81 \text{ m/s} \), and for FibroTest values \( \geq 0.75 \).

• In the same session blood samples were collected for FibroTest assessment.
The study group included 68 (67%) women and 34 (33%) men, the mean age being 61 ± 8 years.

- **TE** performed significantly better than **VTQ** (92.1% versus 79.4%, \( p = 0.04 \)) and than **FibroTest** (92.1% versus 81.3%, \( p = 0.0005 \)) to diagnose cirrhosis.
- There was no significant difference between the diagnostic accuracy of **VTQ** and **FibroTest** (\( p = 0.76 \)) (Fig. 4).

**Figure 4.** The diagnostic accuracy of the non-invasive methods.
conclusion

TE had the highest diagnostic accuracy to diagnose liver cirrhosis in the study group (92%), and the other methods had an accuracy of 79% (VTQ) and 81% (FibroTest) respectively.
Do We Still Need the First Trimester Scan in the Cell-free Fetal DNA (cffDNA) Testing Era?

Karolina Mazurec, Julia Rymaszewska, Maciej Mazurec, Martyna Trzeszcz, Piotr Barcikowski, Krzysztof Bielicki, Izabela Kotkowska-Szeps, Agnieszka Zabielska

1 Student Scientific Club at Woman’s Health Center Corfamed Ltd, Wroclaw, Poland
2 Student Scientific Association at Department of Psychiatry, Wroclaw Medical University, Poland
3 Woman’s Health Center Corfamed Ltd, Wroclaw, Poland
4 Department of Pathology and Clinical Cytology, University Hospital in Wroclaw, Poland

author’s contact email: carlos.mazurec@icloud.com
objectives

The evolution of first trimester prenatal tests to combined testing utilising nuchal translucency (NT) and additional sono-markers, history and serum-markers, have triggered increased detection rates of trisomies 21, 18, 13 to 90-95%, with 5% of false positive rates (FPR). Incorporation to prenatal screening of non-invasive prenatal testing with cffDNA have led to much higher sensitivity (>99%) with an extremely low FPR (0.1%) in trisomies identification. The aim of study was to establish a current role of ultrasound scans in first trimester prenatal screening.
material and methods

2017 first trimester scans were done as part of combined testing based on Fetal Medicine Foundation (FMF) algorithms from 01/2014 to 11/2017 in office-based prenatal screening. CRL, FHR, NT, ductus venosus, tricuspid and uterine artery flow, cervix length and structural abnormalities were evaluated in combination with history, 3 serum-markers and MAP. Trisomies 21, 18, 13 and pregnancy complications risks were assessed. All sono-exams were evaluated by the fully FMF-certified and for minimum 5 years re-audited and re-licensed obstetricians. Followed or parallel with combined tests 172 cases were screened with cffDNA (NIFTY) – study group.
material and methods

1. trimester sono-markers

- Fig 1. NT – nuchal translucency
- Fig 2. NB – nasal bone
- Fig 3. TR – tricuspid flow
- Fig 4. DV – ductus venosus
- Fig 5. UtA PI – uterine artery PI
results

47 intermediate- (1:1000 to 1:100) and 12 high-risk (>100) for trisomies cases were detected. 43 intermediate- and 8 high-risk were false positive. 165 cffDNA tests were true negative and 7 true positive. 5 – 21, 1 – 18, 1 – 13 trisomies and 1 – Klinefelter syndrome were detected in NIFTY and confirmed after amniocentesis. In cffDNA-negative cases (number of cases): single umbilical artery (3), diastrophic dysplasia/DD (1), twin pregnancy MoDi (1), pregnancies with high-risk for preeclampsia (6), FGR (18), preterm birth (6) were found.
results

structural abnormalities

Fig 6. DD – hitchhiker thumb
Fig 7. DD - micrognathia
Fig 8. DD - short long bone - humerus
Fig 9. SUA – single umbilical artery
Fig 10. twins pregnancy – MoDi
conclusion

Both tests are complimentary. cffDNA superiority depends on significantly higher sensitivity and significantly lower FPR, resulting in reduction of a number of invasive procedures. Only ultrasound leads to detection of structural abnormalities and, in combined test, high-risks of pregnancy complications.
Doppler Ultrasound of the Kidney Arteries - a Useful Tool in Assessing Kidney Function

Paula Chirila¹, Mirela Gliga¹,², Adriana Gomotarceanu³, Imola Torok¹, Sanda Voicu¹, Claudia Cozma³ Cristian Chirila¹

¹University of Medicine and Pharmacy, Tirgu Mures, Romania
²Diaverum Dialysis Center, Tirgu Mures, Romania
³TOPMed Medical Center, Tirgu Mures, Romania

mirelalianaagliga@gmail.com
Background

- Doppler ultrasound examination of the kidney is mandatory for nephrologists and it is indicated in case of high serum creatinine levels.
- Renal artery stenosis (RAS) and elevated intrarenal resistivity are the most important findings, after ruling out obstruction.
- Our aim is to characterize the renal vascularization in patients with elevated creatinine of unknown origin, in an emergency setting and to appreciate if Doppler ultrasound can contribute to the final diagnosis.

Images:
- Hydronephrosis, inferior caliceal stone
- Twinkling artifact in a renal stone
- Doppler triplex US. Normal resistive index
- Doppler triplex: prolonged acceleration time, elevated resistive index
- Renal cortical cyst
- Pulsed Doppler: normal maximum systolic velocity and RI
Material and methods

- We performed 270 kidney Doppler ultrasound examinations in a period of six months.
- We used an Esaote MyLab50, PhilipsHD11, GEVoluson270Pro device with a 3.5 MHz convex array transducer.
- The protocol of examination included the kidney morphology and the Doppler protocol included: maximum velocity, resistive index (RI) and acceleration time (AT) in the origin of the renal arteries, hilum and three intrarenal levels, maximum aortic velocity and reno-aortic index.
- Positive results were considered for: reno-aortic index >3 and delayed AT over 100msec; resistive index over 0.75 for AKI or CKD.
- RI over 0.8 was found in acute kidney failure and was predictive for a rapid degradation in kidney function.
- We analyzed the sensitivity (se) and specificity (sp) of the Doppler method compared with the gold standard diagnosis method in each case.
Results

- Significant RAS in 15 patients (5.5%),
- Elevated RI over 0.8 in 134 patients (49%)
  - 11.8% acute kidney injury
  - 24.8% diabetic nephropathy
  - 12.9% hypertensive nephropathy and chronic kidney disease
- In 121 patients the results were inconclusive (44.8%)
- Sensitivity of the Doppler method was 90% at 95%CI, specificity was 91% (95%CI), which were better than other results from the literature.
Conclusions

Ultrasound examination of the kidneys is the first investigational technique used in nephrology.

Grey-scale US can give qualitative morphological data suggestive for the diagnosis.

Doppler ultrasound is a very good method to describe the renal arterial resistance in different acute and chronic renal diseases.

Doppler is a quantitative method, but the technical settings are important in order to avoid false positive results.

Doppler is an important tool in patients in which contrast-agent CT or MRI imaging modalities are prohibited.

The weaknesses of the method consist in subjectivism, the diversity of the devices used and no well defined cut-off measurement values.
Evaluation of Multispectral Phase-contrast Imaging of Acoustic Impedance through Case Study on Chicken Bone

authors
Kohei Shinoda\textsuperscript{1}\textsuperscript{†}, Masasumi Yoshizawa\textsuperscript{1}, Seiya Ishikura\textsuperscript{2}, Norio Tagawa\textsuperscript{2}, Takasuke Irie\textsuperscript{3}

affiliation
\textsuperscript{1}Tokyo Metropolitan College of Industrial Technology, \textsuperscript{2}Tokyo Metropolitan Univ., \textsuperscript{3}Microsonic Co., Ltd.

author's contact email: s17012@g.metro-cit.ac.jp
background

In order to realize the real time pathological diagnosis with a minimal invasiveness, we have been developing a puncture needle-type ultrasonography.

Unlike observation by staining, this system enables to measure directly the structural characteristics and acoustic properties of living tissue as useful information for pathological diagnosis in vivo.
Fig. 1. Phase-contrast imaging procedure.

- PZT
- Thin rod sensor
- Water
- Move
- Signals reflected from end of rod sensor
- Signals reflected from samples
- Sample 1
- Sample 2

Fig. 2. Concept of multispectral phase-contrast imaging.

- Freq. A
- Freq. B
- Freq. C
- Image
- RGB Color Image

Fig. 2. Concept of multispectral phase-contrast imaging.
experiment

- Sample: chicken bone
- Quartz rod: diameter of 1.1 mm, length of 62 mm
- Transducer: center frequency of 44.9 MHz
- Three electrical burst wave
  Amplitude: 10 V_{pp}
  Frequencies: 40.0, 44.9, 50.0 MHz
  Pulse width: 20 cycle
- Temperature: 24.0°C

Fig.3. Schematic diagram of experiment.
results

Photograph (Chicken bone)

Superimposed image

<table>
<thead>
<tr>
<th>Frequency [MHz]</th>
<th>Amplitude [mV]</th>
</tr>
</thead>
<tbody>
<tr>
<td>40.0</td>
<td>25.6</td>
</tr>
<tr>
<td>44.9</td>
<td>28.0</td>
</tr>
<tr>
<td>50.0</td>
<td>10.3</td>
</tr>
</tbody>
</table>

Fig. 4. Obtained Images.
results

Fig. 5. Comparison of images.

Photograph

Superimposed image
conclusion

We demonstrated that the multispectral phase-contrast imaging of acoustic impedance could distinguish the differences in structural characteristics and acoustic properties of the biological sample on one image.

In the future work, by further case studies, we need to clear relationships between acoustic properties and physical properties of biological samples, and to obtain beneficial information for pathological diagnosis.
Evaluation of the Lower Trapezius with Panoramic Ultrasound using the SIG_VIP® System.
A new approach.

Authors: Fernandez-Carnero S¹,²,³, Garrido-Marin A³,⁴, Pecos-Martín D⁵,⁶, Albalate-Barbero FR⁷, Martin-Saborido, C⁸, Gallego-Izquierdo T⁵,⁶.

Affiliation: Department of Physical Therapy, Universidad Francisco de Vitoria, Spain.¹ Grupo de Investigación en Fisioterapia e Imagen Intervencionista (GIFIMI) Universidad Francisco de Vitoria.² Pozuelo de Alarcón, Madrid, España. Spanish Society for Ultrasound in Physiotherapy member.³ CARMASALUD, Madrid, Spain.⁴ Physical Therapy Department, Alcalá de Henares University, Madrid.⁵ Physiotherapy and Pain Group.⁶ Hospital Universitario 12 de Octubre, Madrid, Spain.⁷ Fundación San Juan de Dios. Centro de Ciencias de la Salud San Rafael- Nebrija⁸.

author's contact email: samuelfernandezcarnero@gmail.com
Background

Panoramic ultrasound is an assessment technique that has proven validity and confidence with regard to the gold standard. The use of panoramic ultrasound since Ikai and Fukunaga 1968 for greater anthropometrical exactness and Dr. Archie Young in 80s has provided other very interesting options. This method supplies us with the relevant information in the patient’s medical record at a lower cost, great accessibility, and presents no risk to the patient.

AIM: Validate the exploration of the inferior fibres of the trapezius with a long-axis panoramic ultrasound using the SIG_VIP® (Sistema Guiado para Visión Panorámica/Guided System for Panoramic Imaging).
Material and Methods

A transversal observational study of a healthy population group according to inclusion/exclusion criteria was conducted. The project was approved by the Ethics Committee in Clinical Research at the University of Alcalá (Madrid). Samples were performed by two musculoskeletal sonographers with more than 5 years’ experience using an ultrasound device.

Measurements were taken with the volunteers in a prone position on a plint to which the SIG_VIP® system was attached (Figures 1-3). Two measurements were taken at four locations of each muscle on each volunteer and by each sonographer, in order to be able to calculate the intra- and inter-tester correlation coefficient and assess the target muscle’s characteristics.
Material and Methods

An Ecube 15 Plantinum ultrasound unit with a linear probe with a 58.2 mm footprint and 8-17 Mhz was used with panoramic view license to acquire the images.

The measurements were taken along side the cranial insertion of lower trapezius in medial border of the spine of scapula and caudal insertion at T12 vertebra. The measurements taken, were: muscle length (caudal to cranial) and muscle thickness in three points (Figure 4) in the middle of the muscle and in the middle of the upper and lower resulting portions.

Patients signed consent form and an information sheet prior to be explored was given.

The intraclass correlation coefficient (ICC), standard error of measurement (SEM), and minimal detectable change (MDC) were used to evaluate the relative and absolute reliability.
Results

Pending total saturation of the sample, 15 volunteers were explored and the samples recorded and statistically analyzed with SPSS software. Shapiro-Wilk test checked the quantitative variables normality.

The average baseline characteristics of the population obtained were: age 41 (± 10.56), weight 68.38 kg (± 16.78), height 1.67 m (± 0.10) and BMI of 24.1 (± 3.83) (Table 1).

<table>
<thead>
<tr>
<th>Variables</th>
<th>Total N=15</th>
<th>Females N= 9</th>
<th>Males N= 6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age/Mean, SD Max &amp; min.</td>
<td>41.00 (10.56)</td>
<td>40.33 (10.97)</td>
<td>42 (10.80)</td>
</tr>
<tr>
<td>Weight/kg/Mean &amp; SD</td>
<td>68.38 (16.78)</td>
<td>58.61 (10.98)</td>
<td>83.03 (12.91)</td>
</tr>
<tr>
<td>Height/cm/Mean &amp; SD</td>
<td>167 (0.10)</td>
<td>160 (0.05)</td>
<td>178 (0.04)</td>
</tr>
<tr>
<td>BMI/kg:m²/Mean &amp; SD</td>
<td>24.10 (3.83)</td>
<td>22.77 (3.48)</td>
<td>26.08 (3.73)</td>
</tr>
<tr>
<td>Smoker/NO-YES &amp; %</td>
<td>11(73.3%)/4 (26.7%)</td>
<td>6 (54.5%)/3 (75.0%)</td>
<td>5 (45.5%)/1 (25.0%)</td>
</tr>
<tr>
<td>Sports/NO-YES &amp; %</td>
<td>7 (46.7%)/8 (53.3%)</td>
<td>5 (55.6%)/2 (33.3%)</td>
<td>4 (50.0%)/4 (50.0%)</td>
</tr>
<tr>
<td>Worker/NO-YES &amp; %</td>
<td>1 (6.7%)/14 (93.3%)</td>
<td>1 (11.1%)/8 (88.9%)</td>
<td>0 (0.0%)/6 (100%)</td>
</tr>
</tbody>
</table>

The images were measured in the ultrasound device during the sampling process (Figure 5).
Results

Cronbach’s Alpha was calculated and the ICC intra- and inter-tester correlation coefficient was defined. High correlation was found in the measurement of the length 0.86-0.97 and the thickness in two points 0.83-0.93. The Minimum Detectable Changes (MDC) was also calculated with a 95% confidence level ($\sqrt{2} \times 1.96 \times sw$) considering good in these points. (Table 2)

Bland Altman intra-examiner plot and linear regressions were calculated in order to continue with the MDC evaluation; high confidence results were got. (Graphic 1)

Table 2

<table>
<thead>
<tr>
<th>Variables</th>
<th>Physio.</th>
<th>Cronbach’s Alpha</th>
<th>ICC A</th>
<th>ICC B</th>
<th>EEM</th>
<th>EEM %</th>
<th>MDC</th>
<th>MDC %</th>
</tr>
</thead>
<tbody>
<tr>
<td>TRAPEZIUS INF. LENGTH_1R</td>
<td>1</td>
<td>0.942</td>
<td>0.72 (0.72,0.96);p&lt;0.001</td>
<td>0.72 (0.72,0.96);p&lt;0.001</td>
<td>0.68</td>
<td>3.26</td>
<td>1.88</td>
<td>9.15</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>0.975</td>
<td>0.95 (0.87,0.98);p&lt;0.001</td>
<td>0.95 (0.87,0.98);p&lt;0.001</td>
<td>0.52</td>
<td>2.67</td>
<td>1.44</td>
<td>7.01</td>
</tr>
<tr>
<td>TRAPEZIUS INF. THICKNESS_11R</td>
<td>1</td>
<td>0.908</td>
<td>0.84 (0.58,0.94);p&lt;0.001</td>
<td>0.84 (0.60,0.94);p&lt;0.001</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>0.835</td>
<td>0.72 (0.35,0.89);p&lt;0.001</td>
<td>0.72 (0.37,0.89);p&lt;0.001</td>
<td>0.02</td>
<td>5.00</td>
<td>0.05</td>
<td>12.5</td>
</tr>
<tr>
<td>TRAPEZIUS INF. LENGTH_1L</td>
<td>1</td>
<td>0.863</td>
<td>0.77 (0.43,0.91);p&lt;0.001</td>
<td>0.77 (0.46,0.91);p&lt;0.001</td>
<td>1.87</td>
<td>9.18</td>
<td>5.18</td>
<td>15.44</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>0.949</td>
<td>0.90 (0.75,0.96);p&lt;0.001</td>
<td>0.91 (0.75,0.96);p&lt;0.001</td>
<td>1.06</td>
<td>5.7</td>
<td>2.93</td>
<td>14.57</td>
</tr>
<tr>
<td>TRAPEZIUS INF. THICKNESS_111L</td>
<td>1</td>
<td>0.907</td>
<td>0.81 (0.53,0.93);p&lt;0.001</td>
<td>0.81 (0.54,0.93);p&lt;0.001</td>
<td>0.01</td>
<td>3.03</td>
<td>0.02</td>
<td>6.06</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>0.933</td>
<td>0.87 (0.68,0.95);p&lt;0.001</td>
<td>0.87 (0.68,0.95);p&lt;0.001</td>
<td>0.02</td>
<td>5.56</td>
<td>0.05</td>
<td>7.88</td>
</tr>
</tbody>
</table>

ICC = Intraclass Correlation Coefficient.
SEM= Standard Error of Mean; SEM=SD x sqrt (1 - ICC)
SEM%=SEM / mean * 100%
MDC = Minimal Detectable Changes; MDC = $\sqrt{2} \times 1.96 \times sw$

Graphic 1. Bland Altman intra-exam. TRAPEZIUS INF. LENGTH_1R
Conclusions

• The assessment of the inferior fibres of the trapezius with this system provides reliable measurements.

