BOOK OF ABSTRACTS

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20. - 22. OCTOBER 2022

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Slovenia

7th SLOVENIAN-CROATIAN ULTRASOUND CONGRESS

Laško, Slovenia
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Welcome letter

Dear colleagues, dear friends!

It is our great pleasure to invite you to the 7th Joint Slovenian-Croatian Ultrasound Congress taking place between 20-22 October 2022 at the congress center of the hotel Thermana in Laško, Slovenia. We will meet in a small and picturesque town lying by the river Savinja known for its traditional spa and wellness center, the taste of good beer, and numerous paths for well-being and relaxation to visit after the meeting.

Members of the Croatian Society for Ultrasound in Medicine and Biology and the Slovenian Society for Ultrasound in Medicine will discuss the topics related to all dealing with ultrasound diagnostics – "applicable art": the position of ultrasound in the diagnostic algorithm and indications for it, certification of knowledge, sub-specialization, evaluation of diagnostic examinations – payment etc. The introductory plenary will introduce ultrasound as "daily art" and discuss the meaning or ergonomics, psychology and communication as well as the status of artificial intelligence in our daily practice.

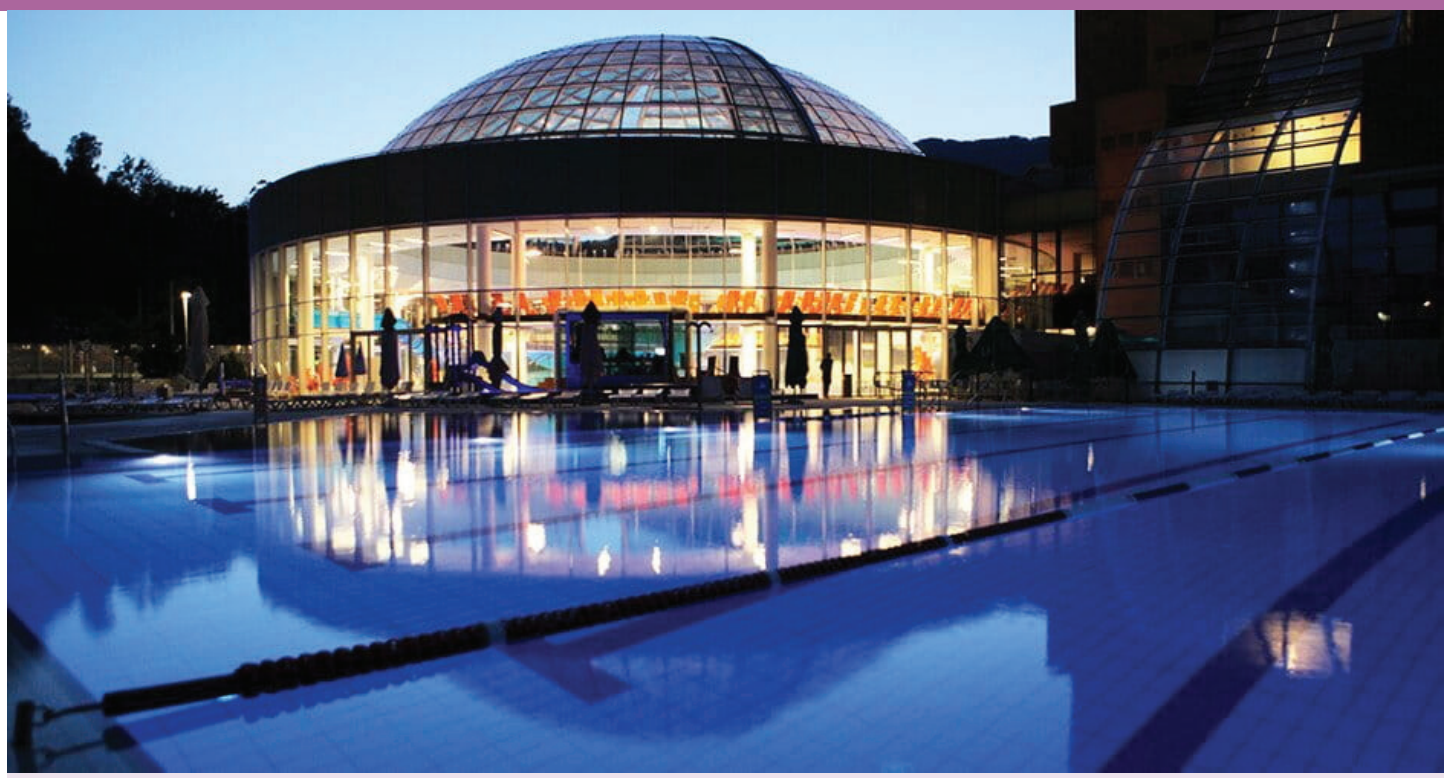
In the following two days, all topics covering the use of diagnostic and interventional ultrasound will be presented. We expect the physicians of from different fields of expertise – radiologists, internal medicine specialists, gastroenterologists, nephrologists, rheumatologists, physiatrists, neurologists, gynecologists, general practitioners, specialists in emergency medicine, nuclear medicine, palliative care, surgeons, pediatricians, and other ultrasonologists to attend the lectures and workshops, use this opportunity to exchange knowledge and experiences as well as get acquainted with the novelties within the profession. To this end theoretical and practical workshops with national and international experts and invited speakers will be organized.

Undoubtedly, we will all use the opportunity at informal gatherings to exchanges ideas and expand our network serving as an incentive for work in the future.

You are kindly invited and welcome in Laško!

Honorary Chair of the Congress
Mirjana Brvar, MD
Prof. Boris Brkljačić

Chair of the Congress
Ksenija Vuković, MD
Prof. Gordana Ivanac



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Croatian Society for Ultrasound in Medicine and Biology
University Medical Centre Maribor

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Role playing on the ultrasound stage

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In the ultrasound diagnostics consulting room in the radiology department, many different people step into different roles every day.
Scenes take place between them that involve individuals in various mutual relationships.
There are several creative techniques available to study the psychodynamics of interpersonal relationships in the workplace.
With one of them(role-playing), we will present what is happening in the ultrasound diagnostics consulting room.
The patient, supervising radiologist, radiology residents, nurse, administrator, chief of surgery are present as well as their feelings, hardships, which are mostly hard to recognize.
As outside observers, we will be able to think together and talk about our own experience while observing of the scenes.
With the help of the present experts in the field of communication and interpersonal relations, we will look for guidelines for solving the hardships experienced by the “actors” in the consulting room.

Ergonomics in ultrasonography

Tadeja Hernja Rumpf, IFRM UKC Maribor

Work-Related Musculoskeletal Disorders (WRMSDs) are injuries caused or aggravated by workplace activities. They are a common cause of pain among ultrasonographers [1]. It has been reported that more than 80% of ultrasound diagnosticians develop WRMSD and continue to work despite their MSK pain. [1,2]. According to the Occupational Safety and Health Administation, the main causes of WRMSD are: repetitive movements, forceful or awkward movements, duration of pressure, overuse, body-only posture or incorrect positioning, vibration, excessive force and strain [3]. Shoulder (73%-90%), neck (28%-74%), wrist (54%-59%), back (44.4%-69%) and hands (55%) are the most affected regions. Ergonomics is defined as the study of human factors that influence the physician, with an emphasis on observing how people interact with their work environment and adapting the workplace to the worker, their abilities and limitations [4]. The goal of optimising ergonomics is often to reduce workplace injuries and improve safety while increasing workplace efficiency. In our presentation, we propose key elements for the optimal positioning of physicians and patients, as well as the optimal set-up of the workplace, ensuring less musculoskeletal disorders by preparing for the task while performing prevention and recovery exercises.

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Ultrasound and general practice in Slovenia

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ABSTRACT

Family doctors make the largest number of referrals to ultrasound exams. There were 303821 referrals by GPs to ultrasound from October 2021 to September 2022, the majority being abdominal US exams, which is still the preferred imaging exam in case of abdominal problems. The exchange of information between the GPs and radiologists is done mostly in the form of letter of referral, which should contain a clearly stated clinical problem; just as the imaging result should contain a clearly stated interpretation of the findings, as well as possible recommendations if needed. At the same time all of the patient's exams should be made available in the digital information system for both the GP and the imaging specialist.

With arrival of more accessible ultrasound machines in the general practices the family physicians started to use point-of-care ultrasound (POCUS) in their day to day work, as it allows a better quality of treatment of the patients. This causes the need for systemic changes in the form of formal training for undergraduate students, GP residents, as well as GP specialists.