• More samples must be taken in order to check the ICC intra and inter tester got.

• This new system opens up a new assessment path for understanding the measurements, morphology and size of muscles in long axial, using panoramic ultrasound view.

• The system provides a high confidence intra and inter tester.

Acknowledgement:
Medical Scan-Alpinion for lending the equipment for the sampling.
Evaluation of Transit Blood Flow Through Vertebral Arteries

F. Daehne; I. Schmehl

Unfallkrankenhaus Berlin, Department of Neurology with Stroke Unit and Early Rehabilitation

frank.daehne@ukb.de
Posterior cerebral circulation contributes 40% to the blood supply of the brain. The blood flow is distributed according to a certain rule (Dähne F, Schmehl I. Strömungsregulation der A. vertebralis. Ultraschall in der Medizin – European Journal of Ultrasound 2017; 38(S01): 1 - 65.) on the right and left vertebral artery and comes together again in basilar artery.

In addition to this transit function, the vertebral arteries also practise a local blood supply function, especially for lower portions of the cerebellum.

We try to evaluate transit blood flow rate through vertebral arteries.
material and methods

408 patients (age 62.7 ± 16.3 y.) with regular CT- or MR-angiography and vascular sonography in posterior cerebral circulation were divided in 2 groups: 50 patients with unilateral aplastic terminal segment of vertebral artery (VA) and 358 patients without such aplasia.

Maximum enddiastolic flow velocity (v) and vessel diameter (d) were measured for each VA. Enddiastolic volume flow (Q) for each vessel, total enddiastolic volume flow for both vessels (Qs) and transit blood flow rate (R) are calculating:

\[ Q = 1.25 \pi \cdot v \cdot d^2 \ [ \mu l/s] , \]
material and methods

group with aplasia:
\[ Q_{sa} = Q_{apl} + Q_{contra}, \text{ with } Q \text{ of aplastic and contralateral VA,} \]
\[ R_{a} = \frac{(Q_{sa} - 2*Q_{apl})}{Q_{sa}} \]

group without aplasia:
\[ Q_{s} = Q_{right} + Q_{left}, \text{ with } Q \text{ of right and left VA,} \]
\[ R = \frac{(Q_{s} - 2*Q_{apl\text{mean}})}{Q_{s}}, \text{ with mean value } Q_{apl} \text{ from first group} \]
results

Fig.: Transit flow rate of vertebral arteries with unilateral aplasia of their terminal segment and without aplasia
Conclusion

1. Approximately 75% of vertebral blood flow supplies A. basilaris and approximately 25% vessel branches of vertebral arteries.

2. It does not make any significant difference (p<0.01) to the transit performance of the vertebral arteries, whether only one or both contribute to this.
Factors affecting FAST OSCE scores of final year medical students

abstract

Sornsupha Limchareon, M.D., Puwich Charoenchue, M.D., Jitraporn Intrarak, M.D.
Division of Radiology and Nuclear Medicine, Faculty of Medicine, Burapha University
sornsupha@hotmail.com
background

- Focused Assessment with Sonography for Trauma (FAST) has become an initial evaluation in acute abdominal traumatic patients. Therefore ultrasound (US) education is needed. Nowadays there has been no standardized teaching of FAST for undergraduate medical students.

- This study aimed to investigate the relationship between FAST scan experience during undergraduate training and the OSCE (Objective Structured Clinical Examination) score of the final year medical students.
Participants: 45 final year medical students
Retrospectively reviewed the FAST OSCE scores
A brief survey regarding the students’ experience with FAST scans
Found the correlation among the students’ FAST scan experience including;
- time of the didactic lecture,
- time of practical training supervised by staffs,
- number of FAST scans,
- number of positive FAST scans, and
- level of confidence in performing the FAST scan.
**material and methods**

<table>
<thead>
<tr>
<th>Ultrasound view</th>
<th>Correctly identified and good image resolution</th>
<th>Correctly identified but poor image resolution</th>
<th>Correct location but cannot identify the image</th>
<th>Not perform</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perisplenic view</td>
<td>20</td>
<td>10</td>
<td>5</td>
<td>0</td>
</tr>
<tr>
<td>Hepatorenal recess</td>
<td>20</td>
<td>10</td>
<td>5</td>
<td>0</td>
</tr>
<tr>
<td>Suprapubic view</td>
<td>20</td>
<td>10</td>
<td>5</td>
<td>0</td>
</tr>
<tr>
<td>Subxiphoid pericardial view</td>
<td>20</td>
<td>10</td>
<td>5</td>
<td>0</td>
</tr>
</tbody>
</table>

Table 1. FAST OSCE checklists
material and methods

Table 2. Survey questions

<table>
<thead>
<tr>
<th></th>
<th>No</th>
<th>Yes</th>
<th>Time (minutes)</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Formal ultrasound training</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- lecture</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- skill practice session</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. FAST scan experience</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Number of patients</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Number of positive cases</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Rating your level of confidence in performing FAST protocol (1=the least, 5=the most)</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>
results

• All the participants passed the OSCE.

• Suprapubic region was highly achieved by students (93.3%) whereas perisplenic region was the lowest (64.4%).

• The correlation coefficients among each factor and the OSCE scores showed weak correlations.

• The correlation coefficients for the level of confidence and three factors included; time of lecture (R=0.45, p=.002), time of practical training (R=0.47, p=.001), and number or FAST scans (R=0.55, p<.001) showed moderate correlations.

• With regard to the survey, 57.8% of respondents received formal training with both a didactic session and a hands-on practical session.
**conclusion**

- FAST scan skill is essential for the physician. Formal US education and real-life exposure to scanning improve the medical students’ confidence level. Therefore standardized US education and assessment for medical students are required. The current study may help to design the ultrasound curriculum in undergraduate medical education.
Follow-up of liver stiffness values in patients with chronic hepatitis B undergoing antiviral therapy with nucleos(t)ide analogues

Alin Lazar, Ioan Sporea, Raluca Lupusoru, Diana Gherhardt, Isabel Dan, Alexandra Deleanu, Roxana Sirli
Department of Gastroenterology and Hepatology,
"Victor Babes" University of Medicine and Pharmacy Timisoara, Romania

lazaralin1990@yahoo.com
Background

- Liver stiffness (LS) measurements by Transient Elastography (TE) has been widely accepted as a tool for fibrosis assessment.
- Nucleos(t)ide analogues (NUC) are the most prescribed treatment for chronic hepatitis B.

- The **aim** of the study was to evaluate what happens to liver stiffness values in patients with chronic hepatitis B undergoing NUC therapy.
Material and methods

- 64 patients from a heterogeneous group, with chronic hepatitis or compensated HBV cirrhosis, undergoing NUC treatment (most of them with entecavir) were followed-up for more than one year.

- LS values were assessed by means of TE (FibroScan, Echosens) (Fig. 1).

- Successive LS measurements have been compared using paired t test.
Results

• The patients have been followed-up for a median interval of 72 months (range 12-132)

• 58 had at least two LSM made during the follow-up (median interval 24 months, range 12-120), with no significant differences between the first and the second LSM, $p = 0.27$

• In 34 patients, 3 LSM were available (median interval 48 months, range 24-120), with no significant differences between the first and the third, $p = 0.08$
Results

- In 18 patients, 4 LSM were available (median interval 48 months, range 36-108), with no significant differences between the first and the fourth, $p = 0.15$

- In 12 patients, 5 LSM were available (median interval 60 months, range 48-120), with no significant differences between the first and the fifth, $p = 0.49$

- In 10 patients, 6 LSM were available (median interval 78 months, range 60-132), with no significant differences between the first and the sixth, $p = 0.34$
During the therapy with nucleos(t)ide analogues, liver stiffness measurements by transient elastography remained stable.
High resolution ultrasound of peripheral nerves in Amyotrophic Lateral Sclerosis

Authors: Wehr. SØ, Johansson MT, Bak. SS, Fuglsang-Frederiksen A, Qerama E.

Affiliation: Department of Neurophysiology, Aarhus University Hospital, Aarhus, Denmark

Author's contact email: 201307355@post.au.dk
Amyotrophic lateral sclerosis (ALS) is a progressive neurodegenerative disease and is characterised by degeneration of both upper and lower motor neurons. In this study, we examined whether the ultrasound (UL) measurement of median and ulnar nerves are different in ALS patients compared to healthy subjects (HS) and whether US can be used to demonstrate the progressive axonal loss by showing decrease in cross-sectional area (CSA) of the nerves.
Material and methods

- Ultrasound examination is performed using a Siemens ACUSON S2000 with a high-frequency linear array transducer (18L6 HD).
- We included 58 patients, all suspected of either ALS, polyneuropathy or myopathy. We recruited a control group of 38 healthy subjects (HS).
- We measured the cross-sectional area (CSA) of the median and ulnar nerve at brachial and antebrachial level bilaterally.
- We calculated inter nerve and intra nerve ratio for both nerves.
- Fifteen were later diagnosed with ALS and invited to follow-up examination 3 months later. Only nine patients showed up to follow up.
Results

- A total of 15 ALS patients and 38 controls were enrolled in the study.
- We found no difference in mean CSA of the median nerve and ulnar nerve at the brachial and antebrachial level between ALS patients and HS.
- We found an increase of mean CSA of both nerves at the antebrachial level at three month follow-up and of ulnar nerve at brachial level also.
Conclusion

- CSA of the peripheral nerves could not differentiate the ALS patients from healthy subjects.
- At follow up, we found an unexpected increase of the CSA of the nerves in upper arm in ALS patients.
  - *An inflammatory process secondary to axonal loss could be the explanation for the increase of the nerve CSA.*
- Further and larger studies are needed to confirm this hypothesis.
High resolution ultrasound of scapulae alatae

*correlation with electrophysiological measurements - a prospective case control study*

Authors: Bak SS, Døssing K, Johnsen B, Fuglsang-Frederiksen A, Qerama E.

Affiliation: Department of Neurophysiology, Aarhus University Hospital, Aarhus, Denmark

Author's contact email: 201307355@post.au.dk
Background

Scapula alata (SA) is a rare but also underreported disorder caused by neuromuscular disturbance in the scapulothoracic stabilizer muscles.

Today, combined with the clinical evaluation, electro-physiological testing is used to diagnose possible SA.

Currently, diagnosis is often made after a delay.

This problem might benefit from a more thorough evaluation when diagnosing SA by using imaging.
The objective is to find out

- whether ultrasound measurements can be used to differentiate SA patients from healthy controls
- whether ultrasound measurements can be used to differentiate between different types of SA
- whether US measurements correlate with electro-physiological findings
Material and methods

- The study is a single-blinded, prospective, controlled multi-center study.
- Ultrasound examination is performed using a Siemens ACUSON S2000 with a high-frequency linear array transducer (18L6 HD).
- 20-30 SA patients will be recruited and a group of 40-50 healthy subjects of different age groups will be recruited in order to collect reference values.
- We measure the cross-sectional area (CSA) of the long thoracic nerve, the accessory nerve, and the dorsal scapular nerve on the neck bilaterally.
- We measure the thickness of the serratus anterior, the trapezius muscle and the rhomboid major muscle
LTN sinister
CSA: 0.1 mm²

LTN dexter (affected side)
CSA: 0.2 mm²

M. Trapezius pars inferior
Diagnosis of SA is difficult
- The clinical examination might not reveal the winging or might suggest another shoulder disorder
- The electro-diagnostic examination might not be possible to perform or show no abnormalities

Ultrasound may be a good supplement when diagnosing SA
Human cystic echinococcosis in endemic regions in Bulgaria

K. Vutova\textsuperscript{1}, B. Golemanov\textsuperscript{2}, V. Velev, R. Chipeva\textsuperscript{1}, N. Yancheva, E. Aleksandrova\textsuperscript{1}, V. Krastev\textsuperscript{1}, M. Muhtarov\textsuperscript{3}, F. Tamarozzi\textsuperscript{4}, E. Brunetti\textsuperscript{4}, A. Casulli\textsuperscript{5}

\textsuperscript{1}\textit{SBALIPB "Prof. I. Kirov"}, Department of Infectious Diseases, Parasitology and Tropical Medicine, Medical University – Sofia; \textsuperscript{2}University Hospital “Queen Joanna” Department of Gastroenterology, Medical University – Sofia; \textsuperscript{3}Hospital “Kardzhali” Gastroenterology ward, Kardzhali town, Bulgaria; \textsuperscript{4}Department of Clinical-Surgical, Diagnostic and Paediatric Sciences, WHO Collaborating Centre for Clinical Management of Cystic Echinococcosis, University of Pavia, Italy; \textsuperscript{5}European Union Reference Laboratory for Parasites, Department of Infectious, Parasitic and Immunomediated Diseases, Istituto Superiore di Sanità, Rome, Italy

author's contact email: K_Vutova@abv.bg
Echinococcosis is a chronic disease in humans, with prolonged recurrent course of illness. In some cases no symptoms, but in others there is repeated surgical treatments and severe complications.

High incidence of cystic echinococcosis (CE) reported in Eastern Europe was a reason for supporting international project, funded by the Seventh Framework Program of the European Commission - HERACLES.

Materials and methods:
Ultrasound examinations (US) were performed on 8602 people in four Bulgarian endemic regions for CE in two years period (2014 and 2015).
Results

The data for registered patients in the Bulgarian Ministry of Health in period 1950 – 62 are 5.0 - 6.6 %ooo and after 2 decree against rabies decreased (1.2 ÷ 2.7 %ooo). The number of cases again increased till maximum - 8.5%ooo (1998). CE cases decreased in 2009 (4.3%ooo) and till now are under 4 %ooo (2016 – 3.8 %ooo ). But we do not know the real number.

Hydatid cysts were found in 70 patients, of which 44 were with post-operated cysts without relapse (CE4), 3 patients are post PAIR treated, 4 were treated in the past with albendazole (solid lesions). In 18 patients hydatid cysts were found for first time (CE1, CE2 and CE4). Relapses were detected in 3 patients operated in the past. From patients with active CE - 3 were operated, one have PAIR, one is treated 4 months with ABZ and after was operated, 4 have treatment with ABZ.
ULTRASOUND FOLLOW UP

Patient post surgery of CE in the lung

CE1 in liver - 4.4/3.6 cm
ABZ 4 months and follow-up after 1 year - 3.4/2 cm

US of patients with liver CE - new found

Follow up after 4 months
ABZ – CE2 (11 cm)

US liver – CE1 14 cm
ULTRASOUND FOLLOW UP

US of patients with liver cyst after operation

Cavity after surgery and ABZ 2 m-ths after. 6.6/7 cm
ELISA positive 2,3

Follow-up - relapse

US of patient with CE4 new found
New found patient (12 years) - liver CE1 7/5 cm

After PAIR (3 weeks) - 6/4 cm

Follow up after 9 months - 6/5 cm

After 1 month ABZ post PAIR therapy

After 1 year and 5 months – relapse

After ABZ 3 months 5.6/4.6 cm
Conclusion

For the first time in endemic areas for CE in Bulgaria was carried out ultrasound screenings. Collection and analysis of accurate epidemiological and clinical data will give a reliable picture of the burden of this disease in Bulgaria, providing a statistically supported case series for future evaluation of efficacy and effectiveness of treatment.

Acknowledgements. The research was funded from the European Community’s FP7 under the grant agreement 602051 (Project HERACLES)
In how many HCV cirrhotic patients with sustained viral response after DAA treatment liver stiffness values become lower than the accepted cut-offs for cirrhosis?

Alin Lazar, Ioan Sporea, Raluca Lupusorul, Alina Popescu, Mirela Danila, Isabel Dan, Alexandra Deleanu, Roxana Sirli

Department of Gastroenterology and Hepatology, "Victor Babes" University of Medicine and Pharmacy Timisoara, Romania

lazaralin1990@yahoo.com
Background

• Liver stiffness (LS) measurements by Transient Elastography (TE) has been widely accepted as a tool for fibrosis assessment.

• The aim of the study was to evaluate what happens to liver stiffness values after successful DAA (Direct-acting antivirals) therapy in patients with compensated HCV (hepatitis C virus) cirrhosis and to highlight in how many LS values become lower than the accepted cut-off for cirrhosis in untreated ones.
Material and methods

- The study included 74 patients with compensated HCV cirrhosis (all genotype 1b) who underwent a 12 weeks DAA therapy course and had sustained virologic response (SVR).
- LS values were assessed by means of TE (FibroScan, Echosens) at the start of treatment (ST), at the end of treatment (EOT), and at 12 and 24 weeks after EOT.
30th EUROSON Congress of the EFSUMB  
14th Scientific Congress of Polish Ultrasound  
Society for Ultrasound in Medicine

Results

- The mean LS values at EOT decreased as compared to ST (18.9 ± 8.9 vs. 22.2 ± 10kPa, p=0.03).

- Twelve weeks after EOT the mean values continued to decrease as compared to ST (17.3 ± 8.2 vs. 22.2 ± 10kPa, p=0.001).

- The decrease continued at 24 weeks after EOT (16.6 ± 7.5 vs. 22.2 ± 10kPa, p=0.0002) (Fig. 2).

![Figure 2](image-url). The dynamics of liver stiffness values (kPa) after antiviral treatment.
Results

At 24 weeks after EOT,
• **36.7%** (29) of patients had LS lower than 12 kPa (the cut-off for cirrhosis in untreated patients) and
• **18.9%** (14 patients) had values lower than 9.5 kPa (considered to be the cut-off value in cirrhotic patients with SVR) (Fig. 3).
Conclusion

In HCV cirrhotic patients, the mean liver stiffness values significantly decreased 24 weeks after EOT:

- 36.7% of patients had LS lower than 12 kPa, while
- 18.9% had values lower than 9.5 kPa.
Liver fibrosis in Patients after Fontan Procedure in Elastographic Examination

Tadeusz Wilkosz

John Paul II Hospital, Kraków, Poland, Department of Diagnostics

Author's contact email: wilkoszt@gmail.com
Fontan operation, redirecting the flow of venous blood directly to the pulmonary circulation, used in children with univentricular hearts, enables the patients to survive to adulthood.

Cardiogenic fibrosis of the liver develops in all patients treated with Fontan surgery, this process is clearly marked already in childhood. Shear Wave Elastography (SWE) can detect significant and severe fibrosis as well as cirrhosis (Metavir score F2-F4) in almost all cases/patients.

Fig.1. 12 years old girl with cirrhosis
A group of 60 subjects – 6 children and 54 young adults (22 women and 38 men aged 5 to 36 years) were examined in 2015-2018. using Philips iU22XMatrix and Aixplorer Supersonic Imagine.

**Fig. 2.** 8 years old boy with moderate and severe liver fibrosis (Metavir score F2-F3)

**Fig. 3.** 27 years old male with moderate and severe liver fibrosis
Patients with moderate fibrosis most often had normal liver function tests (ALAT, ASPAT, GGTP)

Fig. 4. Moderate fibrosis (Metavir score F2)
Most of the patients (73%) had moderate to severe fibrosis (F2-F3), whereas cirrhosis was diagnosed in 8% of patients, one of the patients developed hepatocellular carcinoma.

Fig.5. 35 years old man, cirrhosis and ascites

Fig.6. One year later – hepatocellular carcinoma
Hepatic congestion can increase liver stiffness scores therefore it is not always related to fibrosis progression. Speed of the shear wave is higher in the conditions of slowed flow in the hepatic veins. The full examination includes assessment of the texture of liver parenchyma, vascular drawing, outlines of the organ, spleen and doppler of the portal system.

Fig. 7. 27 years old man with cirrhosis
Fig. 8. Doppler of the portal system in moderate and severe fibrosis
LIVER STIFFNESS VALUES USING 2D-SWE-TOSHIBA IN HEALTHY SUBJECTS

Roxana Sirli, Alexandru Popa, Alina Popescu, Alin Lazar, Raluca Lupusoru, Camelia Foncea, Ruxandra Mare, Ioan Sporea

Department of Gastroenterology and Hepatology, "Victor Babeș" University of Medicine and Pharmacy Timișoara, Romania

roxanasirli@gmail.com
Background

• Ultrasound based elastography has become a widely accepted method to assess liver stiffness, as a marker of liver fibrosis severity.

• New elastographic techniques are emerging each day that need validation.

• The aim of this study was to determine liver stiffness values in healthy subjects, by means of a new 2D-SWE technique from Toshiba, implemented on the Aplio I900 system.
Material and methods - patients

- 43 subjects have been included
  - 75.6% women, 24.4% men,
  - average BMI=23.6 kg/m²,
  - average age=38
- All subjects had:
  - normal abdominal ultrasound
  - no history of chronic liver disease,
  - liver stiffness (LS) was evaluated using a new 2D-SWE technique from Toshiba.
Material and methods – LS measurements

- fasting patients
- ten LS measurements were performed in each subject, in a homogenous area chosen by the operator, avoiding large vessels
- reliable measurements were defined as:
  - the median value of ten measurements
  - IQR/median < 30%.
Results

• Out of 43 subjects, **reliable LS measurements** were obtained in 95.3% (41) subjects.

• The **mean LS values in healthy subjects** was 4.5 ± 0.7 kPa, CI 95% (4.2 - 4.7)

• **no significant differences** between the mean LS in men vs. women 4.6 ± 0.5 kPa, CI 95% (4.2 - 4.9) vs. 4.4 ± 0.7 kPa CI 95% (4.2 – 4.7) (p=0.26).
Conclusions

- 2D-SWE-Toshiba has a very good feasibility (95.34%) in healthy subjects.

- The mean LS value in a healthy cohort, determined by 2D-SWE-Toshiba in our cohort was $4.5 \pm 0.7$ kPa
Lung Hemorrhage Induced by Acoustic Radiation Force Impulse Elastography: A preliminary study in rabbits

(All institutional and national guidelines for the care and use of laboratory animals were followed.)

N. Takayama¹, H. Sasanuma², K. Rifu², M. Furuya³, A.K. Lefor², I. Akiyama³, N. Taniguchi¹

¹ Department of Clinical Laboratory Medicine, Jichi Medical University, Shimotsuke, Tochigi, Japan
² Department of Surgery, Jichi Medical University, Shimotsuke, Tochigi, Japan,
³ Medical Ultrasound Research Center, Doshisha University, Kyotanabe, Kyoto, Japan

E mail: noriya.takkan@gmail.com
background

What is Acoustic radiation force Impulse (ARFI)?

- ARFI is a force remotely exerted inside the medium as the ultrasound propagates, which induce tissue deformation.
- The deformation can be monitored spatially and temporally to assess the elasticity of the tissue.
- To generate sufficient ARFI for elastography, this method uses a focused transducer and longer and higher power acoustic pulses.
- Pulse duration used in typical ARFI elastography is 0.05-1 ms, and these are 10-100 times longer than those of \( \leq 0.02 \) ms in conventional diagnostic ultrasound.

- Ultrasound exposure is known to induce biological effects in animal tissues especially those that contain gas bodies.
- However, ARFI elastography are getting widely used in clinical practice despite the safety of ARFI has yet to be confirmed.


JSUM, Guideline for ultrasound elastography
background


We conducted this study with more accurate exposure using the new ARFI probe that can create B mode under the settings similar to clinical use.

This result was obtained by blind exposure, with a longer pulse duration (PD: 10ms) than that used clinically.

→ We conducted this study with more accurate exposure using the new ARFI probe that can create B mode under the settings similar to clinical use.
5 rabbits were anesthetized and exposed through two paths (transhepatic and transthoracic) bilaterally over the lungs to 5.2 MHz ultrasound with ARF.
Case 1

Case 2

Case 3

Case 4

Case 5

Microscopic analysis of the red spot revealed alveolar hemorrhage.

Red spots were observed on the surface of the lungs corresponding to the area of exposure in each animal.
Lung hemorrhages were induced under the accepted MI limits approved by FDA (< MI 1.9) with shorter PD (0.3-1.0 ms) equivalent to that in clinical use of ARFI.

7 red spots at transhepatic and 6 at transthoracic path out of 10 exposures respectively.
conclusion

• This study is the first investigation of induced lung hemorrhage resulting from the use of ARFI equivalent to clinical setting.

• These results identify a potential risk of lung injury associated with the ARFI elastography when the transducer is directed toward the lung directly or indirectly, especially during liver or breast imaging.

• We are investigating the threshold of lung injury with or without ultrasound contrast agent.
More common abnormal findings encountered during ultrasounds of the scrotum in infertile males

Adrian KRISTO, Evin DANI

Radiologist, University Hospital Center “Mother Theresa”, Tirane, Albania;
Andrologist, Center of Infertility, Tirane, Albania

Contact: ardesa.sa@hotmail.com
Ultrasound is the primary method used for the evaluation of scrotal abnormalities and has become an important component in the assessment of male infertility disorders.

The aim of this study is to show which anomalies occur more rapidly in the ultrasounds of the scrotum in a group of subfertile Albanian males, and to see whether they occur as frequently in a group of fertile males.
Material and Methods

- This study was conducted in UHC “Mother Theresa” during July 2011 to December 2013, 1,300 males, 20-50 years old, seeking medical assistance for unsuccessful fertility attempts, were studied. The only criteria used was the lack of desired pregnancy for at least one year.

- All of the male patients studied have done a Spermiogram analysis and a Scrotal sonogram.

- The evaluation of the spermiogram was done according to the criteria of WHO 2010. The spermiogram analysis is considered normal when all the parameters of the spermiograms have been within the limit values.

- Then, the patients were subjected to the scrotal ultrasound examination, the structure of the testicles was studied and the evaluation of all of the extratesticular structures as well as the inguinal canal has been made.

- XLSTAT, Z-test to compare two proportions and Value P<0.05 was used to make a statistical comparison between the variables of the two group of males.
Results

1,300 males between the age of 20 to 50 years old took part in the study. The average age of the participants was 31.4 years (±3.2).

In the group of 1,300 males, 966 (group A) had abnormal spermiogram results, and 334 (group B) males had normal spermiogram results.

Separated according to their respective groups, all of the observed anomalies are as follows:
# Results

<table>
<thead>
<tr>
<th>Condition</th>
<th>Group 1</th>
<th>Group 2</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Left Varicocele</td>
<td>37.3% (360)</td>
<td>17.9 % (60)</td>
<td>0.0001</td>
</tr>
<tr>
<td>Cryptorchidism</td>
<td>2.3% (22)</td>
<td>0% (0)</td>
<td>0.00001</td>
</tr>
<tr>
<td>Post Orchitis</td>
<td>3.2% (31)</td>
<td>0.59% (2)</td>
<td>0.03</td>
</tr>
<tr>
<td>Microlitiasis</td>
<td>5.8% (30)</td>
<td>4.5% (15)</td>
<td>0.5</td>
</tr>
<tr>
<td>Orchiectomy</td>
<td>2.5% (24)</td>
<td>1.8% (6)</td>
<td>0.4</td>
</tr>
<tr>
<td>Epididymal Cysts</td>
<td>2.3% (22)</td>
<td>2.1% (7)</td>
<td>0.9</td>
</tr>
<tr>
<td>Hydrocele</td>
<td>1.14% (11)</td>
<td>1.19% (4)</td>
<td>0.95</td>
</tr>
<tr>
<td>Inguinal Hernia</td>
<td>0.62% (6)</td>
<td>1% (3)</td>
<td>0.5</td>
</tr>
<tr>
<td>Post Herniorrhaphy</td>
<td>0.41% (4)</td>
<td>0.59% (2)</td>
<td>0.85</td>
</tr>
<tr>
<td>Right Varicocele</td>
<td>0.62% (6)</td>
<td>0.59% (2)</td>
<td>0.5</td>
</tr>
<tr>
<td>Testicular Tumor</td>
<td>0.5% (5)</td>
<td>0.3% (1)</td>
<td>0.3</td>
</tr>
<tr>
<td>Intratesticular Varicocele</td>
<td>0.2% (2)</td>
<td>0% (0)</td>
<td>0.3</td>
</tr>
<tr>
<td>Monorchism</td>
<td>0.5% (5)</td>
<td>1.2% (4)</td>
<td>0.5</td>
</tr>
<tr>
<td>Tubular Ectasia of the Rete Testis</td>
<td>0.31% (3)</td>
<td>0.3% (1)</td>
<td>0.5</td>
</tr>
</tbody>
</table>
Conclusion

Left Varicocele is the most common anomaly in males, it occurs approximately twice as much in the infertile male group than in the fertile male group.
THANK YOU

EUROSON      POZNAŃ
PANCREATIC STIFFNESS VALUES USING A POINT SHEAR WAVE ELASTOGRAPHY TECHNIQUE IN PATIENTS WITH HEALTHY PANCREAS

Alexandru Popa, Alin Lazar, Cristina Apetrei, Ruxandra Mare, Ioan Sporea, Roxana Sirli

Department of Gastroenterology and Hepatology,
"Victor Babeş" University of Medicine and Pharmacy Timişoara, Romania

gastro.popa@gmail.com
Background

In the current literature, there is only a small number of studies that have evaluated the utility of point shear wave elastography for **pancreatic assessment**.

**Objective:** To assess the feasibility of Virtual Touch Quantification (VTQ) elastography for pancreas assessment, as well as the mean pancreatic stiffness values in healthy subjects.
Material and Methods

• We included **41 subjects** (53.6% women, 46.4% men, average BMI=24.5±3.9 kg/m², average age 40±18.8 years) with a normal pancreatic ultrasound aspect and with no history of pancreatic disease or diabetes.

• **Elastographic measurements** were performed with a Siemens Acuson S2000 Virtual Touch ultrasound system (Siemens AG, Erlangen, Germany) using a 4CI transducer.
Material and Methods

• For each patient, **10 valid VTQ measurements** of the pancreatic parenchyma were performed under fasting conditions.

• **Reliable measurements** were defined as a median value of ten pancreas stiffness measurements with a **success rate ≥60%** and an **interquartile range interval <30%**.
Results

• Out of 43 subjects, **reliable measurements** were acquired in 38 subjects (88.4%) by means of VTQ elastography.

• The **mean** pancreas stiffness values in healthy subjects was **1.27 m/s ± 0.1 m/s**, CI 95% (1.241-1.309).
Results

- There were no significant differences between the mean pancreas stiffness in men vs. women 1.29 m/s ± 0.1 m/s, CI 95% (1.224-1.348) vs. 1.27 m/s ± 0.08 m/s CI 95% (1.226-1.308) (p=0.28).
Conclusions

• VTQ can be a useful tool for pancreas quantification, characterized by a good feasibility (88.4%) in healthy subjects.

• The mean pancreas stiffness values in healthy individuals was 1.27 m/s ± 0.1m/s.
Point-of-care-Ultrasound (POCUS) – Potentiality of mobile ultrasound in rural areas – A proof of concept study

Frauendorf V.1, Kersten M.2, Schade D.3, Schmailzl KJ.1, Nuernberg D.1

1 Brandenburg Medical School Theodor Fontane, Fehrbelliner Straße 38, 16816 Neuruppin/ Germany
2 GP Practice Dr. Schäfer, Kirchstraße 5, 16831 Rheinsberg
3 GP Practice Dr. Schade, Straße des Friedens 60, 16835 Lindow

author's contact email: nuernbergdieter@gmx.de
Due to demographic change, urbanization, and shortage of physicians, there is a danger of medical undersupply in rural areas of Germany.

Thanks to further development in portable ultrasound devices, new diagnostic and therapeutic options can be applied at home visits.

POCUS is already used for initial assessment in traumata and can contribute to a better medical supply of palliative patients - e.g., by therapeutic punctures (Nuernberg D. et al 2015 Z Gastroenterol; Nuernberg D. et al 2017 Z Gastroenterol).
Here we aim to evaluate an education program at POCUS, as well as for inexperienced ultrasound doctors.

The program was composed of a 3-h workshop, including the introduction of the study and the devices, detection of important sonographic findings, and puncture training in phantoms, followed by 2 weeks of individual guided examinations with a portable ultrasound device (Vscan Extend, GE) during home visits.
material and methods 2

Afterward, the trained doctors used POCUS in their general and palliative outpatient care over a 6-week period.

Symptoms, examination results, and changes of treatment (acute interventions, new medication) were documented in a standardized data entry form.
results

Thirteen of 96 addressed physicians or palliative doctors in northwestern Brandenburg attended the described education program, and 10 took part in the study with practical application at home visits.

Three of the participating professionals were inexperienced in ultrasound and received prolonged supervision.

The others showed sufficient knowledge after the education program. So far, over a period of 6 weeks, POCUS was applied to more than 35 patients.
conclusion

We found that an individual adjusted education program is suitable for implantation POCUS during in-home visits, even by inexperienced ultrasound doctors.

After evaluation of the data entry forms, we hope to show a measurable effect in the improvement of patient care in rural areas.
Real time strain elastography: fat to lesion ratios as risk stratification of breast lesions

Dana Stoian ¹,², M.Craina ¹,², Izabela Petre ¹,², D. Navolan ¹, Mihaela Craciunescu ¹
¹ „Victor Babes” University of Medicine, Timisoara, Romania
² Emercency County Hospital, Timisoara, Romania

stoian.dana@umft.ro
Background

• The value of RTE in the diagnostic of breast cancer is recognised (EFSUMB 2013, WFSUMB 2015)
• Still, there is no recommended threshold value for the fat to lesion ratio in strain elastography
• Different cut-offs generate different diagnostic information.
• Currently, values between 2.505.5 are being used in different papers.
30th EUROSON Congress of the EFSUMB
14th Scientific Congress of Polish Ultrasound Society for Ultrasound in Medicine

• Material
  - 344 breast nodules
  - Pathology report = golden standard
  - 186 Benign
  - 158 breast cancer

• Method
  - Hitachi Preirus device
  - EUP L53L-92 mm breast probe (water bag)
  - EUP L74M for RTE
  - RISK Stratification according to FLR
    - Low risk: FLR < 3
    - Intermediate risk: FLR = 3-4.88
    - High risk: FLR > 4.88
Results

• Considering strain of the lesion as risk assessment:

  low risk  intermediate risk  high risk
  FLR < 3    FLR 3 – 4.88    FLR > 4.88

Improves the diagnostic quality of RTE in identifying breast cancer, compared with the use of a fixed, even validated FLR value (the value of our centre = 4.88)

  Sensitivity increases from 83.97% to 92.40%
  Specificity varies from 96.23% to 83.97%

• The “intermediate risk category, 4a (by conventional US BIRADS criteria) where either upgraded (23/97) or downgraded (26/97).
30th EUROSON Congress of the EFSUMB
14th Scientific Congress of Polish Ultrasound Society for Ultrasound in Medicine

low risk

Intermediate risk

high risk
Conclusion

• Stratification of fat to lesion ration, helps decreasing the number of unclear, borderline cases.

• Using a category –type semi qualitative RTE information is more flexible and feasible for the diagnostic, compared with a fix value.

• The “intermediate risk category, 4a can be upgraded in the presence of high stiffness, or downgraded, in case of low stiffness, with decrease of false negative results.
Relationship between Intraoperative Atelectasis Findings on Transthoracic Lung Ultrasound and \( \text{PaO}_2/\text{FiO}_2 \)

**Ju Yeon Park**\(^1\), Yunhee Kim\(^2\), Jae Chul Koh\(^2\), Ji Young Kim\(^2\)

\(^1\)Department of Anesthesia and Pain Medicine, Pusan National University Yangsan Hospital, School of Medicine, Pusan National University, Yangsan, Korea

\(^2\)Department of Anesthesiology and Pain Medicine, Anesthesia and Pain Research Institute Yonsei University College of Medicine, Seoul, Korea

contact email: monojp@pusan.ac.kr
background

• Atelectasis: a common adverse effect of general anesthesia and mechanical ventilation.

• There are reports in children that ultrasound examination on lung can be helpful to find atelectasis during surgery.