Liver fat quantification

Richard G Barr

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NAFLD is a worldwide epidemic. Being able to accurately estimate the degree of fat in the liver is important to make the diagnosis and to follow the patient after treatment. Although liver biopsy has been the reference standard it is invasive and impractical to follow patients. MR PDFF is now recommended for the reference standard. It is accurate but expensive and not widely available. There are now several methods to accurately estimate the degree of fat in the liver. This talk will review the state-of-the-art of ultrasound liver fat quantification. The various methods of ultrasound fat quantification will be reviewed. There advantages and disadvantages discussed. Reviewing how multiparametric Ultrasound can be used to evaluate fatty liver disease and used to follow the progression or regression of disease.

Screening for hepatocellular carcinoma - for whom and when?

Vanja Kalacun

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Hepatocellular carcinoma (HCC) is the most common primary liver cancer that usually develops in the setting of chronic liver disease. It is the third leading cause of cancer mortality with an increasing incidence worldwide. Despite significant progress in treatment in recent years, the five-year survival rate remains very poor and is approximately 10% in Slovenia. Poor survival is due to the fact that most patients are diagnosed at an advanced stage of HCC, when only palliative treatment is available. Because survival is closely related to the stage of cancer at diagnosis, leading expert guidelines suggest screening and surveillance of patients at high risk for HCC with abdominal ultrasound every 6 months. Patients at high risk of developing HCC are all patients with cirrhosis Child-Pugh stage A and B regardless of the aetiology of the liver disease, patients with Child-Pugh stage C who are candidates for liver transplantation, a subgroup of patients with chronic HBV infection or chronic HCV infection and patients with advanced fibrosis, regardless of aetiology. Patients with signs of advanced liver cirrhosis Child-Pugh stage C who are not candidates for liver transplantation and patients in poor general condition that precludes the introduction of specific HCC treatment are not eligible for screening due to their short life expectancies. The main goal of monitoring patients at high risk is to achieve a high rate of early-stage HCC at diagnosis, reduce mortality and improve the quality of life of HCC patients.

Key words: hepatocellular carcinoma, screening, abdominal ultrasound

Cystic liver lesions

Katja Novak, gastroenterologist

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Cystic liver lesions are a frequent finding on routine radiological imaging exams, most commonly on ultrasound exams. They represent a heterogenous group of disorders, which differ in aetiology, prevalence and clinical manifestations. The European Association for the Study of the Liver (EASL) in 2022 provided Clinical Practice Guidelines on the clinical management of non-infectious cystic liver diseases. These lesions are simple hepatic cysts, mucinous cystic neoplasms (MCNs) of the liver, polycystic liver disease (PLD), Caroli disease, Caroli syndrome, biliary hamartomas and peribiliary cysts. Many cystic liver lesions have classic imaging findings and the diagnosis can be made with certainty. Key elements in the description of cysts is the number of lesions (solitary vs multiple) and architecture (simple vs complicated vs complex). Complicated and complex cysts are those with complex features within a lesion and require further assessment. Ultrasound and MRI are the best imaging modalities for characterisation of cystic liver lesions. The sensitivity and specificity of ultrasound is about 90%. Contrast-enhanced ultrasound is indicated for complex cysts and helps to identify malignant cystic lesions. MRI is able to identify haemorrhagic or proteinaceous cysts, CT may detect gas or calcification but is less accurate for assessing cyst contents. Cystic liver lesions involve a spectrum ranging from most commonly benign and asymptomatic lesions to rarely malignant lesions which can be treated.

From emergency to palliative medicine - POCUS is a must today

Radovan Radonić, Ozrenka Zlopaša, Nina Gubarev Vrdoljak

Ultrasound can provide quick and important data for better insight into a patient's pathophysiology. The availability of ultrasound devices today, the simplicity of their use, the fast-learning curve of their basic applications, and the short time needed for "on the spot" examination, performed by attending physicians, with no side effects and no additional cost after initial investment, are just some of the reasons to implement ultrasound in all branches of clinical medicine. Many clinical questions are more difficult to resolve by classical physical examination than by point-of-care ultrasound (POCUS).

There are many examples and proofs that ultrasound can resolve issues regarding the aetiology and pathophysiology of dyspnoea, shock, cardiac arrest, renal failure, etc. One of the important issues accessible by ultrasound is the localisation of the source of infection and the recognition of the mechanical problems complicating the infection, like blockade of the urinary or biliary tract. Femoral and popliteal veins thrombosis are easily accessible by ultrasound, in this case the diagnostic method of choice. Volume status can be assessed by ultrasound at the bedside in in- and out-of hospital emergency facilities as well as in palliative care settings. Ultrasound is also helpful in answering more simple but not irrelevant questions. Examples are: Is there urine in the bladder? Is there any peripheral vein suitable for venous access? Such questions can be of interest to nurses who should be able to use the ultrasound, a helpful tool, to manage the problems in their field of interest.

The Utility of POCUS in General Practice

Mojca Žerdin, dr.med., spec.druž.med, Janez Koprivec dr.med., spec.druž.med.

ABSTRACT

Point-of-care ultrasonography (POCUS) is a safe and rapidly evolving diagnostic modality that is utilized in many health care specialities and is becoming increasingly common in general practice. It is a focused ultrasound examination, which is used as an extension of clinical examination. The use of POCUS helps to narrow differential diagnosis, shortens time to definitive diagnosis and appropriate treatment and enables more accurate admissions to hospital. It renders medical assessment safer and better while lowering the costs of medical care. The most significant barriers to the use of POCUS are lack of time and training, and the limited availability of ultrasound devices.

This necessitates systemic changes in the form of training, the reimbursement of GP-performed examinations by insurance companies and improvement in the working conditions in general practices, with less administration and more time for clinical work.

The integration of POCUS into general practice is a certainty, as it enables a higher level of quality in patient care.

Case report: Point of care use of ultrasound in emergency department saves life of a patient with acute dizziness and vertigo

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INTRODUCTION:

Point of care ultrasound (POCUS) is one of main diagnostic tools in ER. We describe how it helped diagnose acute emergency in a patient with insisting symptoms of dizziness and vertigo.

CASE PRESENTATION:

52-year old man felt a slight short pain in the left lower abdomen, had dizziness, vertigo and syncope with vomiting. Paramedics measured blood pressure 88/55, and gave him 500 ml of cristaloids. Other vital signs were normal. In the ER patient was oriented, his main symptoms were still dizziness and vertigo, he had no pain. His vitals and neurological status were normal. Palpation of abdomen was normal, postoperative scar (after stent graft implantation in aneurysm of abdominal aorta (AA) 3 years ago) was noted, femoral pulses were symmetrical. 3 months ago he had CTA where new (asymptomatic) aneurysmal sac was seen under bifurcation of AA, and the council decided he needed a follow up after 6 months. Therefore, POCUS was perfomed where free fluid in the intraperitoneum and enlarged aneurysmatic sac was seen. Immediately CTA was done where rupture of AA was confirmed. He had emergency operation where bifurcated graft was inserted. On fourth day he was discharged home in good condition.

DISCUSSION:

Patient's presenting symptoms were nonspecific. In this case POCUS identified free fluid in the intraperitoneum and an enlarged aneurysmatic sac, and the suspected rupture of AA was confirmed on CTA. POCUS helped to diagnose this acute emergency which could have been missed due to nonspecific symptoms.

Ultrasound elastography of liver and kidneys in our cohort of paediatric nephrological patients – a pilot study

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Introduction:

Ultrasound elastography is a novel ultrasound technique used to assess the elasticity of tissues. The aim of our study was to measure liver and kidney elasticity using ultrasound elastography in children and adolescents with either chronic kidney disease or hypertension, with or without obesity.

Methods:

85 children and young adults were enrolled in the study so far, namely, 40 subjects with chronic kidney disease (Group 1) and 45 subjects with hypertension (Group 2). In all, ultrasound elastography of liver and both kidneys was performed.

Results:

In all participants, the kidneys were less elastic than the liver. The elastic properties of the liver were comparable between both groups, however, elastic properties of the kidneys in hypertensive subjects differed significantly from Group 1 with p=0.001 elastography in (m/s) or p<0.001 elastography in (kPa), respectively. When the participants were divided according to obesity status, there was also statistically significant difference for liver stiffness (p=0.043 and 0.027) as well as significant differences in both kidneys (left kidney: p=0.003 and p=0.002, respectively; right kidney: p=0.008 and p=0.006, respecitvely). In one participant the measurement of kidney was not successful due to severe obesity.