• **Objective**: To identify relationship between $\text{PaO}_2/\text{FiO}_2$ and atelectasis findings on transthoracic lung ultrasound (TLU) in adult patients undergoing general anesthesia.
material and methods

• Preoxygenation: 100% O2 5 L/min.
• Anesthesia: propofol 1.5 mg/kg, remifentanil 0.01 μg/kg/min, sevoflurane 1~1.5 MAC, rocuronium 0.8 mg/kg
• Endotracheal tube (ID): male (8.0 mm), female (7.0 mm)
• Ventilator setting:
  TV 8 ml/kg (IBW = {Height(cm)-100}×0.9), RR (EtCO2 : 32~36), I:E ratio 1:2, VCV, FiO2 0.5
• 26 adult, ASA class I, II patients:
  ✓ Exclusion criteria: pulmonary disease (e.g. asthma, COPD), old tbc sequelae or parenchymal disease pattern in CXR, pregnancy, arrhythmia, MI, coronary vascular disease (e.g. MI), cardiac or pulmonary operation history.
• TLU
  ✓ Performed in 12 segments (anterior, lateral, posterior at superior, inferior in both lungs).

• Peak/plate airway pressure, \(\text{SpO}_2\), BP, ABGA, TLU
  ✓ 30 min after mechanical ventilation (preop), immediate postop

Figure 1. A line and B line at transthoracic ultrasound.
## results

Table 1. Pre-postoperative PaO2/FiO2 and number of B-lines on transthoracic ultrasound

<table>
<thead>
<tr>
<th></th>
<th>Pre</th>
<th>Post</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>P/F</td>
<td>421.3 ± 95.8</td>
<td>425.2 ± 86.0</td>
<td>0.765</td>
</tr>
<tr>
<td>B-line</td>
<td>0.3 ± 0.5</td>
<td>1.3 ± 1.2</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Peak</td>
<td>13.6 ± 2.6</td>
<td>15.7 ± 2.6</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Plateau</td>
<td>12.7 ± 2.4</td>
<td>14.4 ± 2.6</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>

Values are mean ± SD. SD = standard deviation. B-line : number of B-lines observed. MBP : Mean blood pressure. P/F : PaO₂/FiO₂, Peak : Peak airway pressure, Plateau : Plateau airway pressure, Pre : preoperative, Post: postoperative.
Table 2. Pre-postoperative differences between groups

<table>
<thead>
<tr>
<th></th>
<th>Group A (n=10)</th>
<th>Group B (n=16)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>P/F ratio</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Preop.</td>
<td>379.3 ± 100.4</td>
<td>447.5 ± 85.7</td>
<td>0.077</td>
</tr>
<tr>
<td>Postop.</td>
<td>426.0 ± 62.8</td>
<td>424.7 ± 99.8</td>
<td>0.972</td>
</tr>
<tr>
<td><strong>PaO2 (mmHg)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre-op/post</td>
<td>-23.3 ± 35.5</td>
<td>11.4 ± 23.6</td>
<td>0.006</td>
</tr>
<tr>
<td><strong>Peak (cmH₂O)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Preop.</td>
<td>13.2 ± 2.9</td>
<td>13.8 ± 2.4</td>
<td>0.564</td>
</tr>
<tr>
<td>Postop.</td>
<td>15.8 ± 3.5</td>
<td>15.6 ± 2.0</td>
<td>0.826</td>
</tr>
<tr>
<td><strong>Plateau (cmH₂O)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Preop.</td>
<td>12.5 ± 2.7</td>
<td>12.8 ± 2.2</td>
<td>0.799</td>
</tr>
<tr>
<td>Postop.</td>
<td>14.9 ± 3.3</td>
<td>14.1 ± 2.1</td>
<td>0.470</td>
</tr>
<tr>
<td><strong>Op. time (min)</strong></td>
<td></td>
<td></td>
<td>0.097</td>
</tr>
<tr>
<td></td>
<td>345.3 ± 141.5</td>
<td>263.4 ± 100.7</td>
<td></td>
</tr>
<tr>
<td><strong>Anes. Time (min)</strong></td>
<td></td>
<td></td>
<td>0.126</td>
</tr>
<tr>
<td></td>
<td>402.0 ± 135.5</td>
<td>324.6 ± 111.5</td>
<td></td>
</tr>
</tbody>
</table>

Values are mean ± SD. Group A: no additional B line after surgery, Group B: more than one B line after surgery, VO₂: difference between pre-post PO₂, P/F: PaO₂/FiO₂, Peak: Peak airway pressure, Plateau: Plateau airway pressure. Pre: preoperative, Post: postoperative, Op. time: duration of operation, Anes. time: duration of anesthesia.
conclusion

• Although the number of B-lines has increased at postoperative period, there was no difference in arterial oxygenation parameters in patients undergoing general anesthesia. However, the increase in the number of B-lines were associated with decrease in PaO2 in subgroup analysis.
Renal parenchymal perfusion measurement with the PixelFlux method to evaluate the effect of the Nutcracker-Syndrome

Thomas Scholbach

Leipzig Ultrasound Institute  www.scholbach.de  www.chameleon-software.de

praxis.scholbach@posteo.de
Compression of the left renal vein is the hallmark of the Nutcracker Syndrome. It is often difficult to correlate the diameter reduction to the patient’s symptoms, mainly left flank and mid-abdominal and pelvic pain.

- Moreover, left renal vein compression may occur without compression by the superior mesenteric artery or away from the aorta.
- Nevertheless, any compression may cause a relevant pressurization and thus pain in the left flank and in the collateral pathways.
- To evaluate the functional extent of left renal vein compression we measure the parenchymal perfusion of both kidneys with the PixelFlux technique.
Material and Methods

Patients: 285 PixelFlux measurements were carried out in 204 patients with NKS from 2016 til 2018

Method: Dynamic Color Doppler sonographic PixelFlux perfusion measurement

Description of the method: PixelFlux software calculates blood flow intensity in renal cortex in standardized color Doppler videos


Mann-Whitney-U-Test
Color Doppler example of severe Nutcracker-Syndrome

Aorta

V. ren. sin

A. mes. sup.
Perfusion suppression of the left kidney can now be measured

The suppression of left kidney’s perfusion in Nutcracker-Syndrome patients can be measured reliably with the PixelFlux-method.

Perfusion loss is 30% in median.
PixelFlux measurements demonstrate treatment effect in Nutcracker-Syndrome

Snapshot of the renal perfusion in Nutcracker Syndrome before and after treatment – inconclusive evaluation by the naked eye

Clear discrimination of renal perfusion by PixelFlux measurement of the left/right renal perfusion ratio

before treatment: 0.65
after treatment: 1.12
Conclusion

• PixelFlux measurements allow for the first time an objective evaluation of the impact of Nutcracker-Syndrome onto renal perfusion.
• Examination lasts less than 1 minute. Results correlate to patient's complaints (not outlined here).

• In Nutcracker-Syndrome significant suppression of the left renal perfusion is found.
• This improves after surgical or medical treatment.
• Treatment effect can be precisely evaluated.

• For details write to: praxis.scholbach@posteo.de
REVIEW OF REHABILITATIVE ULTRASOUND IMAGING IN PHYSIOTHERAPY. SYSTEMATIC REVIEW AND META-ANALYSIS.

Authors: Fernandez-Carnero S¹,²,³, Arias-Buria JL³,⁴, Cuenca-Zaldivar JN¹,², Leal-Quiñones A¹,², Calvo-Lobo C⁵, Martín-Saborido, C⁶.

Affiliation: Department of Physical Therapy, Universidad Francisco de Vitoria, Spain¹. Grupo de Investigación en Fisioterapia e Imagen Intervencionista (GIFIMI), Universidad Francisco de Vitoria, Pozuelo de Alarcón, Madrid, España². Spanish Society for Ultrasound in Physiotherapy member³. Professor of Physiotherapy, Occupational Therapy, Physical Medicine and Rehabilitation Department. Universidad Rey Juan Carlos⁴. Nursing and Physical Therapy Department, Institute of Biomedicine (IBIOMED), Universidad de León, Spain⁵. Fundación San Juan de Dios. Centro de Ciencias de la Salud San Rafael- Nebrija⁶.

author's contact email: samuelfernandezcarnero@gmail.com
background

The scientific evidence relating to RUSI (Rehabilitative Ultrasound Imaging) has grown exponentially in the last 20 years. It was outlined in the I International Symposium on RUSI, held in San Antonio, Texas, in 2006, and was recognised by the WCPT in 2009. The II International Symposium on RUSI was held in Madrid in 2016, and recognised the broader scope of this technique. The lumbopelvic region has received the most studies.

Aim: Conduct a systematic review of the lumbopelvic region following the Cochrane Handbook. In order to evaluate the level of scientific evidence, we will determine the effectiveness of this technique in physiotherapy for diagnosis and treatment.
Material and Methods

The revision was registered in PROSPERO with the reference: CRD42017078326.

Searches in Discovery EBSCO (selecting Medline, Science Direct, Sport Discuss, Cinahl, Scielo and Conchrane Data base) and EMBASE using the same strategies without language limitations from 1994-2017 was developed. All the references were exported in ris format.

KEY WORDS:
1. ('rehabilitative ultrasound imaging' OR 'ultrasound imaging' OR echography OR ultrasonography OR 'real time ultrasound imaging') AND ('lumbar spine' OR 'lumbar region' OR 'lumbar multifidus' OR 'low back').
2. ('rehabilitative ultrasound imaging' OR 'ultrasound imaging' OR echography OR ultrasonography OR 'real time ultrasound imaging') AND ('abdominal wall' OR 'abdominal wall musculature').
3. ('rehabilitative ultrasound imaging' OR 'ultrasound imaging' OR echography OR ultrasonography OR 'real time ultrasound imaging') AND ('pelvic floor' OR 'endopelvic fascia' OR 'bladder base')
Material and Methods

COVIDENCE™ was used to perform the peer review phases. Five reviewers conducted the review phases from the title and abstract to the extraction phase. 1 reviewer for all the references, 3 peer-reviewers and 1 more for to solve conflicts.

REVMAN 5.3 was used for bias analysis and statistical collection for heterogeneity assessment.

EndNote™ was used to manage the references to write the final manuscript.
Results

We obtained 6544 references (of which 1917 duplicates). There were 4618 references for the Title and Abstract phase, of which 4307 were discarded as irrelevant.

Of the remaining 320, a full text review discarded 296 (for these reasons: 188-Not randomised studies, 83-Wrong study design, 12-Wrong patient population, 8-Abstracts from Congress or Symposium and 3-No abstract available or incomplete) and 2-Wrong setting. 24 studies includes for qualitative synthesis and 14 studies included for quantitative synthesis. (Figure 1)
Results

• The risk of bias for the lumbar region concluded a low risk for the RCT founded.

• The variable analysed the multifidus muscles thickness. The \( \chi^2 = 2.91, P = 0.23 \) and the \( I^2 \) (heterogenicity) = 31%.

• The studies demonstrated to be close to the effect waited.
Conclusion

• Attending to preliminary results, just in lumbar region and just with one comparation, the ultrasound evaluation has a high level of confidence in multifidus muscles evaluation.

• There are reasons to conclude that the RUSI technique represents an effective tool for assessing treatment in physiotherapy.

• There were few studies to compare and the Chi² and the p value weren’t good but I² gave Low-Moderate Heterogenicity.

• More comparations must be done and Linear Regression could be interesting.
Shear-wave elastography in a case of papillary thyroid carcinoma – usefulness of this new technique

Ioana Golu, Mihaela Vlad, Melania Balas, Marioara Cornianu, Alina Popescu, Ioan Sporea
University of Medicine and Pharmacy "Victor Babes " Timisoara, Romania

igolu25@yahoo.com
BACKGROUND

Elastography is a method recently being used in the evaluation of thyroid nodules, which analyses tissue elasticity.

The aim of this presentation is to discuss the value of shear-wave elastography in distinguishing benign from malignant thyroid nodules.
material and methods

CASE PRESENTATION: We report a case of a 23-year-old female patient who was referred to our clinic for evaluation of a thyroid nodule. She reported that this nodule was found incidentally. The nodule is 3 cm in size and the patient is clinically euthyroid. Thyroid function tests demonstrated normal TSH, FT4 and Calcitonine determination was in normal range. Family history is negative for thyroid cancer, but several family members have goiters. The patient has no history of irradiations.
Thyroid ultrasound showed a TIRADS 3 score for nodule and detected a cervical lymphadenopathy.
The parameters measured by this technique were suggestive for malignancy: the SWE-mean elastography index (EI) for nodule was 56.66 kPa, SWE-SD was 39.33 kPa.
Results:

FNAB: smear with neoplastic cells with squamoid cytoplasm (x400, Liu staining)

Classical PTC with HT (HE x 20)
Conclusion

Although a number of conventional ultrasonographic (US) features are proved to be markers of malignancy, SWE added to conventional US may help in evaluation of thyroid nodules. In this case the ultrasound did not help in establishing the diagnosis, the SWE being much more useful.
Sonographic Assessment of Patients with Erectile Dysfunction. A Pictorial Review.

Sidek NZ, Jamaruddin S, Zhuang KD, Sanamandra SK, Patel A, Venkatanarasimha NK

Division of Radiological Sciences, Singapore General Hospital

nur.zakiah.sidek@sgh.com.sg
Introduction

• Doppler ultrasound is the imaging modality of choice to assess for vasculogenic causes of erectile dysfunction (ED).

• Doppler combined with grey-scale imaging and pharmacological induction of erection together facilitates assessment of both anatomical and physiological abnormalities.

Objectives

This pictorial review will illustrate & discuss:

• Grey-scale and color Doppler anatomy of the penis

• Normal and abnormal Doppler waveforms, before and after pharmacological induction

• Ultrasound techniques

• Discuss clinical implications of abnormal waveforms

Methodology

• Electronic medical records of 200 patients assessed by penile Doppler study over a period of 4 years (April 2014 to April 2018) were reviewed. Ultrasound and color Doppler images of representative cases were obtained from our departmental Picture Archive and Communication System (PACS).

• During the procedure an intracavernosal injection of 10 - 20mcg of Prostaglandin E1 (PGE–1), a drug used for pharmacological induction of penile erection, was given to the patients using a 28G needle close to the base of penis. PGE-1 is chosen because of its high efficacy and safety profile (low priapism rates). ¹

The penis is made up of three corporal bodies: Two corpora cavernosa and a single corpus spongiosum.

Corpora cavernosa are main erectile bodies and corpus spongiosum contains the urethra.

A septum divides two corpora cavernosa but contains fenestrations that provide communications between both corpora.²

PGE-1 acts as a vasodilator and in this study its role is to simulate a penile erection. This allows for the assessment of cavernosal artery to be made.


**Fig 1.2 Cavernosal Artery Diameter (a)** Grey-scale image of the penis in the pre-injection state, the inner diameter of the cavernosal artery is measured at 0.02cm. **(b)** At 5 minutes post PGE-1 injection, the inner diameter of the cavernosal artery is measured again, now at 0.05cm.

Penile Doppler Technique

Colour Doppler spectra are obtained from the **proximal cavernosal arteries** at the base of the penis.

Doppler angle is kept **between 30-60 degrees**. The sample volume and wall filter are fixed at minimum.

Doppler ultrasound improves the localization of the penile vessels and thus permits more rapid acquisition of Doppler waveforms.

---

**Normal Spectral Findings**

In the **flaccid state**, relatively **high resistance flow** is present. With the onset of erection, there is an increase in both systolic and diastolic flow.

As **intracavernosal pressure increases**, a **dicrotic notch appears** and a **decrease in diastolic flow** occurs. With continuously increasing pressures, end diastolic flow declines to zero and then undergoes diastolic flow reversal.

Then the **systolic envelop is narrowed** and **diastolic flow disappears completely with firm erection**.

---

**Fig 2.1 Sagittal Cross Section Anatomy of the Penis**


(b) Colour Doppler image of the penis in sagittal scan with the cavernosal artery in profile.

**Fig 2.2 Normal Spectral Waveform of Cavernosal Artery at Different Phases of Erection**

(a) Spectral waveform of the cavernosal artery at pre-injection state. High resistance flow with no diastolic component.

(b) At 5 minutes post PGE-1 injection. Increase in both systolic and diastolic flow with dicrotic notch seen.

(c) At 15 minutes post PGE-1 injection. The systolic envelope narrowed with minimal diastolic flow seen.

---

Arterial Insufficiency (AI)\textsuperscript{4,5}

Peak Systolic Velocity (PSV) < 25cm/s

If PSV = 25-35 cm/s: indeterminate

Secondary Diagnostic Criteria:
- Asymmetry of >10cm/s in PSV
- Increase in the diameter of cavernosal artery by 75%

Fig 3.1 The Spectral Waveform of a Patient with AI; PSV > 25cm/s. (a) Waveform at pre-injection state. PSV = 11cm/s. (b) Waveform at 5 mins post PGE-1 injection. PSV = 25cm/s. (c) Waveform at 10 mins post PGE-1 injection. PSV = 9.15cm/s. (d) Waveform at 25 mins post PGE-1 injection. PSV = 13.2 cm/s.