Conclusions:

Ultrasound elastography can be reliably performed also in the pediatric population and young adults with a somewhat more difficult investigation in the obese. The elastic properties of liver and kidneys differ in children with chronic kidney disease and hypertension, which seems to have a more profound effect on elastic properties of the kidneys. Further research is needed including the comparison to a healthy control group.

Current indications for intracavitary contrast-enhanced ultrasound in children

Damjana Ključevšek[1]

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Abstract

Ultrasound contrast agent (UCA) can be injected into physiological or non-physiological cavities. In this presentation, the possible indications for intracavitary use of UCA in children is discusses.
Intracavitary contrast-enhanced ultrasound (CEUS) could be an option where the conventional techniques have failed to reach a diagnosis or are of high risk (ionising radiation, anesthesia). There is no standard dose recommendation. The reported range is from 0.1ml to 1ml of UCA diluted in 0.9% normal saline solution, depending on the type of the cavity and the aim of the study (clinical question).
The most frequently performed intracavitary application of UCA into the urinary bladder is the contrast-enhanced voiding urosonography, which is also the only approved intracavitary examination in children.
Other intracavitary applications of UCA are off-label. UCA is usually administered via a catheter/tube inserted into other physiological cavities like the kidney pelvicalyceal system (CEUS nephrostogram), biliary tract (CEUS-guided percutaneous cholangiography), pleural space and peritoneal cavity, or into non-physiological cavities (cloaca, abscess, fistulae). Intracavitary CEUS applications are particularly useful for real time assessment of drain position, drainage effectiveness and causes of drainage disfunction, for evaluation of cavitary anatomy, identifying filling defects and the presence of communications with adjacent structures (fistulation, leakage), and for evaluation urinary (ureter) or biliary tract stenosis. Another off-label application of UCA is the oral or rectal administration of diluted UCA.
In conclusion, there are a wide spectrum of intracavitary applications of UCA in children, which could safety replaced conventional techniques.

Contrast-enhanced ultrasound in detection and follow-up of focal renal infections in children

Evita Pšeničny, Mojca Glušič, Marko Pokorn, Damjana Ključevšek

ABSTRACT

Background

Focal renal infections like focal nephritis and renal abscesses are not very common in children. However, they have to be diagnosed early in order to enable an appropriate antibiotic treatment. The purpose of our study was to investigate the efficacy and clinical utility of intravenous renal contrast-enhanced ultrasound (CEUS) as an alternative imaging method for the diagnosis and follow-up of focal renal infections in children.

Patients and methods

Fourteen children aged from 6 months to 17 years in whom focal renal infection was suspected at our University Children's hospital from January 2018 to February 2022 were included in this retrospective study. All clinical, laboratory, treatment and imaging data were obtained from medical and imaging records of the patients.

Results

CEUS was performed for the diagnosis in all fourteen children and then also for follow-up in seven children with renal abscess. In three children enhancement pattern was concordant with focal nephritis and in four children CEUS excluded focal renal infection and the diagnosis of pseudolesion was confirmed. All clinically relevant imaging data was obtained by CEUS and no other imaging was necessary for diagnosis and follow-up.

Conclusions

Renal CEUS was proven to be an efficient and self-sufficient imaging in diagnosis and further follow-up of focal renal infections in children. We described CEUS patterns of focal renal infections like focal nephritis, renal parenchymal and subcapsular renal abscess as well as relevant CEUS enhancement patterns important for differential diagnosis. Renal abscess follow-up algorithm with CEUS is suggested.

Imaging of emergency surgical conditions in the abdomen in children

Matija Žerdin

Summary

Ultrasound is a very useful imaging tool in cases of abdominal pain in children, owing to its noninvasiveness and lack of need for anesthesia. In the following presentation I examine the ultrasound findings (and sometimes compare them to other imaging modalities) of typical pathological entities that are a cause for acute abdomen in children of different age groups. I will also touch upon our experience with use of contrast enhanced ultrasound in pediatric acute abdomen.

Ultrasound diagnosis of spinal dysraphism in neonatal age

G. Roić

Abstract

This presentation presents and discusses the indications and techniques for neonatal spine ultrasound, including its advantages and disadvantages. Features and ultrasound findings in normal infants and those with spinal dysraphia (SD) are reviewed. SD refers to abnormalities with imperfect fusion of central neural and bony structures. It is the most common congenital abnormality of the central nervous system, with myelomeningoceles occurring in up to 2 per 1,000 live births in some studies. Spinal ultrasound is the method of choice as the first screening test in newborns suspected of having spinal dysraphisis. It can also be useful in the diagnosis of tumors, vascular malformations and trauma, although the indication in most cases is the exclusion of SD. The advantage of ultrasound diagnostics is not only the diagnostic sensitivity equal to MRI, but also that, unlike MRI, spinal ultrasound can be performed portable, without the need for sedation or general anesthesia. A new generation of high-frequency ultrasound machines with the possibility of an extended field of view now enables imaging of high diagnostic quality in small babies. Spinal ultrasound is possible in newborns due to the lack of ossification of the predominantly cartilaginous posterior arch of the spine. The quality of ultrasound assessment declines after the first 3-4 months of life as the posterior spinous elements ossify, and in most children spinal ultrasound is not possible after 6 months of age. However, the persistent acoustic window in children with posterior spinal defects allows ultrasound to be performed at any age. In infants with occult SD, early diagnosis may be beneficial, as SD can lead to distortion of the spinal cord and nerve roots with growth, resulting in neurologic sequelae in the lower extremities, lower urinary tract, and gastrointestinal tract. Since in some cases early surgical correction of SD can avoid these consequences, early diagnosis of SD can be important.

Urinary tract ultrasound in children with spina bifida

Andrea Cvitković Roić

Clinic for pediatric medicine Helena, Zagreb, Croatia

Spina bifida (SB) is one of the most common severely disabling birth defects in which there is incomplete closing of the spine and the membranes around the spinal cord during early development in pregnancy. There are three main types: spina bifida occulta, meningocele and myelomeningocele. Children with SB may have poor ability to walk, hydrocephalus, Arnold-Chiary type II malformation, neurogenic bowel and bladder. Neurogenic bladder is one of the most severe complications because if unrecognized and untreated can lead to urinary tract infections (UTI), incontinence, vesicoureteral reflux and upper tract damage. Urologic focus is based on maintaining normal kidney function at a time when the kidneys are most susceptible to kidney damage especially during the first years of life. Ultrasonography (US) is the first imaging modality because it is noninvasive and uses no radiation so we use it for early screening and regular follow up. Using US, we can detect indirect signs of raised intravesical pressure which is the most important risk factor for UTI, secondary vesicoureteral reflux, hydroureteronephrosis and renal damage.

In all children with suspected neurogenic bladder dysfunction, it is important to regularly assess kidney size and growth, upper tract dilatation, ureteric dilatation, bladder wall thickness, bladder emptying and rectal diameter. In children with increased bladder wall and/or detrusor thickness, small or large bladder capacity for age, residual urine, dilatation of ureters/renal collecting system further invasive imaging is indicated, first of all urodynamics and contrast enhanced voiding urosonography (ceVUS).

Lenticulostriatal vasculopathy – ultrasonographic and transfontanellar Doppler marker of cytomegalovirus infection in infants?

Vlasta Đuranović[1], Goran Krakar[2]

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The most common and serious causes of fetal intracranial infections are Cytomegalovirus (CMV), Rubella, HSV, Toxoplasma gondii or Treponema pallidum. Their consequences are, depending on the time of infection: neuron migration disorder - polymicrogyria, cerebellar hypoplasia, myelination disorders, leukomalacia, hemorrhage, subependymal cysts and lenticulostriatal vasculopathy (LSV). LSV is an ultrasound (US) visible lesion of the brain, which appears as echoic vertical »strip-like«, branched or dotted shape in the arteries of thalamus and basal ganglia. Transfontanelar Color Doppler (TFCD) can easily display lenticulostriatal blood flow and assess: stage I LSV with present flow within echogenic changes, and stage II LSV in which the flow disappears, despite a presence of streaks and spots, which at this stage most probably correspond to calcification.
We examined and followed-up 98 infants with LSV. First group (37/98) with congenital CMV infection and second (61/98) negative. All infants had neuromotor delay and ultrasound and TFCD markers of LSV. The most of infants from both groups had TFCD visible flow at the age of 0–4 months. In majority of them in both groups, at the age of 5–8 months, there was no more visible flow. TFCD showed no statistically significant difference among congenital CMV infection positive group and negative group, nor in youngest age period (0–4 months), nor in later course of flow in LSV, unilaterally or bilaterally. So, we conclude, although the LSV presents nonspecific marker for intracranial infection (ICI), all infants presenting with LSV should be evaluated for possible ICI. Thus, the Doppler findings of LSV in infants require a detailed examination, monitoring and follow-up of neuromotor outcome.

Cranial ultrasonography in newborns: role and limitations

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Cranial ultrasonography (cUS) is the first line neuroimaging modality in studing neonatal brain. Early and serial cranial ultrasound can provide valuable information about the timing and evolution of neonatal brain lesions in preterm and term newborns and enables visualization of (a-) typical brain maturation.

The first cUS serves to role out antenatal brain injuries and congenital malformations. In preterms, cUS during the first week of life aims to detect germinal matrix-intraventricular haemorage and periventricular hemorrhagic infarction while after the second week is used to detect white matter injury and post hemorrhagic ventricular dilation. In the term newborns cUS is a golden standard to detect perinatal arterial ishemic stroke, signs of hypoxic-isxemic brain injury including brain oedema, hyperechogenicity in the basal ganglia and thalami, cortical and subcortical echogenicity changes as well as sequelae of brain infections.

The use of different and higher frequency transducers and additional acoustic windows (e.g., mastoid fontanel) can improve visualization which can result in a more reliable detection of abnormalities. Doppler sonography of neonatal brain vessels enables the evaluation of intracarnial blood flow velocities and the patency of both arteries and veins (e.g., to diagnose sinuvenous thrombosis, arterial vessel occlusions). However, cUS is seen complementary to MRI because it lacks several important imaging features, is operator dependent, has a limited field of view, and variability across the quality of ultrasound machines.

Arterial ischaemic stroke in the newborn with a heterozygous mutation of the factor V Leiden gene

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ABSTRACT

Arterial ischaemic stroke is the most common recognised cause of cerebral palsy and the second most common cause of neonatal seizures. The incidence is 1 in 2500-4000 live births. It most commonly affects the middle cerebral artery, more often the left one. *Neonatal arterial ischaemic stroke* (NAIS) is most often clinically manifested by seizures, which are the initial sign in 69-90% of cases. The clinical picture also includes changes in muscle tone and consciousness, *apneic* spells, feeding problems and focal neurological deficits, most commonly haemiparesis. The diagnostic workup includes a thorough history, a detailed clinical and neurological examination, cranial ultrasound (CUS), transcranial Doppler sonography of the cerebral arteries (TCD), magnetic resonance imaging (MRI) of the head with or without cerebral and carotid angiography, transthoracic echocardiography (ECHO), and diagnostic workup for thrombophilic factors.

We present the case of a full-term newborn in whom 48 hours after birth seizures appeared (extension of the trunk and right arm, then clonisms of the right arm lasting 10-20 seconds). At the first CUS, non-sharply limited enhanced echogenicity in left periventricular matter was visible (Figure 1). The mentioned changes were then monitored by CUS on a daily basis. On postnatal day 5 the CUS showed well defined hyperechogenic lesions in the territory of the left middle cerebral artery that were suspected for infarction (Figure 2). For confirmation we performed an head MRI, which confirmed an ischemic lesion on the left frontoparietotemporal in the branches of the left middle cerebral artery. Changes were also visible in DWI sequence, which spoke of a relatively recent event with a diffusion disorder (Figure 3).

After arterial ischaemic stroke was confirmed, investigations were carried out to rule out congenital and acquired thrombophilias, where we proved that the boy was a heterozygous carrier of the mutation in the factor V Leiden (FVL) gene. The FVL mutation results in resistance to activated protein C and that means its anticoagulant activity is impaired, which increases the risk of clot formation. Heterozygous carriers of the FVL mutation have a five- to tenfold increased risk of venous thrombosis, while homozygous carriers have a 50 to 100-fold increased risk. Impact on arterial thrombosis is not fully understood, but there is evidence of an association between ischaemic stroke and FVL. In literature there are case reports of neonates with a proven FVL mutation who have suffered arterial ischaemic stroke.

The clinical course of reported case was typical for NAIS, which was detected and followed up by CUS and confirmed by MRI. MRI of the brain is the investigation of choice for the diagnosis of neonatal stroke, but it is not always readily available. CUS is a non-invasive method that does not require sedation of the patient and it can be performed at the patient's bedside and allows monitoring of changes over time. On CUS ischaemic stroke usually presents as a wedge-shaped focal increase in echogenicity in the area of the affected artery. In previous studies, the sensitivity of CUS in detecting NAIS was considered to be low, but more recently studies have reported significantly better sensitivity, with a study by Olivé et al. (2019) estimating the sensitivity to be as high as 87%. CUS is therefore still the first-choice imaging tool in a newborn with neurological symptoms and suspected arterial ischaemic stroke before MRI.

Keywords: factor V Leiden, ischaemic, stroke, newborn, thrombophilia

Figure 1: At the first cranial US non-sharply limited enhanced echogenicity is seen in left periventricular matter.

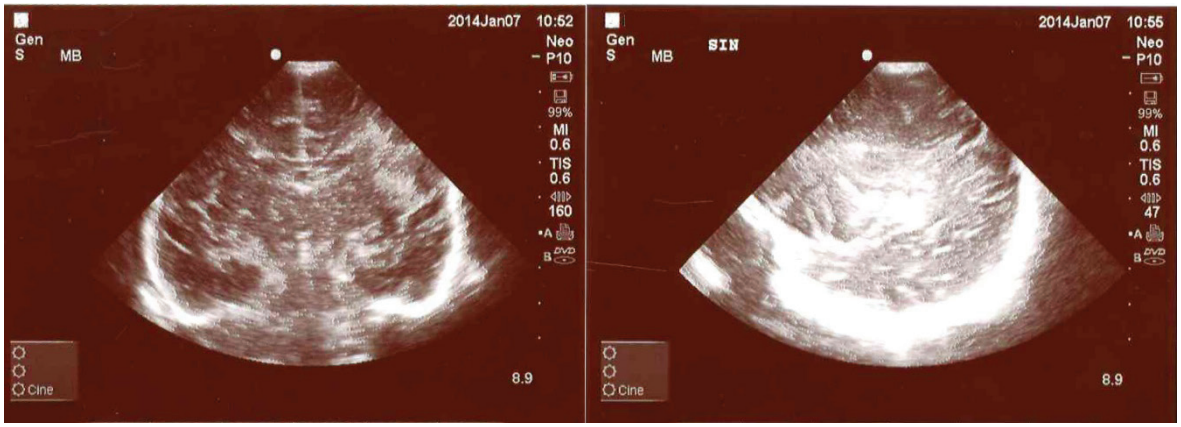

Figure 2: Cranial US on day 5 showed well defined increased echogenicity in the territory of the left middle cerebral artery.

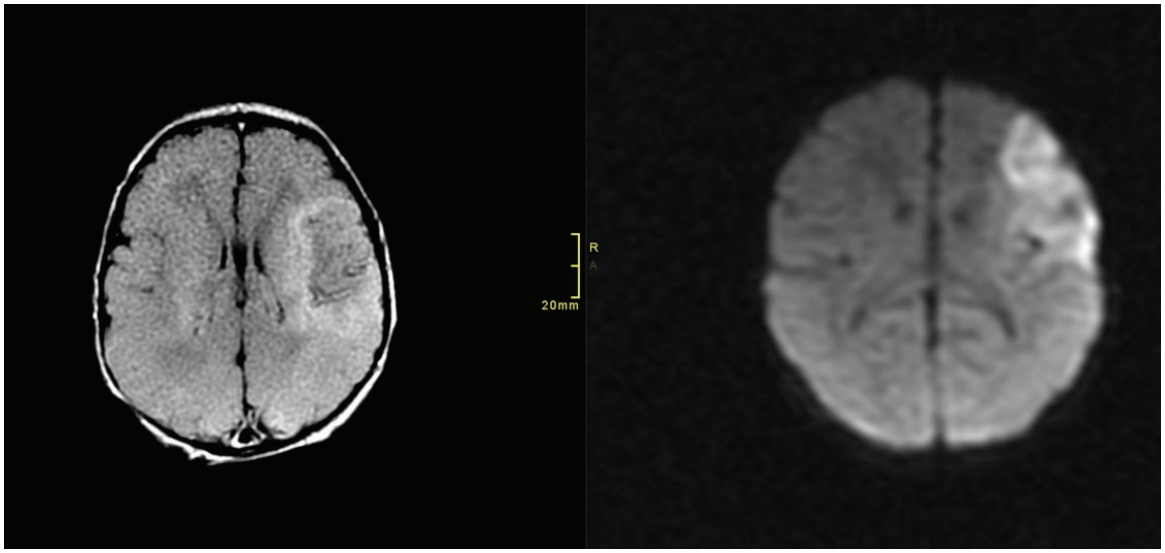

Figure 3: Ischaemic stroke in the left middle cerebral artery; left T2 FLAIR, right DWI sequence.