Venous Incompetency (VI)\textsuperscript{4,5}

End Diastolic Velocity (EDV) > 5cm/s


Fig 4.1 The Spectral Waveform of a Patient with VI; EDV > 5cm/s. (a) Waveform at pre-injection state. EDV = 5.31 cm/s. (b) Waveform at 5 mins post PGE-1 injection. EDV = 5.43 cm/s. (c) Waveform at 10 mins post PGE-1 injection. EDV = 5.02 cm/s. (d) Waveform at 25 mins post PGE-1 injection. EDV = 6.63 cm/s.
Management Options of Patients in Singapore General Hospital (SGH)

- Arterial Insufficiency
  - Extracorporeal Shock Wave Therapy (ESWT)
- Venous Incompetency / Normal response
  - Oral Therapy
  - Intracavernosal injections
- Arterial Stenosis
  - May be referred to National Heart Centre for further assessment of possible cardiovascular diseases

Conclusion

Penile ultrasound and color doppler imaging plays an important role in evaluation of erectile dysfunction. A thorough understanding of its functional anatomy, vascular supply and color flow parameters plays a vital role in suggesting correct diagnosis and appropriate management.
Sono-Teleconsulting With Remote Expert Supervision

Steffen Ortmann¹, Ali Haddadi Esfahani¹, Vilmar Frauendorf², Dieter Nürnberg²

¹IHP, Im Technologiepark 25, 15236 Frankfurt (Oder), Germany
²Brandenburg Medical School Theodor Fontane, Fehrbelliner Straße 38, 16816 Neuruppin, Germany

author's contact email: ortmann@ihp-microelectronics.com
background

Point-Of-Care Ultrasound (POCUS) examinations anywhere and anytime (24/7) have become technically feasible, BUT:

1. Often fail due to the lack of highly qualified personnel
2. Available care givers (e.g. nurses) would require adequate assistance

The **Sono-Teleconsulting** concept allows:

- Use of a mobile POCUS device in ambulant scenarios
- Additional live conference to a remotely-connected ultrasound expert
The aim of **Sono-Teleconsulting** is:

**Live transmission** of ultrasound images to the remote expert in the clinic

+ A visual impression of the patient

+ Visualize the handling of the ultrasound device

+ An audio link

+ Integration of different wired and wireless POCUS devices

→ POCUS device images are synchronized and merged with parallel image data of another camera and live transmitted during the examination
material and methods

Target architecture

Trained staff
- Wireless GE Vscan
- Wired Phillips Lumify Interson

Remote Physician
- Video
- Audio

eHealth center
- Documentation
- Images
- Videos

PACS

EUROSON
6-9.09.2018, Poznań, Poland
results

Remote user interface
Remote ultrasound conference already feasible with ~30% 3G connection
  • Minimum 2 Mbit transmission speed required for 20 frames/sec

*Sono-Teleconsulting* concept was implemented with:
  • Wireless Vscan device from General Electrics
  • Wired US device from Interson

→ Live transmission of US data + audio and video stream for supervision
→ SoA Android tablet used as remote device for physician in clinic
STEPWISE ULTRASOUND EVALUATION OF THYROID NODULES

Dana Stoian 1,2, Madalina Salapa 2, Ioana Mozos 1, Mihaela Craciunescu 1, F. Varcus 1,2

1 Victor Babes University of Medicine and Pharmacy, Timisoara, Romania
2 Emergency County Hospital, Timisoara, Romania

stoian.dana@umft.ro
### Background – multiple risk stratification strategies

<table>
<thead>
<tr>
<th></th>
<th>Very low</th>
<th>Low</th>
<th>Intermediate</th>
<th>High</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>AACE 2010</strong></td>
<td>&gt; 1 cm</td>
<td>&lt;1 cm</td>
<td>&lt;1 cm</td>
<td>&lt;1 cm</td>
</tr>
<tr>
<td><strong>AACE 2016</strong></td>
<td>&gt; 2.5 cm</td>
<td>&gt; 2 cm + growth</td>
<td>&gt; 2 cm</td>
<td>&gt; 1 cm</td>
</tr>
<tr>
<td><strong>ATA 2010</strong></td>
<td>&gt; 1 cm</td>
<td>&lt;1 cm</td>
<td>&lt;1 cm</td>
<td>&lt;1 cm</td>
</tr>
<tr>
<td><strong>ATA 2015</strong></td>
<td>&gt; 2 cm</td>
<td>&gt; 1,5 cm</td>
<td>&gt; 1 cm</td>
<td>&gt; 1 cm</td>
</tr>
<tr>
<td><strong>BTA 2014</strong></td>
<td>High risk history</td>
<td>High risk History</td>
<td>&lt; 1 cm</td>
<td>&lt; 1 cm</td>
</tr>
<tr>
<td><strong>KSTR</strong></td>
<td>&gt;2 cm</td>
<td>&gt; 1.5 cm</td>
<td>&gt; 1 cm</td>
<td>&gt;1 cm (selective &gt; 5 mm)</td>
</tr>
</tbody>
</table>
material and methods

- 174 cases with solid nodular goiter
  - Pathology report – definitive golden standard
  - Starting January 2017
  - Hitachi Preirus Device, Hitachi Inc, Japan
    - Linear Probe 10-18 Mhz (2B, CD, RTE strain,Asteria Criteria)
    - Planar volumetric probe

<table>
<thead>
<tr>
<th>LOW RISK</th>
<th>INTERMEDIATE RISK</th>
<th>HIGH RISK</th>
</tr>
</thead>
<tbody>
<tr>
<td>2B</td>
<td>Subcapsular Hypoechoic</td>
<td>+ 2 risk sign</td>
</tr>
<tr>
<td>Oval</td>
<td>Hypoechoic Inomogeneity</td>
<td>Taller than wide</td>
</tr>
<tr>
<td>Mild hypoechoic</td>
<td></td>
<td>Intens hypoechoic</td>
</tr>
<tr>
<td>No risk sign</td>
<td></td>
<td>Subcapsular calcification</td>
</tr>
<tr>
<td>ELS TO</td>
<td>ES 3</td>
<td>ES 4,5</td>
</tr>
<tr>
<td>ES 1,2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4D</td>
<td>Unclear capsula</td>
<td>Altered capsular</td>
</tr>
<tr>
<td>Intact capsula</td>
<td></td>
<td>intranodular vascularisation</td>
</tr>
<tr>
<td>No vascularisation</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
DOWN GRADE
- RTE
  - Intermediate risk ➔ low risk = 43 cases
  - High risk ➔ intermediate risk = 3 cases
- 4D None

UP GRADE
- RTE
  - low risk ➔ high risk = 4 cases
  - Intermediate risk ➔ high risk = 7 cases
- 4D
  - low risk ➔ high risk = 2 cases
  - Intermediate risk ➔ high risk = 5 cases
30th EUROSON Congress of the EFSUMB
14th Scientific Congress of Polish Ultrasound
Society for Ultrasound in Medicine

Upgrade intermediate ➔ high
Conclusions

Combined US approach:

• Reassures benignity in the vast majority of low risk cases = Low risk 2B + low stiffness

• Sustains the malignancy suspicion

• Upgrades the risk category, in case on increased stiffness/capsular alteration/4D vascularisation

• Downgrades the risk category, in case on low stiffness
conclusion

content / images
Strain elastography for rectal tumor differentiation using ultrasound machines from different manufacturers: a pilot study

L.P. Orlova, E.M. Bogdanova, I.V. Kalinina, M.A. Yusupova
State Scientific Center of Coloproctology, Moscow, Russian Federation
author's contact email: lporlova2013@yandex.ru
background

In previous studies we established a strain ratio cut-off value (5.74) for the differentiation of villous adenoma and adenocarcinoma of the rectum, all exams being carried out using Hitachi Hi Vision Preirus machine(*). Anyhow, strain ratio values acquired using Esaote MyLab Class C machine did not exceed 4.00 even in cases of T3-T4. This discrepancy has clarified the need of defining peculiar strain ratio normal ranges for ultrasound machines from different manufacturers.

<table>
<thead>
<tr>
<th>strain ratio cut-off value</th>
<th>Sensitivity, %</th>
<th>Specificity, %</th>
<th>positive predictive value, %</th>
<th>negative predictive value, %</th>
<th>overall accuracy, %</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.84</td>
<td>100</td>
<td>73.1</td>
<td>73.1</td>
<td>100</td>
<td>84.4</td>
</tr>
<tr>
<td>4.65</td>
<td>100</td>
<td>88.5</td>
<td>86.4</td>
<td>100</td>
<td>93.3</td>
</tr>
<tr>
<td>5.74</td>
<td>94.7</td>
<td>92.3</td>
<td>90</td>
<td>96</td>
<td>93</td>
</tr>
<tr>
<td>7.13</td>
<td>89.5</td>
<td>92.3</td>
<td>89.5</td>
<td>92.3</td>
<td>91.1</td>
</tr>
<tr>
<td>8.35</td>
<td>84.2</td>
<td>96.2</td>
<td>94.1</td>
<td>89.3</td>
<td>91.1</td>
</tr>
</tbody>
</table>

material and methods

We included 24 patients diagnosed with rectal tumor on admission (aged from 44 to 76y, median - 64.5y, 12 - male, 12 - female). Each patient underwent endorectal ultrasound examination with strain elastography using Esaote My Lab Class C ultrasound machine, in 5 patients strain elastography was additionally carried out with Hitachi Hi Vision Preirus machine. 19 patients were subjected to surgical treatment, in remaining 5 patients adenocarcinoma was verified with biopsy. Histopathological evaluation of the resected specimen in 19 patients revealed adenoma in 5 cases, adenocarcinoma with various grades of differentiation and rectal wall involvement - in 14 cases. Elastographic data was compared with histology results.
**results**

Echostucture, shape of the lesion, depth of rectal wall involvement, pattern of vascularization, presence of suspicious regional lymph nodes and strain ratio were assessed during ultrasound examination. For Esaote equipment strain ratio values were: for adenocarcinoma - 2.4 (2-2.95) (median (25 percentile - 75 percentile)), for adenoma - 1.74 (1.7-2.1). For Hitachi machine strain ratio values were: for adenocarcinoma - 25.7 (24.4-26.7), for adenoma - 1.17 (1.12-1.2). Our sample was not large enough to define a cut-off ratio for adenoma and adenocarcinoma differentiation using Esaote My Lab Class C machine.

<table>
<thead>
<tr>
<th>Depth of rectal wall involvement</th>
<th>Esaote My Lab Class C Me (25-75 percentile)</th>
<th>Hitachi Hi Vision Preirus Me (25-75 percentile)</th>
</tr>
</thead>
<tbody>
<tr>
<td>T0</td>
<td>1.74 (1.7-2.1)</td>
<td>1.17 (1.12-1.2)</td>
</tr>
<tr>
<td>Tis-T4</td>
<td>2.4 (2-2.95)</td>
<td>25.7 (24.4-26.7)</td>
</tr>
</tbody>
</table>
conclusion

Considering differences between strain ratio values measured using Hitachi Hi Vision Preirus and Esaote My Lab Class C machines it is clear that different cut-off values should be developed for each model of ultrasound equipment.
Villous adenoma

Adenocarcinoma uT2-pT2

Adenocarcinoma uT1-pT1
TEACHING INNOVATION IN MUSCULOSKELETAL TRAINING IN ECOCOGRAPHY IN PHYSIOTHERAPY: ON-SITE vs. ONLINE.

Authors: Fernandez-Carnero S\textsuperscript{1,2,3}, Arias-Buria JL\textsuperscript{3,4}, Cuenca-Zaldivar JN\textsuperscript{1,2}, Leal-Quiñones A\textsuperscript{1,2}, Martin-Saborido, C\textsuperscript{5}.

Affiliation: Department of Physical Therapy, Universidad Francisco de Vitoria, Spain\textsuperscript{1}. Grupo de Investigación en Fisioterapia e Imagen Intervencionista (GIFIMI), Universidad Francisco de Vitoria, Pozuelo de Alarcón, Madrid, España\textsuperscript{2}. Spanish Society for Ultrasound in Physiotherapy member\textsuperscript{3}. Professor of Physiotherapy, Occupational Therapy, Physical Medicine and Rehabilitation Department. Universidad Rey Juan Carlos\textsuperscript{4}. Fundación San Juan de Dios. Centro de Ciencias de la Salud San Rafael- Nebrija\textsuperscript{5}.

author's contact email: samuelfernandezcarnero@gmail.com
Background

Several publications exist on the evidence of ultrasound management, its reliability and confidence. We understand accuracy in the use of ultrasound by experts versus novices for both medical doctors and physiotherapists. Likewise, we also have evidence of the extent to which ultrasound is used in physiotherapy in various countries, and these publications have concluded that there are some instances where access to on-going training is lacking or difficult. Online training in ultrasound has no presence in the health sciences for this reason and, as a result of this and previous history, this project was launched.

Prospective observational study (October’17–March´18). Determine whether online training is a reliable method for acquiring knowledge and skills in the use of ultrasound.
Material and Methods

144 volunteers were given training (n= 55 online and n= 89 on-site). Online group was randomised with regard to the level of training that they would receive. There were two training levels (basic= 18h advanced= 36h) for each group. The online group had the chance for the same practical time with sonographs than on-site group, without teacher help. Each group sat the same type of theoretical exams for each level of training through a gamification test (Kahoot) and a practical test measuring 5 points, with a validated phantom. Similarly, the 5 measurements and the independent variables were collected through a Google form. Ethics Committee of Alcalá de Henares University (Madrid) approved the project. The statistical analysis was developed with “R”.
Results

The average age of the participants was 31.3 ± 2.7 years old, of whom 67.3% were women. The average gamification score for the basic level group was on-line 7 vs. on-site 6 (P = 0.06), compared to the advanced group who scored on-site 7 vs. online 7 (P < 0.01). The measurements with the phantom were > 0.65mm in favour of the on-line participants (P = 0.01). The online-advance group obtained the highest accuracy in measurement of one variable (CCI 0.94).

The absolute standardized difference was calculated (Figure 1) and the difference was low when the matching was done. But it was still over 0.2.

After the matching, the p-value was calculated, and checked it grew-up, instead of the difference between groups continues, see the Perwise-minimum values, Figure 2.
Conclusion

• This was a pilot study and quite difficult to get samples. There was difficulty in the randomization. There are differences between on-site and online training, especially in advanced training and phantoms.

• The online-advance group obtained the highest accuracy in measurement of one variable (CCI 0.94).

• The result shows significant differences between some of the training groups and the outcome variables, however, it is confirmed that, despite the weighted adjustment of the covariates, very high differences remain in the SMDs, above the tolerable limit of 0.2, both between the covariates and between the groups and, in fact, between the groups with the least differences between them (Classroom1 and Classroom2) no significant differences were detected in any of the outcome variables.

• All index show very low values, below 0.3, except ICC1k in the variable Between_structures_distance in the Online2 group with a score of 0.9

• This study had a great complexity due to the difficulty for randomization. Without considering this issue, we believe the Project has a high potential.

• As result of this experiment we can conclude the online system has a potential interest to introduce in sonography for Physiotherapy and even other health sciences.

**Limitation:** The sample should be higher and probably this gave low results.
Testicular Microlithiasis
– An epidemiological approach

Malene R. Pedersen¹,³, Henrik Møller⁴,⁵, Søren R. Rafaelsen¹,³, Mette M B Jørgensen¹, Palle J. Osther²,³ and Peter Vedsted⁵.

¹) Vejle Hospital, Department of Radiology, DK. ²) Vejle Hospital, Department of Urology, DK. ³) University of Southern Denmark, Institute of Regional Health Research, DK. ⁴) Cancer Epidemiology and Population Health, King’s College London, UK. ⁵) Aarhus University, Department of Public Health, DK.

author’s contact email: Malene.Roland.Vils.Pedersen@rsyd.dk
Testicular Microlithiasis (TML) is an incidental finding by ultrasonography. TML is 1-3 mm in diameter, and can occur both uni- and bilateral.

TML has been suggested associated with testicular cancer. However, most studies are retrospective studies with minor data on general health and lifestyle. Risk factors for testicular cancer is not clear, but there are some suggested risk factors for example, cryptorchidism, height, testicular volume, family history of testis cancer, and maternal smoking.

The aim of this study was to investigate if lifestyle and health were associated with TML.
material and methods

A self-administered questionnaire was conducted including 1538 patients, who all had been scrotal ultrasound investigated. The patients were divided into two groups, with or without Testicular microlithiasis.

The 23-item questionnaire included questions on height, age, lifestyle (alcohol, smoking, workload, exercise and food) previous diseases in the testicles, and testicular pain.
results

A total of 1538 patients were included.

197 men had TML
1341 men without.

TML Prevalence 12.8%

Mean age TML 51.9 (18-89) years
Mean age No TML 54.3 (18-93) years
results

Overall, there were limited differences in health and lifestyle between men with and without TML.

However, men with TML reported...

• to consume crisps and popcorn more often (36% vs. 22%, p =0.001)
• reported less physical exercise (38% vs. 48%, p=0.011),
• experienced more often testicular discomfort (34% vs27%, p=0.058)

...than men without TML.
### Patient's soft drink and food consumption

<table>
<thead>
<tr>
<th>Variables</th>
<th>Men with TML</th>
<th>Men without TML</th>
<th>Age adjusted</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N = 197</td>
<td>N = 1342</td>
<td>OR</td>
</tr>
<tr>
<td>Soft drink with sugar</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>More than once a week vs. less</td>
<td>103</td>
<td>709</td>
<td>0.89</td>
</tr>
<tr>
<td>than once a week</td>
<td>52.3%</td>
<td>52.9%</td>
<td></td>
</tr>
<tr>
<td>Soft drink without sugar</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>More than once a week vs. less</td>
<td>84</td>
<td>506</td>
<td>1.16</td>
</tr>
<tr>
<td>than once a week</td>
<td>42.6%</td>
<td>37.7%</td>
<td></td>
</tr>
<tr>
<td>Cake, candy, ice cream</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>More than once a week vs. less</td>
<td>156</td>
<td>1037</td>
<td>1.04</td>
</tr>
<tr>
<td>than once a week</td>
<td>79.2%</td>
<td>77.3%</td>
<td></td>
</tr>
<tr>
<td>Crisps, popcorn etc</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>More than once a week vs. less</td>
<td>72</td>
<td>295</td>
<td>1.95</td>
</tr>
<tr>
<td>than once a week</td>
<td>36.6%</td>
<td>22.0%</td>
<td></td>
</tr>
<tr>
<td>Fast-food</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>More than once a week vs. less</td>
<td>39</td>
<td>215</td>
<td>1.19</td>
</tr>
<tr>
<td>than once a week</td>
<td>19.8%</td>
<td>16.0%</td>
<td></td>
</tr>
<tr>
<td>Meat</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>More than 3 times a week vs. &lt;3</td>
<td>144</td>
<td>966</td>
<td>1.01</td>
</tr>
<tr>
<td>times a week</td>
<td>73.1%</td>
<td>72%</td>
<td></td>
</tr>
<tr>
<td>Poultry</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>More than 3 times a week vs. &lt;3</td>
<td>55</td>
<td>327</td>
<td>1.11</td>
</tr>
<tr>
<td>times a week</td>
<td>27.9%</td>
<td>24.4%</td>
<td></td>
</tr>
<tr>
<td>Fish</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>More than once a week vs. less</td>
<td>136</td>
<td>853</td>
<td>1.33</td>
</tr>
<tr>
<td>than once a week</td>
<td>69.0%</td>
<td>63.6%</td>
<td></td>
</tr>
<tr>
<td>Vegetable/vegan dishes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>More than once a week vs. less</td>
<td>122</td>
<td>797</td>
<td>1.15</td>
</tr>
<tr>
<td>than once a week</td>
<td>62.0%</td>
<td>59.4%</td>
<td></td>
</tr>
</tbody>
</table>
Development of TML was not associated to classic lifestyle factors such as age, height, alcohol consumption, smoking, or mothers smoking during pregnancy.