Breast Strain and Shear Wave

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Elastography has been used for 20 years to characterize breast lesions. It has not been widely accepted due to limitations. It is mentioned in BI-RADS but not required. IT is recommended to use to upgrade or downgrade BI-RADS 3 and BI-RADS 4A lesions. In this talk we will review both strain and shear wave elastography. The technique to perform optimal elastography will be reviewed. A discussion of both strain and shear wave elastography and why they do not provide the same results even though they measure the same property. An algorithm using both strain and shear wave elastography will be presented as a method of improving sensitivity and specificity. Newer techniques will be reviewed that will improve the utility of elastography of characterizing breast lesions as benign or malignant.

CEUS in the breast

Prof.dr.sc. Gordana Ivanac

Contrast-enhanced ultrasonography (CEUS) of the breast is less commonly performed than abdominal CEUS. Several authors had focussed on the possible application of sono-graphic contrast media to breast imaging. Main purpose was the characterization of breast masses. Initial results were rather disappointing, because CEUS did not prove its ability to formally differentiate benign from malignant lesions. Since then, improvement of US machines was determinant. Recent devices allowed the identification of slow flows, and high frequency probes have been developed, improving dramatically the spatial resolution. Another step forward was the availability of new contrast media, and also better adaptation of softwares dedicated to contrast-enhanced implanted in recent US machines. Second generation of contrast agent contain an inert lipophilic gas with very low solubility in blood, avoiding early leakage of the gas and making the microbubbles much more stable. Contrast microbubbles show high degree echogenicity which enables good differentiation of gas echogenicity in comparison with surrounding tissue. One of the biggest advantages of NACT is response follow up which is not possible when the therapy is provided after the surgery and excision of the tumor. Complete pathologic response to the therapy is an important prognostic factor of survival. Before starting NACT it is important to provide all necessary imaging examinations, check the status of regional lymph nodes, exclude systemic developed disease and do the histopathological analysis of samples obtained by biopsy. CEUS showed promising results in treatment response to NACT. In comparison with multiparametric MRI these ultrasound techniques are more available, faster and less expensive. CEUS contrast agent because of different pharmacokinetic shows less side effects in comparison with MRI contrast agent.

Mastalgia - medical treatment at the secondary level and the role of US

Nina Čas Sikošek

Mastalgia is the medical term describing the common symptom of breast pain. About 70% of women have breast pain at some point in their life. This symptom can occur in both men and women, but it presents more often in women, with the severity of the pain varying from mild and self-limited to severe pain.
Cyclic breast pain is often appear by women natural menstrual cycle, but noncyclic breast pain causes may include: birth control pills, pregnancy, infection, inflammation, infertility medications, hormone replacement therapy, antidepressants.
Breast pain is a rare symptom of breast cancer. Women who present with breast pain but have undergone normal examination and imaging can be reasonably assured that their risk of breast cancer is similar to that of a woman without breast pain.
Diagnosis involves breast examination, with medical imaging only in a specific location of the breast pain.Medical imaging by ultrasound is recommended for all ages, while in those over 30 it is recommended together with mammography.
In more than 75% of people the pain resolves without any specific treatment. Pain may be relieved by reassurance that it does not signal a serious underlying problem such as cancer is. And an active life style and a well filling bra can also lead to improvement. Otherwise treatments may include paracetamol or NSAIDs. In those with severe pain tamoxifen or danazol may be used.
In general, mastalgia has a natural history of remission and relapse. The prognosis is variable and influenced by the age of onset of pain and whether pain is cyclical or noncyclical. In most case relief may be spontaneous.

Role of ultrasound in detection of breast cancer recurrences

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Abstract

Understanding of current surgical methods in breast cancer treatment and their impact on imaging results is mandatory for a modern breast radiologist. Early detection of locoregional recurrence improves patient's outcome, and disease control in first five years after treatment is crucial for long-term results. Although there is still no clear international consensus about imaging in follow-up of breast cancer survivors, mammography, ultrasound and magnetic resonance show high sensitivity for locoregional recurrence detection, especially after breast conserving surgery. Ultrasound can detect typical features of cancer recurrence: irregular hypoechoic mass with poorly defined edges, often showing internal vascularization on Color Doppler examination. However, false positive results are possible due to iatrogenic changes of breast parenchyma due to surgery and radiotherapy. New methods allow for better tissue characterization, and sonoelastography was proven useful in recurrence detection, especially in second-look ultrasound of lesions detected by postoperative MRI of the breast.

Follow-up of breast cancer patients after completion of treatment

Andraž Perhavec

Breast cancer treatment has advanced greatly in recent decades and has become multimodal and highly complex, increasing the success of treatment. Due to the increase in incidence and better survival, the prevalence of breast cancer patients without evidence of the disease is also increasing. These patients need regular follow-up to detect early recurrence and new primary breast cancer. In addition, follow-up is necessary to manage short-term and long-term consequences of treatment, encouragement to continue possible treatment (hormonal therapy), psychological support for returning to a normal rhythm of life and promotion of a healthy lifestyle.

The optimal frequency of follow-up is not known. We adjust it according to the risk of recurrence of the disease in a certain period of time. At the Institute of Oncology (IO), breast cancer patients who have no evidence of the disease are monitored every 3-6 months for the first three years, every 6-12 months from the third to the fifth year, and then annually. After a five-year period or after completion of hormone therapy, most patients can be managed by centers of breast diseases outside the IO. History and a clinical examination are the basis of every outpatient visit. Mammography is a basic imaging examination of the breasts and should be performed annually. The purpose of performing regular mammograms is early detection of local disease recurrences and new primary breast tumors. Other imaging of the breasts (ultrasound, magnetic resonance) is performed exceptionally, mainly with the aim of clarifying mammographically uncharacteristic lesions. Laboratory tests and imaging (except mammography) are not indicated in the follow-up of asymptomatic breast cancer patients, as they have too low sensitivity and specificity.

The plan is to establish high-quality and equally qualified centers for the diagnosis, treatment and follow-up of breast cancer patients, which will operate throughout Slovenia.

Liver stiffness

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Chronic liver disease is a worldwide problem. It can be caused by any etiology that creates liver inflammation. Hepatitis B and C virus have been major etiologies, however with new treatments these are becoming less prevalent. Non-alcoholic fatty liver disease is now becoming the most prevalent cause of chronic liver disease. In order to assess chronic liver disease, the degree of fibrosis, inflammation, and steatosis is required. Liver elastography is able to measure liver stiffness accurately and has replaced liver biopsy in the vast majority of cases. It is important to realize that liver fibrosis measures stiffness NOT fibrosis. Stiffness is a combination of fibrosis, inflammation, and congestion. We will review the strict protocol to obtain accurate liver stiffness measurements. The interpretation of the results will be discussed including the factors that need to be assessed when providing a result, especially in patients treated for hepatitis B and hepatitis C. A review of the recommendation of the Society of Radiologists in Ultrasound will be discussed. How to use liver stiffness in pediatric patients with Fontan circulation will be discussed.

Elastography and the management of patients with portal hypertension

Andrej Hari

Elastography of the liver and spleen allows us to non-invasively assess the presence of clinically significant portal hypertension in patients with advanced chronic liver disease. The examination is quick, relatively simple, reliable, reproducible and enables dynamic monitoring of portal hypertension stages and induction of treatment with non-selective beta receptor blockers based on the proposed normograms. The lecture will focus on the strengths and limitations of the elastographic investigation, proposed guidelines (Baveno VII) and recent study reports in this field. Special attention will be given to the field of portal hypertension as a consequence of metabolically associated liver cirrhosis. The latter shows significant limitations when interpreting pragmatic invasive and non-invasive indicators. In conclusion, some recommendations will be given regarding priority study areas of this field.

Experience with use of transient elastography on Fibroscan® unit in patients with chronic hepatitis B and C

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Assessment of liver fibrosis is an important factor in the management of individuals with chronic hepatitis C and B or other chronic liver diseases, because the extent and progression of liver fibrosis determines treatment options and overall prognosis. Historically, the primary method of detecting fibrosis and monitoring disease progression has been liver biopsy, which is painful, expensive, and invasive procedure. With the discovery of direct-acting antivirals for the treatment of chronic hepatitis C, use of transient elastography on the Fibroscan® for the evaluation of liver fibrosis also came to the forefront as a rapid and noninvasive examination and quickly became part of the standard of care for patients with hepatitis C and B. The Fibroscan® examination uses an ultrasound transducer to transmit low-amplitude, low-frequency vibrations through liver tissue. The vibrations induce an elastic shear wave that propagates through the underlying liver tissue, the velocity of which can be determined using pulse-echo ultrasound. The velocity of the wave is directly related to the stiffness of the tissue, which correlates with fibrosis. In the Clinic for Infectious Diseases and Febrile Illnesses over 2350 Fibroscan® examinations have been performed in a total of 1706 patients since 2014, initially as part of a study and later as standard treatment of patients with chronic hepatitis B and C. Furthermore, the additional use of the mobile Fibroscan® unit enabled on-site assessment of liver fibrosis in people who inject drugs and participate in low- or high-threshold programs in order to improve linkage to care and treatment of hepatitis C in this vulnerable population.

The role of two-dimensional shear-wave elastography for the assessment of kidney allografts

Eva Vičič, Nika Kojc, Tomaž Hovelja, Miha Arnol, Damjana Ključevšek

Abstract

Objective

To assess the role of two-dimensional shear-wave elastography (2D-SWE) for the differentiation of kidney allografts with significant fibrosis and the effect of body mass index (BMI) on 2D-SWE results.

Methods

Sixty-four patients were enrolled in this prospective observational study. Biopsies were performed following 2D-SWE and blood examination. 2D-SWE was performed using a 5-14 MHz linear transducer for very superficially lying kidney allografts and a 3,5-5 MHz convex transducer for allografts lying more than 2 cm below skin surface.

Results

Due to a small number of patients examined with a linear transducer (n = 9), only the patients examined with a convex transducer (n = 53) were enrolled in further 2D-SWE analysis. Of these, 42 had biopsy proven clinically insignificant fibrotic changes and 11 had clinically significant fibrotic changes. 2D-SWE values did not differ between the two groups. However, patients with higher body mass index (BMI ⩾ 25 kg/m^2) had significantly lower cortical 2D-SWE values (16.78 kPa vs 19.22 kPa, respectively; p = 0.043).

Conclusions

2D-SWE could not differentiate between patients with clinically significant and clinically insignificant fibrotic changes. 2D-SWE values were significantly lower in patients with BMI ⩾ 25 kg/m^2.

Keywords: allograft fibrosis, two-dimensional shear-wave elastography, kidney transplantation

Ultrasound in emergency conditions in muskuloskeletal system

Prof.dr.sc. Gordana Ivanac

In last years ultrasound has become important modality to diagnose and follow-up diseases of musculoskeletal system, with increasing number of indications to use, including emergency conditions. Sensitivity and specificity for most diseases is comparable to MRI and since ultrasound is widely accessible and cheap it is excellent alternative to MRI. US enables demonstration of diverse patologies of MSK system, including joint effusion, popliteal and meniscal cysts, inflammations, hematomas, buristis, ruptures of muscles and tendons, changes of carpal canal, epycondilities and some bone lesions. Doppler can demonstrate vascularization which improves evaluation of tumors and evaluation of vascular structures that might mimic changes in MSK system.
Sonoelastography is sonographic method that enables assessment of tissue stiffness. It is used ni real-time. Lately elastography and contrast-enhanced US are used in MSK system. US guided instilation of medications in some MSK conditions causing pain is established. Advantage of US in MSK system is real-time examination during the movement of tissues, which is very helpful to evaluate ruptures of muscles and tendons.

Ultrasound of the rotator cuff

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Abstract:

Due to its feasibility and availability, ultrasound is an important tool in rotator cuff assessment. Not only anatomic relations ant tissue structure can be analyzed, but real-time dynamic tests of rotator cuff function can be performed. However, method is highly dependable on examiner's technique and experience. Thorough knowledge of ultrasound anatomy and use of standardized approach to shoulder examination are crucial for reliable radiological report. Step-by-step guide to ultrasound examination is given, including patient positioning and transducer placement for optimal visualization of rotator cuff tendons: long head of biceps, subscapularis, supraspinatus, infraspinatus and teres minor tendon. The guide is based on European Society for MusculoSkeletal Radiology guidelines, as well as our clinical experience.

Lumps and bumps: What to do next?

Ultrasound is commonly regarded as the imaging modality of choice in the assessment of palpable soft-tissue abnormalities. The goals of ultrasound imaging are to confirm the actual presence of a focal lesion, establish the precise features of the lesion (location, size, structure, etc.), identify the involvement of any critical adjacent structure, differentiate solid from cystic and malignant from benign lesions, rule out any mimicker, provide a definitive diagnosis if possible, plan and guide the cytology and/or histology sampling when needed and follow-up if needed.
In some cases, there are overlapping US features among the benign and malignant entities, requiring further imaging. Second-level options include magnetic resonance imaging, fine needle aspiration, biopsy, and surgical excision.

Soft tissue tumours – What surgeons expect of ultrasound?

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Soft tissue tumours are a heterogeneous group of neoplasms that may arise anywhere in the body and show similar clinical presentation. Plastic surgeons encounter patients with soft tissue tumors quite frequently. Diagnosis is mostly based on history, clinical presentation, radiological and histological features. Ultrasound is cheap and readily available radiological technique that is useful for initial evaluation. It allows differentiation of cystic versus solid tumors and assesment of their vascularity. It provides information on spatial relationship of soft tissue tumors to tissues and organs in their surrounding. It is optimal for guided biopsy.

Ultrasound-guided biopsy of soft-tissue tumors

Jeromel M, Kljaić Dujić M

Soft-tissue tumors are a rare group of heterogeneous lesions which are etiologically benign and malignant. Diagnosis is made with biopsy and is a cornerstone of treatment. Biopsies in interventional radiology are an alternative to the surgical approach.
One of the most used techniques is ultrasound-guided core needle biopsy. It enables a diagnosis and assessment of tumor viability which is a basis of treatment.
Authors will present a short review of the literature concerning the basic principles, usefulness and limitations of ultrasound-guided biopsy of soft-tissue tumors. Correlations with pathohistological diagnosis will be made. A practical approach in the scientific field will be provided together with our own experiences.

MRI-US fusion biopsy of the prostate – our initial experience

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General hospital Slovenj Gradec

Fusing MR images to the real-time US image has become the preferred method of targeted biopsy of suspicious areas in the prostate detected by multiparametric MRI. Studies show no significant difference in detection rates between MRI-US fusion biopsy and MRI in-bore biopsy.
In our institution the procedure was introduced in march 2019; since then 198 MRI-US fusion biopsies were performed. All biopsies were performed in outpatient setting, using transrectal approach. All patients recieved prophylactic antibiotic pre- and post-procedure. The indication for biopsy was decided on basis of findings on mpMR images and was performed mostly in patients with asessment categories PIRADS 4 and PIRADS 5. The biopsy was perfomed by the urologist; radiologist performed fusion of MR and US images and determined the target for biopsy. During biopsy 4 samples were obtained in the target area. In patients with first-time biopsy targeted biopsy was followed by systematic biopsy.
Prostate cancer was confirmed in 66 patients. In 61 patients cancer tissue was present in targeted biopsy samples, in 5 patients in samples obtained by the following systematic biopsy.
Patients with rectal bleeding or hematuria after the procedure were observed in the department of urology; none reqiured immediate specific treatment or hospitalisation.
With growing experience more cancers are diagnosed, also in patients with prior negative systematic biopsies, reflecting both more accurate mpMRI reporting and improving skill of the biopsy team. MRI-US fusion is now the preferred method for targeted prostate biopsy in our hospital.

Pancreatic cystic lesions and endoscopic ultrasound

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Due to improvements in imaging techniques, cystic lesions of the pancreas (PCL) are being identified more frequently, even in asymptomatic patients. These lesion could be of non-neoplastic to highly malignant nature, which significantly affects treatment of these patients.

Neoplastic cysts have malignant potential. Cancer can developmost typicaly from Intraductal papillary mucinous neoplasm, others are less frequent such as mucinous cysts,nonmucinous cysts,solid pseudopapillary tumors, serous cystic neoplasms and neuroendocrine tumors with cystic degeneration.

There is no risk of malignant transformation in non-neoplastic cysts. The best known is the pancreatic pseudocyst which is always in connection with acute or chronic pancreatitis.