Patients with TML experience less physical activity and consumed more crisps than patients without TML. Since ingestion of crisps has potential carcinogenic effect (acrylamide), this finding needs confirmation in a separate study.
THE DOPPLER SONOGRAPHIC EXAMINATION OF HEPATIC VEIN CONFLUENCE IN CLINICAL ASSESSMENT OF HYPEREMIC LIVER

Grzegorz Zabielski, Iwona Marczyk, Magdalena Balcerak, Iwona Duraj

Department of Internal Diseases and Clinical Pharmacology Medical University, Biegański Hospital, Łódź, Poland email: gjz@wp.pl
Background

The presence of the hepatic veins flow abnormality, reflexes abnormal liver – heart relations come across in advanced right cardio – hepatic insufficiency. The liver congestion impairs liver function and may cause liver damage: hepatomegaly, abnormal hepatic tests, ischemic hepatitis and finally cirrhosis. Clinical symptoms of hepatic hyperemia – soft liver edge, smooth surface, cardiac pulsation are not always present. Also laboratory tests are not optimal for assessment of liver congestion. The insightful analysis both 2D USG and hepatic veins doppler spectrum abnormalities has important significance for clinical grade of right heart insufficiency.
Material and methods

40 right cardiac failure (III – IV NYHA classification) patients were examined by USG – Doppler method. All were diagnosed clinically – anamnesis and physical examination, chest X – ray examination, cardiac sonography, laboratory tests. We compared results of USG examinations to a group of 40 pts without right cardiac pathology.
Results

Abnormalities USG of visceral organs and doppler flow hepatic vein confluence we diagnosed in 30 pts. There were: hepatomegaly and/or liver deformation, veins dilatation and deformation, significantly decreased or lack respiratory of inferior vena cava (VCI) movements, different deformations of doppler hepatic veins spectrum, liquid inside bodies cavities, others.
Results

Cardiac symptoms of the right heart failure

Right ventricle and atrium dilatation, tricuspid regurgitation
Results

Hepatic 2D and doppler symptoms of right heart failure
lack of VCl respiratory movements, veins dilatation, twodimensional hepatic veins flow
Conclusions

1. The total USG rating of the liver, adjacent organs and hepatic veins together especially with spectral veins flow analysis, facilitate clinical cardiac assessment of the right heart.

2. Different scale of doppler spectrum oscillation may to have significance for the assessment liver hyperemia and/or for right heart insufficiency, especially in diagnosis and grade of the tricuspid insufficiency.

3. The doppler flow analysis of hepatic veins deformity is particularly important when conditions of USG cardiac examination is not optimal.

4. The relationship between hepatic veins doppler flow deformity, 2D USG abnormality and clinical hepatic changes are not clear.
THE DOPPLER SONOGRAPHIC EXAMINATION OF PORTAL VEIN CONFLUENCE IN CLINICAL ASSESSMENT OF HYPEREMIC LIVER

Grzegorz. Zabielski, Magdalena Balcerak
Department of Internal Diseases and Clinical Pharmacology Medical University, Biegański Hospital, Łódz, Poland email: gjz@wp.pl
The long standing hyperemia creates hepatic parenchymal complications. Clinical symptoms of the liver hyperemia not always are clear. The hepatic congestion and abnormal blood supply in patients suffering heart failure may create abnormal laboratory tests. Its may be cause of misinterpretation of the liver disease. Numerous twodimensional USG symptoms of the liver congestion are helpful. But for the clinical significance suspecting the developing of parenchymal fibrosis both sonographic morphological and flow portal abnormalities analyses are essential for prognosis and also for therapy.
material and methods

40 pts suffering from liver hyperemia (right cardiac insufficiency, respiratory failure, pneumonia and/or bronchitis, others) were treated clinically. The following sonographic examinations of portal vein were made: vein morphology and diameter analysis, wall thickness, doppler spectrum velocity and shape analysis, respiratory reaction movements (inspiration/expiration), portal flow comparison to arterial flow, USG 2D morphology of abdominal organs.

Control group were 40 pts without hepatic hyperemia
results

USG – doppler abnormalities of the portal confluence (trunk of portal vein, splenic vein, superior mesenteric vein) important for clinical prognosis and for clinical decision about treatment diagnosed in 25 pts. There were: veins deformation, veins dilatation, bold veins walls, different abnormalities of spectral portal and hepatic arterial flows, others.

The different scale of portal doppler pulsatility flow was met in advanced long standing liver hyperemia. It is associated with right atrial pressure and with advanced left ventricular insufficiency but is not typical for liver hyperemia on its own.

Four patients had portal velocity flow decreased and/or hepatic arterial increased flow. It was interpreted as parenchymal fibrosis or result of liver deformation.
Results
Visceral veins dilatation in right heart failure
Results

The twodimensional portal flow in advanced right heart failure
conclusion

1. The total USG rating of the liver, adjacent organs and portal vein together with spectral portal flow analysis, facilitate clinical therapy and prognosis.

2. The dilatation of vena cava inferior, hepatic veins, hepatomegaly, bold of gall bladder walls usually are visible and accompanies of portal abnormalities.

3. The intensive portal abnormalities are met in advanced long term liver hyperemia

4. The spectral portal flow analysis may be useful in right heart hypertonic assessment.

5. The decrease of portal flow (hepatopetal flow), reversed flow (hepatofugal flow), intensified arterial flow are symptoms of extremely parenchymal destruction.
The Effect of Tissue Compression on the Results of Shear Wave Elastography Measurements

Jaromir Vachutka¹, Zuzana Sedlackova², Martin Snehota¹

¹Department of Medical Biophysics, Institute of Molecular and Translational Medicine, Faculty of Medicine and Dentistry, Palacky University Olomouc, Czech Republic

²Department of Radiology, Faculty of Medicine and Dentistry, Palacky University Olomouc and University Hospital Olomouc, Czech Republic

Author's contact email: jaromir.vachutka@upol.cz

This work was supported by the AZV MZ ČR 16-31881A grant, by DRO (FNOI, 00098892) and by NPS I LO1304 grant from the Czech Ministry of Education.
Background

Currently available ultrasound elastography techniques can be divided into two main groups: strain imaging and shear wave imaging. Shear wave imaging is considered to be more precise and less operator dependent when compared to strain imaging. It enables to obtain quantitative and reproducible data (Young’s modulus of the imaged tissue). However, results of shear wave imaging can be affected by a variety of different factors. The aim of this study is to evaluate the effect of the pressure applied by the ultrasound probe during examination on the measured values of Young’s modulus.

A material that obeys Hooke’s law, where stress is linearly proportional to strain, is called linear. In a linear material, the value of Young’s modulus is constant and does not depend on the stress applied on the material. Biological tissues in general exhibit nonlinear behaviour. Many theoretical models describe the nonlinear course of the stress-strain curves. One of them, the Veronda-Westman (VW) model, provides an exponential dependence of stress on strain. The VW model allows for the explicit evaluation of the dependency of Young’s modulus on the value of strain.1,2


Material and Methods

All measurements were performed using the SuperSonic Aixplorer ultrasound machine with a linear array transducer SL15-4 (SuperSonic Imagine, Aix-en-Provence, France). The effects of tissue compression on the results of the real-time shear wave elastography were studied (1) on a gelatine phantom, (2) through _ex vivo_ experiments on pig liver, and (3) through _in vivo_ measurements of the thyroid gland stiffness on a group of 8 healthy volunteers.

The pressure applied by the ultrasound probe on the evaluated object was measured quantitatively using a digital scale (during phantom and _ex vivo_ experiments) and semi-quantitatively via the analysis of ultrasound B-mode images (during _ex vivo_ and _in vivo_ experiments). Increase of the pressure applied by the ultrasound probe causes compression of the tissues and detailed analysis of the B-mode images enables the calculation of the relative deformation of imaged tissues.
Results I

Gelatine phantom: Dependency of the mean stiffness on the pressure applied by the ultrasound probe. The whiskers denote the 68% confidence interval of the mean.

Pig liver (ex vivo): Dependency of the mean stiffness on the pressure applied by the ultrasound probe.
Results II

**Thyroid gland (in vivo):** Dependency of the mean stiffness on the relative deformation of the soft tissues between the ultrasound probe and the vertebral transverse process.
Pig liver (ex vivo): Dependency of the mean stiffness on the relative deformation of the liver lobe.

Thyroid gland (in vivo), volunteer 3, right lobe: Dependency of the mean stiffness on the relative deformation of the lobe of the thyroid gland.
Conclusion

The results of our measurements showed that the measured value of Young’s modulus increases with the increasing pressure applied on the imaged object, which is consistent with previously published data. Highest increase was observed during the ex vivo experiments (400%), lowest increase was detected in the case of the phantom measurements (8%). Two- to three-fold increase in Young’s modulus was observed between the minimum and maximum pressure in the case of the in vivo elastography measurements of thyroid gland. The Veronda-Westman theoretical model was used for the description of the tissue nonlinearity. This model describes the nonlinear behaviour of tissues using two parameters: $E_0$ is the Young’s modulus at zero stress and $\gamma$ is a nonlinear parameter determining the rate of increase of Young’s modulus with increasing stress.

We conclude that tissue compression by the force exerted on the probe can significantly affect the results of the real-time shear wave elastography measurements, especially under high pressure conditions. Therefore, care is needed when comparing results obtained by different radiologists. Minimum pressure should be used when measuring the absolute value of Young’s modulus of superficial organs.
THE VALUE OF ELASTPQ AND THROMBOCYTES FOR PREDICTING THE PRESENCE OF HIGH RISK VARICES

Renata Fofiu, Ioan Sporea, Felix Bende, Ruxandra Mare, Alina Popescu, Roxana Sirli

Department of Gastroenterology and Hepatology, University of Medicine and Pharmacy Victor Babes Timisoara, Timisoara, Romania

renata.fofiu@yahoo.com
Background and Aim

• Ultrasound based elastographic methods and biological markers can be used as noninvasive tools for predicting the presence of high risk varices (HRV) defined as grade II, III esophageal and gastric varices, in patients with advanced chronic liver disease.

• The aim of the study was to determinate the utility of liver stiffness (LS) values measured by ElastPQ and thrombocytes as non-invasive markers for prediction of high HRV in patients with advanced chronic liver disease.
Material and Methods

- A retrospective study was performed, including 61 subjects with advanced liver disease who underwent both liver stiffness measurements (LSM) with a pSWE technique-ElastPQ and upper endoscopy in the same admission.

- Reliable LSM were defined as the median value of 10 measurements acquired in a homogenous area and an interquartile range/median (IQR/M) <0.30.

- Advanced liver disease was diagnosed based on clinical, biological and elastographic criteria (ElastPQ > 7 kPa) [1].

---

Results

❖ We obtained reliable LSM in 60/61 subjects (98.3%).
❖ 27/60 (45 %) subjects had HRV.
❖ The mean LS values for patients with HRV were significantly higher as compared to those with first grade or no varices (24.7 ± 17 kPa vs. 16.3 ± 7.8 kPa with p=0.0145)
❖ As regards thrombocytes, the mean value for subjects with HRV was significantly lower (96740 ± 56128 vs. 155848 ± 90508, p= 0.0045)
Results

The best LS cut-off value by ElastPQ for predicting the presence of HRV in our study group was: 11.96 kPa

- AUROC 0.67
- Sensitivity 96.3%
- Specificity 39.3%
- NPV 92.9%
- PPV 56.6%

The thrombocytes cut-off value for the identification of patients with HRV was < 126 000

- AUROC 0.70
- Sensitivity 81.4%
- Specificity 57.5%
- NPV 79.2%
- PPV 61.1%
Conclusion

- Using the LS cut-off value $\leq 11.96$ kPa obtained by means of ElastPQ we can rule out the presence of HRV.

- Thrombocytes value lower than 126 000 was associated with HRV.
Ultrasound evaluation of diaphragm structure and pulmonary function in female canoeing high competition athletes - a pilot study

Alexandra André¹, José Castanheira¹, Liliana Resende³, Telmo Pereira¹, Paula Martins²

1 Coimbra Health School, Polytechnic Institute of Coimbra
2 School of Health Sciences, University of Aveiro
3 Physiologyst, Medical Technician of Cardiopneumology- Coimbra Health School, Coimbra PT

Alexandra André: alexandra.andre@estescoimbra.pt
Coimbra Health School, Polytechnic Institute of Coimbra, MSc, Coimbra, Portugal
Background

- High-intensity respiratory muscles training result in changes in ventilator functions and exercise capacity
- Canoeing require a well develop relation between power, agility and speed
- To evaluate this performance in this group of athletes this study did an ultrasound that includes
  - Measurement of the diaphragm thickness and function
  - Spirometry to assess respiratory capacity in the athletes and in the control group

Objectives - The main purpose of this study was to compare diaphragm thickness and excursion in canoeing athletes with age-matched untrained healthy volunteers. Furthermore, we aimed to correlate US measurements with pulmonary function tests.
Material and Methods

- High competition female (n=11) canoeing athletes, (21.73±4.2, years, BMI=22.9±1.3 kg/m2)
- Untrained (n=11) age matched young females (20.45±2.9) years, BMI=21.9±1.4 kg/m2
- US equipment (Portable GE Logiq) with multifrequency linear probe () and curved probes (4,5 MHz)
- Diaphragmatic thickness at maximal inspiration (DtkI), at end expiration (DtkE) and at residual volume (DtkRV) were obtained by one operator (3X)
- Thickness ratio (TR) and fraction (TF%) were calculated.
- Diaphragmatic excursion was obtained while the subjects perform Normal breathing (NB) and Maximal inspiration (Insmax) using M-mode US technique
- Spirometry (FVC, FEV1 and FVC/FEV1) and platismography were obtained.
Material and Methods

- High resolution equipment was used, with a
- 11 MHz probe;
- Real-time movement of the diaphragm was recorded in B-mode ultrasonography;
- The US transducer was placed transversely – at the lowest intercostal space for good approach of the diaphragm;
- Bilateral diaphragmatic thickness at maximal inspiration (DtkI)
- Bilateral diaphragmatic thickness at the end of expiration (DtkE)

Image 2. A - Ultrasound identification of the diaphragm at the end of expiration. B - Ultrasound identification of the diaphragm at the end of inspiration
# Results

**Table 1.** Baseline demographic characteristics

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Control n=11</th>
<th>Athletes n=11</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>20,45 (± 2,94)</td>
<td>21,73 (± 4,24)</td>
</tr>
<tr>
<td>Weight (Kg)</td>
<td>59,91 (± 5,18)</td>
<td>60,95 (± 4,31)</td>
</tr>
<tr>
<td>Height (m)</td>
<td>1,65 (± 4,74)</td>
<td>1,63 (± 4,25)</td>
</tr>
<tr>
<td>BMI (Kg/m²)</td>
<td>21,96 (± 4,47)</td>
<td>22,91 (± 1,35)</td>
</tr>
</tbody>
</table>

**Table 2:** Diaphragmatic Thickness (cm) at expiration and inspiration and residual expiration. Diaphragmatic excursion, normal breathing and maximal inspiration

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Control n=11</th>
<th>Athletes n=11</th>
</tr>
</thead>
<tbody>
<tr>
<td>DTKE (mm) - Diaphragmatic thickness at expiration</td>
<td>1,31 ±0,36</td>
<td>1,99 ±0,59</td>
</tr>
<tr>
<td>DTKI (mm) - Diaphragmatic thickness at expiration</td>
<td>2,86±0,73</td>
<td>4,36±1,38</td>
</tr>
<tr>
<td>DTKRV (mm) - Diaphragmatic thickness residual volume</td>
<td>1,12±0,39</td>
<td>1,82±0,71</td>
</tr>
<tr>
<td>NB (cm) - normal breathing (diaphragma excursion)</td>
<td>1,33±0,50</td>
<td>1,82±0,42</td>
</tr>
<tr>
<td>Max Ins (cm) - maximal inspiration (diaphragma excursion)</td>
<td>4,27±1,07</td>
<td>5,93±0,69</td>
</tr>
</tbody>
</table>
Conclusion

This study can confirm that canoeing players have a high respiratory capacity to maintain the pulmonary performance and lung functions and when compared with the control group statistical differences were observed;

In relation to the diaphragm the values of the thickness and excursion, was more high in athletes than in control group;

There are an hypertrophy of the muscle and the diaphragmatic excursion is more high;

Some correlations were obtained between the diaphragmatic evaluation and respiratory parameters;

In conclusion, the individual that do exercise have more resistense capacity and the control group.
Ultrasound evaluation of diaphragm structure and pulmonary function in female canoeing high competition athletes - a pilot study

Thank you for your attention

Alexandra André: alexandra.andre@estescoimbra.pt
Coimbra Health School, Polytechnic Institute of Coimbra, MSc, Coimbra, Portugal
Ultrasound Evaluation Of Testicular Volume In Patients Diagnosed with Testicular Microlithiasis

Malene R. Pedersen¹, Palle J. S. Osther² & Søren R. Rafaelsen¹

¹. Vejle Hospital, Department of Radiology, Denmark.
². Vejle Hospital, Department of Urology, Denmark.

author's contact email: Malene.Roland.Vils.Pedersen@rsyd.dk
Ultrasonography is a useful tool to measure testicular volume. According to the European Society of Urogenital Radiology, the combination of testicular atrophy and testicular microlithiasis (TML) is a risk factor for testicular cancer. Testicular atrophy is defined as volume of less than 12 ml.