Endoscopic ultrasound (EUS) and endoscopic ultrasound guided fine needle aspiration (EUS FNA) are established as diagnostic tools both in the differentiation and assessment of cysts. Especilly EUS FNA offers the possibility of obtaining cyst samples for cytological, biochemical, molecular and genetic analyses, to clarify the nature of the cyst and distinguish between benign and malignant lesions.

EUS enables us to determine the size of the cyst, its exact location and position in relation to sorrounding blood vessels and organs, and the presence of locoregional or distant metastases. We can also distinguish between micro- or macrocysts (>1cm) or a mixed type of cyst, eveluate the presence of wall-thickening or septum in the cyst, and the presence of echo-dense mucus or debris. There are some worrisome signs that raise suspision for malignant transformation of cysts, such as thickened walls or septa, associated solid masses or nodules. Also, the presence of local dilation of the main pancreatic duct to more than 10 mm, or the main pancreatic duct between 5 and 10 mm with a mural nodule, is associated with an increased risk for malignant transformation.

We recommend a multidisciplinary approach, with clinicians, surgeons, radiologists and oncologists involved, and all findings (clinical, imaging, biochemical, cytological, molecular findings) evaluated.

Endoscopic ultrasound - guided drainage of pancreatic fluid collections

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The development of pancreatic fluid collections (PFC) is a frequent local complication in acute pancreatitis. These collections are classified as early (acute peripancreatic fluid collection or acute necrotic collection) or late (walled-off necrosis or pseudocyst). Rare causes of PFC are a previous surgical procedure or trauma. Although the majority of PFC resolve spontaneously, some will require intervention. The indication for intervention is the presence of symptoms and/or complications such as abdominal pain, gastrointestinal and biliary obstruction, vascular compression or infection. Invasive interventional procedures include radiological, endoscopic and surgical approach. Endoscopic drainage of pancreatic fluid collections is now the preferred approach of drainage due to reduced morbidity as compared to surgical or percutaneous drainage. Currently, the treatment of choice is the step-up approach, in which the necrotic collections are primarily drained, and in case of no clinical improvement, there is a "step-up" towards necrosectomy. Guidelines recommend that EUS-guided access should be preferred over conventional transmural drainage for initial endoscopic transmural drainage. Either plastic stents or lumen-apposing metal stents (LAMS) can be used after cystogastrostomy, with no differences regarding treatment success, however LAMS enables direct endoscopic necrectomy and use of nasocystic catheters if needed. A necrotic collection is usually drained with a single transmural drainage, if larger than 12 cm or the drainage is not effective, several different routes should be considered. A simultaneous combination of endoscopic and percutaneous drainage is a possible form of treatment for large collections that extend into the pelvic or paracolic space. The most common complication is bleeding, perforation and pancreatic fistula formation are rare.

Neurosonology parameters in asymptomatic carotid disease treatment decisions

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Abstract

Using carotid artery ultrasound in patients with vascular risk factors generates a group of patients with subclinical or asymptomatic carotid stenosis (ACAS). As the risk of stroke is not the same in all, treatment decisions in this group of patients should include individual risk-benefit assessment. Besides clinical and imaging data the basic carotid ultrasound findings first are leading the further diagnostic steps in treatment decisions. Therefore, standard carotid ultrasound exam and report should include the critical morphology and hemodynamic data. Plaque morphology, the degree of stenosis, and post-stenotic blood flow velocity are related to higher stroke risk. Vulnerable, lipid-rich plaques and irregular plaque surface increase the stroke risk. The degree of stenosis should be measured, and the methodology used should also be noted in the report. The North American Symptomatic Carotid Endarterectomy Trial (NASCET) and the European Carotid Surgery Trial (ECST) methodology give different absolute measures of stenosis, this seems to be the most common cause of misinterpretation. The highest post-stenotic velocity should be accurately measured with appropriate angle correction.

Additional ultrasound criteria should be used in cases with low blood flow velocities like in heart failure patients, and specific anatomical findings, like tortuosity, kinking and large carotid bulb. The St. Mary ratio is useful as it compares the velocities in the common and internal carotid arteries. Contrast-enhanced ultrasound could also derive some more information on plaque vulnerability.

Including all the critical information in the standard carotid artery ultrasound report would lead to fewer repeated exams and additional diagnostic imaging in patients with ACAS.

Clinical vignette
High grade asymptomatic carotid stenosis – performed or not performed revascularization?

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Abstract

Asymptomatic carotid atherosclerotic disease (ACS) refers to the presence of atherosclerosis in individuals with no history of ipsilateral carotid territory ischemic stroke or transient ischemic attack within the preceding six months.
A 60-year-old female patient with arterial hypertension, after a history of angiographically negative perimesencephalic subarachnoid haemorrhage, was diagnosed with asymptomatic subtotal left ACI stenosis by carotid ultrasound, which was confirmed by carotid CTA. Consilius opted for a revascularisation procedure with CEA in the presence of calcified left ACI stenosis. After the procedure, the patient was hypertensive with headache. On the fourth day, hyperperfusion syndrome was recognised. Despite the intervention, a massive intracerebral haemorrhage occurred on the seventh day after CEA, which, despite neurosurgical intervention and intensive care, was the cause of severe disability and later fatal outcome.
It is important to determine the severity of ACS and identify individuals who may be candidates for revascularization. If revascularization is not performed, disease progression must be monitored. The most important decision is which strategy to use to identify patients with ACS who are at higher risk of stroke and therefore likely to benefit from carotid revascularization. Another important decision concerns the risk of hyperperfusion syndrome. This is a rare but very serious complication that has a high probability of causing intracerebral hemorrhage and even death, especially in cases of high-grade stenosis. The benefit of carotid revascularization in ACS is uncertain. RCT had found that CEA was beneficial in selected patients with ACS from 60 to 99 percent, but the absolute benefit was small and less convincing in women. Several studies have shown that intensive medical therapy reduced the risk of stroke in patients with ACS treated without carotid revascularization. Cerebral hyperperfusion syndrome is a rare sequela of carotid endarterectomy (CEA) that occurs in only a small percentage of patients after carotid revascularization (from ⩽ 1 to 3 percent). It is more likely to occur during revascularization of a high-grade carotid lesion.

The role of ultrasound of the neck and cerebral arteries in the diagnosis of vasculitis

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Classical confirmation of giant cell arteritis by temporal artery biopsy is currently losing its importance and the diagnosis is based on imaging studies, such as arterial ultrasound (US). US helps and even allows to establish the diagnosis of other large vessel vasculitides based on the pathognomonic circumferential thickening of the vessel wall and potential stenoses/occlusions. Unfortunately, US diagnostics is limited by the size of the vessel which makes it useful only in large vessel vasculitis no matter if it is primary (giant cell arteritis, Takayashu arteritis) or secondary (ankylosing spondylitis, infection).

The neck and cerebral arteries are often involved in large cell vasculitides. US enables to diagnose even subtle changes of the vessel wall as well lumen and flow as opposed to CT, MR or classical angiography which focus only on the lumen of the vessel. Specifics of US diagnostics of neck and cerebral arteries need to be considered. Differentiation between atherosclerotic and vasculitic changes can be challenging therefore US should be performed by a skilled ultrasonographer. US helps to establish the diagnosis of large vessel vasculitis and evaluate the extent of affected vessels. Importantly, treatment with corticosteroids changes the morphology of the arteries within a few days. US enables monitoring of the treatment success and weaning off the corticosteroid treatment.

In conclusion, US of the neck and cerebral arteries enables to establish the diagnosis and extent of the large vessel vasculitis. Importantly, it also helps to monitor the treatment success.

Neurosonologic features of fibromuscular dysplasia

Arijana Lovrencic-Huzjan, University Department of Neurology, Sestre milosrdnice University Hospital Center

Fibromuscular dysplasia (FMD) is an underdiagnosed and neglected vascular disease.
FMD is characterized by succession of stenoses and aneurysms of medium sized muscular arteries. The clinical presentation are atypical like headache, dizziness, pulsatile tinnitus or hypertension. Most patients are younger females with absence of some traditional risk factors like hyperlipidemia and obesity. FMD has severe consequences depending on the arterial territory affected, like stroke from craniocervial artery dissection (CAD) or aneurysm rupture.
There are no standardized protocol to seek for FMD in CAD patients. It is challanging to diagnose cervical/intracranial FMD, since acute or chronic structural lesions secondary to CAD can make diagnosis and classification of FMD difficult. FMD mimics atherosclerosis, arteritis, external compression, carotid hypoplasia and chronic lesions secondary to dissection. Unique forms of FMD exist that do not fit the classical criteria. Current large series of CAD patients derive from neurology departments with less expertise in FMD.
Ultrasound can show diversity of findings like tortuosity as kinks, coils, S curve, thickened intima-media, focal stenosis or aneurysm. Classical sign of string of beads are rare. Carotid web is an unusual form. Single patient can exhibit diverse findings, and since they are nonspecific, they can mimic other disease.