The aim of this study was to compare testicular volume in patients with microlithiasis to patients with normal testicular tissue.
material and methods

Cases: 91 adult case patients with TML (182 testes)

Controls: 91 adult patients with normal testicular tissue (182 testes)

The patients were included during 2013-2015. All patients had a B-mode ultrasound scrotal investigation performed, including width, length and height in both testicles, using a linear-array 9L4 frequency transducer. Testicular volume was calculated with the formula $\pi/6 \times \text{length} \times \text{height} \times \text{width}$.
material and methods
Mean testicular volume
Cases: 14.7 ml (3.5-35.0 ml)
Controls: 14.9 ml (3.0-29.9)

Mean age was 48 years in both groups.
Overall, no statistically difference was found between testicular volume (both testicles) > 30 ml in TML patients compared to control patients (Odds Ratio 0.77, 95% CI 0.43-1.38, p = 0.37).

However, TML Patients tended to have lower testicular volume compared to controls, when investigation volume below 12 ml.
No association was found between testicular volume and testicular microlithiasis, but there was a trend indication that severe atrophy is often seen in patients with testicular microlithiasis compared with patients without microlithiasis. However, a significant difference was only found in testicular volume of 8 ml.
Ultrasound Examination of Tongue in Cases of Cleft Lip and Palate: from Patients to Fetuses and Back

Andrey Nadtochiy, Natalia Starikova, Marina Ageeva

Central Research Institute of Dentistry and Maxillofacial Surgery, Moscow, Russia

naggan@mail.ru
Background

One of the important functions of the tongue is the influence on the formation dento-alveolar and maxillofacial systems.

The goals of study:

• clarification of peculiarities of tongue position and function in patients and fetuses with cleft lip, cleft lip and palate, cleft palate (CL, CLP, CP)

• the improvement of prenatal ultrasound diagnostics of cleft fetuses based on evaluation of fetus tongue position and motility.
material and methods

• 86 CLP patients from 3 till 18 years old were undergone clinical, ultrasound (US) and computer tomography (CT) examinations: CLP patients – 49; CL patients – 14; CP patients – 23. 50 patients without CL/P formed the control group.

• 57 CL/P fetuses 19-24 weeks gestation were undergone ultrasound examination: CLP fetuses – 37; CL fetuses – 9; CP fetuses – 11. 50 fetuses without CL/P formed the control group.

• In all patients and fetuses the tongue position and motility were the objects of special interest.
results

NORM

CLEFT Lip & Palate

NORM

CLEFT Lip & Palate

NORMAL corpus tongue position
NORMAL apex of tongue position
(contact with maxilla incisors)

UPPER and RIGID corpus tongue position
LOW apex of tongue position
(contact with mandible incisors)
results

NORM

CLEFT Lip & Palate

“Seesaw tongue”

“Broken tongue”
30th EUROSON Congress of the EFSUMB
14th Scientific Congress of Polish Ultrasound
Society for Ultrasound in Medicine

**results**

- **3D:** no cleft of upper lip
- Abnormal Tongue Position
- 22 weeks of pregnancy
- Normal Tongue Position
- 22 weeks of pregnancy
- Neonate period: no cleft of upper lip
- Cleft palate

Cleft palate
conclusion

• Patients and fetuses with CP (with or without CL) have the specific congenital disorders of tongue form, position and function.

• These findings may be used as the new important symptoms in prenatal CLP ultrasound diagnostics
Ultrasound Field During Sonication Experiments

*In Vitro* – Influence of Culture Containers

Martin Snehota, MUDr.; Jaromir Vachutka, Mgr.

Department of Medical Biophysics, Faculty of Medicine and Dentistry, Palacky University, Olomouc, Czech Republic

m.snehota@email.cz

This work was supported by the Grant Projects IGA_LF_2018_001 and L01304.
background

- Current sonication experiments performed *in vitro* show big variability of methods and experimental set-ups. Most of them encounter several issues affecting final ultrasound dose received by sonicated samples such as standing waves formation, attenuation of ultrasound energy by culture containers, streaming and cell mixing of cell suspensions, etc. all of which lead to uncertainty of final ultrasound dose received by the sonicated samples. Therefore, the experiments reporting „similar“ conditions show different biological outcomes and consequently the experiments show low reproducibility both of which decrease their scientific value. The main scope of this work was to assess the influence of common laboratory glass and plastics on ultrasound field parameters *in vitro*. 
material and methods

Experimental set-up

- Water tank with degassed water
- Last axial maximum
- Transducer s/n: PA192
  - 3.5 MHz, 0.1 W continuous mode
- Culture container
- Hydrophone SN: 1057
- X, Y, Z positioning system
- WaveRunner 62Xi oscilloscope
- PC
material and methods II

Following culture containers were tested:
- plastic culture dish Ø 100 mm
- plastic culture dish Ø 40 mm
- plastic culture dish μ-Dish 35 mm, low
- glass culture dish Ø 100 mm
- glass culture dish GWST-5040
- 6 well culture plate
- 12 well culture plate
- 24 well culture plate
- 48 well culture plate
- 96 well culture plate
- Eppendorf test tube
- cone test tube 15 ml

Additional testing of following tubes was performed:

<table>
<thead>
<tr>
<th>PVC</th>
<th>5</th>
<th>10</th>
<th>20</th>
<th>40</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ø [mm]</td>
<td>22.6</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Ø [mm]</td>
<td>17.8</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Cu</th>
<th>5</th>
<th>10</th>
<th>20</th>
<th>40</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ø [mm]</td>
<td>19.8</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Ø [mm]</td>
<td>18.1</td>
<td>✓</td>
<td>✓</td>
<td>X</td>
</tr>
<tr>
<td>Ø [mm]</td>
<td>5.4</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>
If a culture container is placed in ultrasound field which main lobe size exceeds size of the culture container, local increase of ultrasound intensity can be observed (24 and 48 well plate). To study this phenomenon we additionally placed several PVC and Cu tubes of different sizes at the position of culture containers.
**results II**

<table>
<thead>
<tr>
<th>PVC [mm]</th>
<th>max</th>
<th>min</th>
</tr>
</thead>
<tbody>
<tr>
<td>22.6/5</td>
<td>154 %</td>
<td>55 %</td>
</tr>
<tr>
<td>22.6/10</td>
<td>124 %</td>
<td>39 %</td>
</tr>
<tr>
<td>22.6/20</td>
<td>153 %</td>
<td>53 %</td>
</tr>
<tr>
<td>22.6/40</td>
<td>209 %</td>
<td>38 %</td>
</tr>
<tr>
<td>17.8/5</td>
<td>246 %</td>
<td>24 %</td>
</tr>
<tr>
<td>17.8/10</td>
<td>292 %</td>
<td>14 %</td>
</tr>
<tr>
<td>17.8/20</td>
<td>254 %</td>
<td>12 %</td>
</tr>
<tr>
<td>17.8/40</td>
<td>249 %</td>
<td>3 %</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Cu [mm]</th>
<th>max</th>
<th>min</th>
</tr>
</thead>
<tbody>
<tr>
<td>19.8/5</td>
<td>119 %</td>
<td>76 %</td>
</tr>
<tr>
<td>19.8/10</td>
<td>216 %</td>
<td>22 %</td>
</tr>
<tr>
<td>19.8/20</td>
<td>227 %</td>
<td>29 %</td>
</tr>
<tr>
<td>19.8/40</td>
<td>189 %</td>
<td>26 %</td>
</tr>
<tr>
<td>18.1/5</td>
<td>94 %</td>
<td>67 %</td>
</tr>
<tr>
<td>18.1/10</td>
<td>172 %</td>
<td>25 %</td>
</tr>
<tr>
<td>5.4/5</td>
<td>376 %</td>
<td>18 %</td>
</tr>
<tr>
<td>5.4/10</td>
<td>472 %</td>
<td>13 %</td>
</tr>
<tr>
<td>5.4/20</td>
<td>469 %</td>
<td>6 %</td>
</tr>
<tr>
<td>5.4/40</td>
<td>350 %</td>
<td>5 %</td>
</tr>
</tbody>
</table>

**Interference inside and behind the tube**

**US intensity distribution on the beam axis**

**Reference scan**
- **Cu**: 18.1 mm/10 mm
- **PVC**: 17.8 mm/10 mm
- Transducer Ø 17.8 mm 3.5 MHz near field calc.
conclusion

- Almost all culture containers changed the final ultrasound intensity by tens of percent.

- Curved surfaces increase local ultrasound intensity.

- The ultrasound field parameters were least influenced by a well of 6 well culture plate.

- In case of ultrasound main lobe size exceeding size of culture container or tube respectively, local intensity profile reminds of near field. Intensity distribution change is probably caused by a diffraction at circular opening of the tube and reflection of ultrasound from the inner wall of the tube.

- Sonicated samples experience conditions differing from those reported in some of current papers.

- Influence of standing waves should also be studied in detail.
Ultrasound Follow-Up of Giant Hepatic Hemangiomas.

Author/authors: C. Delgado Martínez; M. Castellanos González; L. Santos Santamaría; M. Gómez Rubio; C. Fernández de la Plaza.

Affiliation: University Hospital of Getafe. Madrid.

Author's contact email: cdelgado91@gmail.com
Introduction

Hepatic hemangiomas (HH) are the most common benign mesenchymal space occupying lesions (SOL) in the liver. They are often solitary, range in size from a few millimeters to over 200mm. Those larger than 50mm have been referred to as giant hemangiomas (GH).
Clinical cases

Clinical case 1. A healthy 65-year-old woman. Ultrasound (US) performed due to urinary incontinence: hyperechoic SOL, 72mm in diameter, located in right hepatic lobe. Magnetic resonance imaging (MRI): multilobulated SOL, 83mm in diameter, located in segment VII, dynamic study compatible with HH. The GH has remained stable for years.
Clinical cases

Clinical case 2. A 80-year-old woman with osteoarthritis. MRI performed due to incidental liver SOL in a vertebral imaging test: polylobulated hypervascular SOL, 45mm in diameter, located in segment VII, dynamic study suggestive of HH. Six-monthly ultrasound was performed without evidence of changes.
Discussion

HH have a prevalence of 0.5%-20%. In most cases they are asymptomatic and do not require follow-up. Abdominal pain is frequent in those greater than 40mm, secondary to thrombosis or bleeding.

The diagnosis of HH is difficult. Ultrasound usually shows a solitary, hyperechogenic nodule, <30mm, with well-defined edges, in the absence of subsequent sound modification. Atypical HH are larger, with lobed edges and heterogeneous echogenicity in relation to thrombosis and fibrosis phenomena.

These require the completion of a dynamic study that demonstrates a very specific behavior, characterized by irregular ring peripheral uptake in arterial phase similar to malignant SOL, with homogeneous centripetal filling in the portal phase and hyperechogenic permanence with respect to the surrounding parenchyma in late phase. The natural history of the HH is unknown. In most cases, the lesions remain stable. In asymptomatic patients the attitude is expectant and the need of surgery is rare.
Conclusions

HH usually have a typical behavior. Atypical HH must be characterized by dynamic imaging tests.
Ultrasound monitoring of venous ulcer healing in biostimulation therapy

Krauze Agnieszka ¹, Woźniak Witold ², Mlosek Robert Krzysztof ¹

1. Department of Imaging Diagnostics, Medical University of Warsaw, Warsaw, Poland
2. First Department and Clinic of General and Vascular Surgery of the Second Faculty of Medicine, Medical University of Warsaw, Warsaw, Poland

author's contact email: agnieszka.krauze@outlook.com
background

ULCERATION - Wound with full-thickness skin loss that does not heal for 6-8 weeks or does not change significantly (by 20-40%) in 2-4 weeks;

ETIOLOGY:
- Chronic venous insufficiency
- Lower limbs artherosclerosis
- Diabetes
- Other (local skin infections, skin cancers, etc.)

INCIDENCE:
- Mainly elderly people (concerns 5% of people over 80 y.o.)

THERAPY:
- Causative treatment (arterial or venous revascularization; venous reflux elimination, glycemic control, etc.)
- Local treatment (photobiostimulation, local vacuum therapy, etc.)
material and methods

**STUDY GROUP:** 8 patients (K:M 1:1) of the I Department of General and Vascular Surgery of the Medical University of Warsaw.

**INCLUSION CRITERIA:**
2. Possibility of arriving at a control examination.

**EXCLUSION CRITERIA:**
1. Patients with other type of legs ulcer.
2. Contraindications for biostimulation therapy.
material and methods

Ultrasound examination of ulceration (Philips EPIQ5 machine with 18-5MHz linear probe).

Biostimulation treatment with a laser (Lasotronix SMARTs: $\lambda=635\text{nm}$, $P=400\text{mW}$).

Visual examination - ulcer photographs.

4-6 MONTHS TREATMENT

Ultrasound and visual examination after treatment therapy.
30th EUROSON Congress of the EFSUMB
14th Scientific Congress of Polish Ultrasound Society for Ultrasound in Medicine

results

4-MONTH BIOSTYMULATION

EUROSON
6-9.09.2018, Poznań, Poland
results

1. Biostimulation therapy significantly increases epidermis formation (ultrasound examination allows for an objective assessment of the amount of epidermis growth over time).

2. Old ulcerations were characterized with slower epidermis growth.

3. Slower wound healing mechanism correlates with lower echogenicity of the skin and subcutaneous tissue.

4. No significant correlation between the size of ulcers vascularization and the rate of their healing.
conclusions

• High-frequency ultrasonography allows for objective monitoring of the process and the mechanism of ulcer healing.

• Laser biostimulation is highly effective in the treatment of aging venous ulcers.
Minimally Invasive Verification of Suspected Malignant Spread in Gynaecological Malignancies – Ultrasound-Guided Biopsy

Authors:
Anna Matyszkiewicz [1,2], Marcin Wiecheć [1,2], Agnieszka Nocuń [2], Kazimierz Pityński [1]

Affiliations:
1- Department of Gynecology and Obstetrics, Jagiellonian University, 31-501 Krakow, Kopernika 23
2- MWU DOBREUSG CENTRE OF ULTRASOUND DIAGNOSTICS, 31-209 Kraków, Gen. Fieldorfa-Nila 14/JU3
Author's contact email: annamatyszkiewicz@mp.pl
Background

A patient with suspected malignant spread poses a diagnostic challenge for her medical team. Without proper patologic result one cannot make therapeutic decisions. In contrast, a non-radical surgery would diminish patient's quality of life, not providing any additional benefit.

In such circumstances minimally invasive diagnostics – like ultrasound-guided biopsy – seems to be the most beneficial option.
Material and methods

We analyzed retrospectively a group of 12 patients with high suspicion of advanced malignant disease, most probably arising from female genital tract, diagnosed and treated in the Department of Gynaecology and Oncology, between 2015 and 2018, with use od ultrasound-guided biopsy. We analyzed safety of the procedure and its feasibility to provide an adequate sample, which would be useful for pathologic confirmation and so for further counselling.

Mean age of patients in the group was 56 (49-76).

The enrolled patients were suspected of:

- cervical cancer recurrence (4)
- endometrial cancer recurrence (1)
- progression of ovarian cancer (1)
- advanced ovarian cancer (5)
Results

An indication for conducting a biopsy was determining the origin of malignant spread. 7 patients in the group where previously treated from malignant disease – in those patients biopsy would additionally differentiate between progression of the original process and the occurrence of a new malignancy.

Suspected inguinal lymph nodes in 49 years old patient with cervical cancer history
Each biopsy was carried out depending on specific clinical situation. Tru-cut or fine-needle biopsies were performed depending on ultrasound appearance of the lesion, in particular the prevalence of liquid or solid component of the tumor. In case of ascites demanding decompression one decided to insert a pig-tail catheter instantly, instead of a fine-needle biopsy, to avoid an additional unnecessary intervention. Transvaginal or transabdominal biopsy was conducted based on localization of the lesions.
There was no complications, what confirms the safety of ultrasound-guided biopsies.

In 9 cases per 12 a conclusive pathological result was achieved, allowing implementation of further treatment. There were 3 inconclusive pathological results (“suspicious cells, probably cancerous”), all from pig-tail (2) and fine-needle (1) biopsies. However, in view of advanced disease and consistent clinical picture those results were recognised satisfactory and further treatment was initiated accordingly.

In 2 patients, regardless of ovarian cancer suspicion, the biopsy showed a different result (spread of endometrial clearcell adenocarcinoma, spread of colon cancer), which proves purposfulness of this diagnostic modality.

Further treatment of the patients after the biopsy

- palliative chemotherapy (9)
- palliative radiotherapy (1)
- improvement of status and subsequent surgical treatment (1)
- best supportive care (1)
Conclusion

Ultrasound-guided biopsy is safe diagnostic method, well-accepted by the patients. Minimally invasive procedure in view of advanced malignant process and lack of possibility to conduct radical surgery, allows implementation of systemic treatment instead.
Usefulness of Ultrasonography for Local Recurrence in Patients Treated with Breast Cancer

Hye-Won Kim, MD., PhD.

Dept. of Radiology, Wonkwang University Hospital, Iksan, Korea

khw@wonkwang.ac.kr
Background

• As breast cancer increases, the likelihood of recurrence after treatment increases and the importance of follow up imaging modalities that can diagnose it is emphasized.

• Locoregional recurrence occurs in up to 35% of patients by 10 years after mastectomy or breast-conserving therapy.

• **Mammographic evaluation** of women who have been treated for primary breast cancer has some limitations;
  - can not take mammography in mastectomy site;
  - not easy to differentiate between recurrence and scar;
  - hard to detect recurrence in dense breast;
  - axilla can not contain enough.
Background

- **Ultrasonography (US)** is a widely available, has no radiation hazards, does not require a contrast agent, and it allows real-time monitoring with multiplanar scanning capability.
- US is useful to evaluate not only chest wall of mastectomy site but regional lymph nodes of axilla and internal mammary chains.
- Prominent vascularity on color-Doppler US or showing stiffness on elastography may increase suspicion of recurrence during evaluation of new lesions, including the surgical site.
- In addition, US-guided fine needle aspiration biopsy or core needle biopsy allows an accurate diagnosis.
- In this presentation, we present usefulness of ultrasonography in local recurrence of breast cancer with some representative cases.
Local recurrences (I)

Local recurrence in 61-year-old woman who treated conserving surgery for invasive breast cancer 9 years ago. (A) During routine follow up US, a irregular hypoechoic hypervascular mass (arrows) was newly noted above the scar(*) compare with previous US image (B). Invasive carcinoma was revealed by US-guided core biopsy. (C) A irregular heterogeneously well enhancing mass was well demarcated on MR.

Local recurrence in 60-year-old woman who treated conserving surgery for DCIS (2cm, high grade with comedonecrosis) 2 years ago. (A) Grouped suspicious calcifications are detected on routine follow up mammography (arrow). It was newly seen about 3 cm away from the surgical site(*) (B) US shows a irregular mild low echoic lesion with mild stiffness on elastography. DCIS was revealed by US-guided biopsy. 1cm sized high grade DCIS with comedonecrosis was confirmed by mastectomy.
Local recurrences (II)

**Chest wall recurrence** in 58-year-old woman who treated mastectomy for triple negative invasive breast cancer (TNBC). (A) Photography shows erythematous nodular skin thickening. (B) US shows hypoechoic skin thickening and lymphatic dilatation. (C) MR shows edematous change and well enhancement. Invasive carcinoma was confirmed by skin punch biopsy.

**Recurrent breast cancer at neo-breast** in 43-year-old woman who treated subcutaneous mastectomy and TRAM flap reconstruction for TNBC (T3N2M0). (A) Post-OP 6month chest CT shows reconstructed fatty breast. (B) Newly developed nodular enhancing lesion in the neo-breast and suspected metastatic mediastinal lymph nodes on 1 year FU chest CT. (C) This lesions shows hypermetabolism (max SUV 10.1) on PET-CT. (D) Oval partly irregular low echoic mass was noted on US and US-guided biopsy was done. Pathological diagnosis was invasive ductal carcinoma. (E) After chemotherapy, previous noted breast lesion and metastatic lymph nodes were disappeare.
Regional recurrences

**Regional recurrence of ipsilateral Internal mammary lymph node** in 51-year-old woman who treated mastectomy for invasive breast cancer. (A) Chest CT shows enhancing mass in the right parasternal area. (B) This lesion shows hypermetabolism (max SUV 7.5) on PET-CT. (C,D) US shows irregular hypoechoic hypervascular mass in right internal mammary chain. US-guided fine needle aspiration biopsy was done and confirmed invasive carcinoma.

**Regional recurrence of ipsilateral axillary lymph node** in 58-year-old woman who treated right mastectomy for invasive breast cancer. (A) No suspicious lymph node in the right axilla on pre-OP chest CT. (B) 1 year follow-up chest CT shows peripheral enhancing enlarged lymph node in the right axilla level II. (C) PET-CT shows hypermetabolism in this lymph node. (D) US was done for biopsy. A large mass-like enlarged lymph node is seen interpectoral area.
Conclusion

- US is a useful surveillance imaging method in addition to mammography in women who have been treated for breast cancer.

- US has been very useful for detecting and characterizing abnormalities in breast cancer patients after surgical treatment.
US-guided Core Needle Biopsy of Spleen: Illustrative Review

Jae Woong Choi, So Yeon Park Yang Shin Park, Jongmee Lee, Chang Hee Lee,

Kyeong Ah Kim, Cheol Min Park

Department of Radiology, Korea University Guro Hospital, School of Medicine, Korea University,

Seoul, Korea

author's contact email: cooljay@korea.ac.kr
Background

- The spleen
  - A highly vascular encapsulated lymphoid organ
  - Central immunological and hematological tasks

- Core needle biopsy of spleen
  - To evaluate focal solid or cystic splenic lesions, especially spleen-involving lymphoma.
  - Rarely performed on the spleen due to the fear of complications
    - Complication: hemorrhage, pneumothorax, and injury to the colon and kidney
    - Avoidance of splenectomy

- US-guided biopsy of the spleen can be a safe diagnostic option if performed with appropriate techniques.
Material and Methods

- **Techniques for safe biopsy**
  - Normal *clotting parameters*: PLT > 100K/μL; PT lab > 70 %; INR < 1.4
  - Adequate *compliance* of patient: Suspending respiration during biopsy
  - Selecting a *peripherally-located lesion*
  - Choosing the *shortest route*
  - Avoiding the *larger vessels* at the hilum
  - Avoiding the *pleura*
  - Cranially angulated approach via the subcostal route for upper polar splenic lesions in an attempt to avoid the pleural recess
Results

- **Success rate**: 88~100%

- **Complications** following percutaneous splenic interventions (0~2%)
  - Hematoma formation (m/c)
  - Injuries to the adjacent organs: Colon, stomach, left kidney, pleura, etc.
    - GI Perforation
    - Pneumothorax, pleural effusion

- **Post-procedure patient management**
  - US after the procedure to exclude hemorrhage
  - Checking vital sign regularly
  - Instructing not to perform any heavy lifting or to participate in activities that require significant physical exertion for at least 3 days
Results: Case 1. Cystic Hemangioma

Figure 1-2. Male, 73 yo. with advanced gastric cancer. (a) CECT shows about 2 cm-sized low density lesion in spleen. (b) After 1 year, FU CT shows increased size of the lesion with peripheral solid portion. (c) US-guided biopsy utilizing an 18G automated biopsy gun. Pathology disclosed consistent with hemangioma. No complication following biopsy.
Results: Case 2. Tuberculosis

Figure 4. Male, 34 yo, who complained of fever and cough. (a) CECT shows multiple tiny low density lesions in spleen with splenomegaly and (b) lymphadenopathy with central hypodensity in paraaortic space. (c) US-guided biopsy utilizing an 18G automated biopsy gun. PCR for tuberculosis is positive and pathology disclosed chronic caseating granulomatous inflammation consistent with tuberculosis. No complication following biopsy.
Conclusion

- US-guided spleen biopsy is a safe diagnostic tool for establishing a pathologic in various focal and diffuse splenic diseases.
- Complications related to US-guided spleen biopsy can be avoided with appropriate techniques.
- US-guided spleen biopsy can help avoid unnecessary splenectomy.

* Complications & prevention

1. Bleeding
   - prevented by short needle passage, avoid vessels using color Doppler
2. Pneumothorax
   - prevented by inferior approach, breath hold
3. Pain
   - prevented by minimal puncture, local anesthesia
4. Reported major complication rate: 2.2%
Vascular Malformation of the Liver in Newborn with Patau Syndrome- Case Report

Joanna Puskarz- Gąsowska, Renata Bokiniec, 1
Joanna Szymkiewicz- Dangel 2
Maria Katarzyna Borszewska- Kornacka 1

1 Department of Neonatology and Neonatal Intensive Care, Medical University of Warsaw
2 Perinatal Cardiology and Congenital Anomalies Department, Center of Postgraduate Medical Education, Warsaw

asiapuskarz@wp.pl
Prenatal ultrasound abnormalities

- Intrahepatic part of umbilical vein, incorrect portal vein invisible
- Connection of the umbilical vein and vena cava inferior stenosis 2.7 mm
Clinical symptoms

• The baby boy was delivered by C-section in the 40+2 week of gestation with central cyanosis, no breath, low muscle tone.

• Dysmorphic features:
  • nuchal fold
  • low-set ears
  • cloudy cornea
  • polydactyly
  • hypogenitalism
  • anorchidism and anderdeveloped scrotum
  • skin fold between scrotum and anus
  • multiple visible petechiae and bruises
Massive hemorrhages in frontal and perietal-occipital areas

Bilateral vasculopathy of the thalamus
Large edemc kidneys with retrograde artery flow
Anomalies of the vessels

Lack of ductus venosus, wide VCI, extrahepatic connection between VCA and UV with 3-phasic flow
Agenesia of DV – clinical consequences

- Extrahepatic connection DV and VCI, RA, LA – pure prognosis- death 60-100%
- Hipoplasia right branch of the portal vein
- Atrofia of the right hepatic lobe and hepatic cells insufficiency
- Hiperbilirubinemia Bil 25 mg/dl, Bil-D 17mg/dl
- AspAT 610 U/L; AIAT 149 U/L
- Coagulopathy APTT 41,4s
  - PT 22s
  - INR 4,52
  - PT 49,2s
  - Fibrynogen 0,91;
  - D-Dimery 3,32;
  - C Protein 11
  - ATIII < 10%
- Platelets 23x10^3/mm^3

Trisomy of 13
Xantogranulomatous pyelonephritis (XGP) diagnosed in 2-years old child with nephrolithiasis

authors: Marianna Lichosik (1), Małgorzata Placzyńska (1), Katarzyna Jobs (1), Joanna Milart (1), Katarzyna Królikowska (1), Beata Jurkiewicz (2), Joanna Samotyjek (2), Bolesław Kalicki (1)

Affiliation:
(1) Department of Paediatric, Nephrology and Allergology, Military Institute of Medicine
(2) Department of Paediatric Surgery and Paediatric Urology, Centre of Postgraduate Medical Education

author’s contact email: mlichosik@wim.mil.pl
background

Xantogranulomatous pyelonephritis (XGP) is an unusual variant of chronic pyelonephritis.

Most cases occur in setting of obstruction due to infected renal stones.

The most common symptoms are flank or abdominal pain, lower urinary tract infections, fever, palpable mass, gross hematuria, and loss of weight.

Affected patients usually have massive destruction of kidney due to granulomatous tissue containing lipid-laden macrophages.

Only a third of all cases are seen in children.
material and methods

Objective:
We report a case of 2-year old girl, which was treated for XGP, taking into account imaging examination results.

Methods: Retrospective analysis of Medical records.

results

2-year old girl was admitted to Paediatric and Nephrology Department after being diagnosed with nephrolithiasis. There was history of urinary tract infection in first year of life and respiratory tract infection (pneumonia) with fever one month before hospitalization. On admission physical examination revealed a mass of the left flank with tenderness. Laboratory tests presented elevated inflammatory markers but urine culture was negative.
results

**Ultrasound** showed enlarged left kidney (115mm x 66mm x 58 mm) with loss of the corticomedullary differentiation and two stones: one 17mm in renal pelvis and 8mm in a lower calyx, right kidney was normal. The calyces in affected kidney were dilated giving a multiocculated appearance that looked like the paw print of beer ("bear’s paw" sign). Due to clinical and ultrasound picture the XGP of the left kidney was suspected.

The CT was made and confirmed the diagnosis.
results

Left radical nephrectomy was performed. Pathological examination of the kidney confirmed the diagnosis of diffuse XGP. The girl remains well at 1 year follow-up.

Conclusion:

XGP should be included in the differential diagnosis of all children presenting with perirenal or abscess of the psoas major muscle, renal mass and/or non-functioning kidney associated with/or without urolithiasis. Typical CT “bear’s paw sign” may also be clearly seen in Ultrasound and is helpful to achieve preoperative diagnosis.
Ultrasonograf w Twoim smartfonie?

Philips Lumify to pierwsza na rynku głowica USG podłączona bezpośrednio do Twojego telefonu lub tabletu. Od dziś możesz przeprowadzać badanie USG zawsze, gdy tego potrzebujesz.
Daj się zaskoczyć jakością Philips Lumify.
www.philips.pl/lumify

Odwiedź nasz Lumistore (poziom 0), przetestuj możliwości głowic Lumify i kup aparat w wyjątkowej kongresowej cenie.
Empowering Professionals

S-Shearwave Imaging™
Non-invasive assessment of the stiffness of tissue/lesions in the breast and liver, providing an advanced level of diagnostic information.

A new, outstanding diagnostic experience
RS85 incorporates an integrated solution engineered to offer medical professionals a new, outstanding experience in diagnosis. It delivers enriched view, advanced intelligence and streamlined workflow.

Ultrasound system RS85

Visit Us at EUROSON 2018

Visit www.samsunghealthcare.com to Learn more
Innovating Healthcare, Embracing the Future

We create value through Innovation and Digital Technologies, by equipping today's Healthcare Professionals with tomorrow's Innovative Solutions.

Visit us at Booth 28

Hitachi Medical Systems Europe Holding AG, Switzerland
www.hitachi-medical-systems.com

Your Insight, Our Solutions

Bracco Welcomes EUROSON 2018 Delegates
Please visit us at Bracco Booth 20 Hall 15

www.braccoimaging.com
Czy jesteś zaangażowany w diagnostykę i leczenie chorób wątroby?
Prawdopodobnie potrzebujesz efektywnej, kosztowej, powtarzalnej metody identyfikacji pacjentów wysokiego ryzyka, etapów rozwoju schorzenia, śledzenia postępu choroby, która pomoże Ci w podejmowaniu świadomych decyzji odnośnie ścieżki leczenia.

Rozwiązanie dla Ciebie.
Pakiet funkcjonalności dedykowany obrazowaniu wątroby, nowego aparatu LOGIQ™ S8 XDclear™ 2.0 łączy najważniejsze modalności w zakresie badań przesiewowych, diagnozowania oraz oceny stopnia zaawansowania chorób wątroby.
LOGIQ™ S8 XDclear™ 2.0 oferuje dostęp do wszechstronnego zestawu narzędzi obrazowania i kwantyfikacji.
Podczas 30. Kongresu Euroson EFSUMB i XIV Kongresu Naukowego Polskiego Towarzystwa Ultrasonograficznego, GE Healthcare zaprasza na sponsorowany wykład:

"Liver Elastography: combining Transient Elastography and 2D-SWE" prowadzony przez Profesora Ioana Sporea.

Wykład i sesja skanowania na żywo odbędą się 7 września o godz. 13:00-13:45 w hali 1F (1. piętro).

---

Czy jesteś zaangażowany w diagnostykę i leczenie chorób wątroby?
Prawdopodobnie potrzebujesz efektywnej kosztowo, powtarzalnej metody identyfikacji pacjentów wysokiego ryzyka, etapów rozwoju schorzenia, śledzenia postępu choroby, która pomoże Ci w podejmowaniu świadomych decyzji odnośnie ścieżki leczenia.

Rozwiązanie dla Ciebie.
Pakiet funkcjonalności dedykowany obrazowaniu wątroby, nowego aparatu LOGIQ™ S8 XDclear™ 2.0 łączy najważniejsze modalności w zakresie badań przesiewowych, diagnozowania oraz oceny stopnia zaawansowania chorób wątroby.
LOGIQ™ S8 XDclear™ 2.0 oferuje dostęp do wszechstronnego zestawu narzędzi obrazowania i kwantyfikacji.
X-Insight

An insightful solution to envision more

We cordially invite you to discover Mindray’s brand-new ultrasound solution, X-Insight, which delivers high efficiency and precision imaging with:

- **eXpress Clarity**
  More clarity at hand

- **eXceptional Intelligence**
  Intelligence throughout entire workflow

- **eXceeding Experience**
  Experience with high productivity

www.mindray.com/en
marketingeu@mindray.com
Taking Ultrasound to New Heights and Depths

Satellite session of Siemens Healthineers
7 September (Friday)
Time: 14:45–15:45
room Hall 1F

Moderators:
- Prof. Paul Sidhu, King’s College London
- GUMed Prof. Wojciech Kosiak, M.D.

Speakers:
- Prof. Christoph Dietrich, Caritas Krankenhaus Bad Mergentheim
- Dr. Gibran Timothy Yusuf, King’s College London

siemens.pl/sequoia
Taking ultrasound to new heights

ACUSON Sequoia ultrasound system

- **OLED display**
  Experience vivid color against true black and with higher shades of grey. There are no visual distractions, no other noise, only what matters is displayed.

- **Largest touch display**
  A 15.6" touch display gives you more space to define your own intuitive workflow.

- **Intuitive control panel**
  An intuitive design based on user feedback places the most used and important keys right at your fingertips.

- **Multiple cable hooks**
  Integrated transducer storage and hassle free connector storage for easy access.

- **Central locking & steering**
  A central locking and steer function that eliminates the need to lock wheels individually enhancing maneuverability.

- **Floating control panel**
  Designed to fit every room and workflow, the control panel can swivel and rotate left or right 180 degrees for a seamless workflow.

- **Integrated gel warmer**
  An integrated gel warmer to support patient comfort.

- **ECG leads and pencil port**
  Shared-service cardiac functionality.

- **Four active ports**
  Compact micro-pinless connectors for four active ports.

- **Powerful and portable**
  Lighter, thinner and more robust than any previous platforms in this category, the ACUSON Sequoia is incredibly powerful yet remarkably portable.

siemens-healthineers.com/sequoia
WALKING ON THE BRIGHTER SIDE OF ULTRASOUND IMAGING

MyLab™ X5 X6 X7

Esaote S.p.A. – sole-shareholder company
Via Enrico Mela 77, 16152 Genova, ITALY. Tel. +39 010 654371, Fax +39 010 65437 275, info@esaote.com / www.esaote.com
Diamond Select
Rekondycjonowane USG w promocyjnych cenach

Diamond Select iU22
już od 99 700 zł netto
- system premium z oprogramowaniem Shared Service (pełny pakiet kliniczny)
- 3 standardowe głowice
- pakiet zaawansowanych obrazów 2D
- technologia PureWave
- rok gwarancji

Korzyści płynące z programu Diamond Select:
- Fabrycznie odnowiony sprzęt z roczną gwarancją
- Wsparcie techniczne przez cały cykl życia produktu
- Dostęp do najnowszych funkcji i aplikacji
- W pełni konfigurowalny system
- Wymiana na części posiadające certyfikat Philips

Więcej informacji:
www.philips.pl/diamond-select

Prezentowany materiał ma charakter informacyjny i nie stanowi oferty handlowej w rozumieniu art. 66 par. 1 kodeksu cywilnego. Szczegółowe informacje techniczne dotyczące prezentowanych urządzeń i systemów są zawarte w dokumentach technicznych. Konfiguracja urządzeń i systemów jest zawsze dostosowywana do konkretnych potrzeb klienta i może różnić się od prezentowanej w powyższym materiale. Philips ma prawo zmienić lub dostosować dane techniczne i konfiguracje urządzeń i systemów bez obowiązku wcześniejszego informowania o tym klientów.