Ultrasound assessment of tumor infiltration of the carotid arteries in patients with malignant tumors of the head

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Introdaction:

Tumor invasion of arteries occurs by spread from the primary tumor or by extracapsular spread from a metastatic lymph node. Invasion from the lymph node is rare. Carotid artery infiltration correlates with worse prognosis. According to the American Joint Committee on Cancer criteria, patients with an infiltrated carotid artery are inoperable, but selective resection can be considered and the assessment of invasion is valuable for the treatment decision.
Radiological assessment of tumor invasion of arteries by computed tomography and magnetic resonance is demanding and insufficiently reliable. Invasion is suggested when tumor surrounds more than 180° of the circumference of the artery, when fatty tissue between the artery and metastatic lymph node is reduced or when the artery is compressed. Ultrasound monitoring of wall motion in assessing arterial invasion has not been investigated so far.

Aim:

1) to determine the mobility of the infiltrated part of the artery next to metastatic lymph node using ultrasound
Materials and methods: 22 carotid arteries from patients with a known malignant head tumor were included in the study. They underwent a CT scan which described the invasion of the arteries along to the cytologically verified metastatic lymph node. Afterwards, the mobility of the artery was monitored by ultrasound.
Results: The infiltrated part of the artery wall described by CT has a reduced movement compared to the non-infiltrated part. Comparison of CT and US findings regarding arterial wall invasion showed a strong correlation.
Conclusion: On ultrasound, the tumor infiltrated artery has reduced or absent movement.

Ultrasound in acute abdominal pain

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Abstract

Acute abdominal pain is a common complaint in the emergency setting. Abdominal pain may have surgical or medical background, it may range from self-limiting conditions to life-threatening diseases with high mortality. Most common urgent conditions causing acute abdominal pain in adults are acute cholecystitis, acute appendicitis, acute diverticulitis, visceral perforation and bowel obstruction and in women urgent gynecological causes like extra-uterine pregnancy. Ultrasound of the abdomen is a noninvasive, accessible and relatively cheap diagnostic tool that does not require the injection of a contrast medium nor radiation. It can be performed quickly as a bedside examination tool, is easily repeated and offers real-time dynamic imaging of peristalsis and blood flow. Ultrasound can help in early identification and management of the causes of acute abdominal pain in emergency department as well as on hospital wards, but one important limitation is examinators experience which can greatly influence sensitivity, yield and impact consequent clinical decisions.
Key words: ultrasound, acute abdominal pain

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The role of ultrasound in bowel imaging

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Bowel ultrasound (BUS) is traditionally the first imaging method for diagnosing acute intestinal conditions like appendicitis and diverticulitis. Nowadays, according to recently published guidelines, BUS is a non-invasive and radiation-free method for screening and monitoring inflammatory bowel disease (IBD) activity. The most parts of the bowel can be visualized with low-frequency and high-frequency probes but sometimes gas-filled loops, adiposity and anatomic variations in postoperative setting can be obstruction for adequate visualization. The main part of BUS procedure includes assessment of the bowel wall parameters: bowel wall thickness, symmetry of thickness, bowel wall stratification, the presence/absence of focal or extensive disruptions and vascularity assessed by color Doppler signal and graded by Limberg scale. Colonic haustration can be scored as absent or present. Extramural assessment includes the analysis of the mesenteric inflammatory fat surrounding the gut and evaluation of mesenteric lymphadenopathy. The most frequent IBD complications which could be visualized are strictures, dilatations of a proximal loop above a stenotic segment, fistulas and abscesses. Also, as a real-time procedure, BUS is a method of choice for evaluation not only morphological appearance but also function and motility of the gastrointestinal tract. According that small bowel peristalsis should be scored as present, absent, reduced or increased. Conclusion: Bowel ultrasound is a promising tool for easy, fast and not expensive diagnostics and monitoring IBD, very useful in differential diagnostics of other intestinal conditions. Bowel ultrasound with oral contrast can improve visualization of the proximal small bowel loops.

Ultrasound-guided peripheral nerve bloks in acute pain management

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Pain is defined as unpleasant sensory and emotional experience associated with an immediate or threatening tissue injury. It is a natural and the earliest sign of morbidity and represents the most present experience of the disease. Pain stimulus can be interrupted on the place of injury, peripheral nerve fiber, dorsal horn of the spinal cord or cerebral cortex. The use of central analgesics in continuous parenteral infusion were associated with nausea, vomiting and longer hospital stay. Also, pain control is not usually adequate. Implementation of the ultrasound replaces the previous » blind tehnique« which depends largely on the skill of the physician who performs it. Today's gold standard is ultrasound-guided regional tecnique with use of peripheral nerve stimulator. Peripheral nerve blockade using ultrasound became a superior method in all kinds of surgeries. In the last year, ultrasound- guided peripheral nerve blokade became popular in emergency medicine. Because of keeping life threatening patients in the so-called safe zone, they are often treated with suboptimal pain control. Peripheral nerve block is associated with better pain control, reduced opiate use and consequently reduced morbidity and mortality. It offers effective and safe alternative to central analgesia. The most important goal of rapid and effective acute pain control is prevention of chronic pain.

Use of imaging in large vessel vasculitis

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ABSTRACT

Large vessel vasculitis (LVV) is the most common form of primary vasculitis comprising giant cell arteritis (GCA) and Takayasu arteritis (TA). Temporal arteritis (giant cell arteritis) is an inflammatory vasculopathy that can affect medium and large sized arteries mostly branches of the carotid arteries. It mostly involves superficial temporal branch, but other arteries may be affected as well. Granulomatous inflammation consists of mononuclear cell infiltrates and formation of giant cell within the vessel wall. Hallo sign and non-squeezable artery are typical ultrasound signs in patients with temporal arteritis.

Rapid diagnosis and effective treatment are required in LVV in order to treat symptoms to reduce the risk of complications such as blindness in GCA and aortic aneurism or vascular stenosis in GCA and TA. A suspected diagnosis of LVV should be confirmed by imaging (ultrasound (US) or MRI for temporal or other cranial arteries, US, CT, PET-CT or MRI for the aorta/extracranial arteries) or histology (temporal artery biopsy). Ultrasound -guided fast-track approach has led to a reduction of irreversible vision loss. Importance of imaging modalities (including ultrasound) has increased. Use of ultrasound in the diagnosis of GCA at the Department of rheumatology of University Medical Centre Maribor in 10 years' time span will be presented.

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Sjögren's disease and salivary gland ultrasonography

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Sjögren's disease (pSS) is slowly progressive autoimmune disease, characterized by involvement of lachrymal and salivary glands (SG). The diagnosis of pSS is clinical, and imaging can assist in the diagnostic work-up. Among imaging techniques ultrasonography (US) of SG seems the most applicable. Typical US abnormalities are inhomogeneity with hypoechoic areas, hyperechoic bands, and poorly defined SG borders. The presence of hypoechoic areas is the most important feature. As several different scoring systems to graduate morphological changes were used in the past, experts under the umbrella of the OMERACT Sjögren ultrasound subgroup reached a consensus on elementary lesions and proposed a 4-grade semiquantitative scoring system. The addition of SG US can improve the performance of pSS classification criteria. Furthermore, findings support the premise, that SG US may be powerful tool for pSS stratification. Associations between US scores and glandular dysfunction, disease activity, antibody positivity, damage as well as various risk factors for lymphoma have all been reported. Lately, the possibility of using Doppler US to non-invasively evaluate SG inflammatory activity was studied. OMERACT US working group standardized the investigation and developed a scoring system to evaluate SG vascularization. As recently shown a higher Doppler US score may predict the progression of pSS morphological features. Furthermore, the combined use of greyscale and Doppler scoring systems could permit an adequate distinction between activity and damage, further improving the management of pSS patients. Ongoing research on automated assessment using computer-based algorithm analysis will ease the usage of US in practice in future.

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Management guidelines for thyroid nodules and differentiated thyroid cancer

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Ultrasonography (US) is the best method for the evaluation of thyroid nodules. However, it is not possible to differentiate malignant from benign nodules. There are certain sonographic features suggestive of malignancy. These include marked hypoechogenicity, microcalcifications, irregular shape, presence of irregular margins, invasion into surrounding structures and the presence of metastases in the neck lymph nodes.

The size of a nodule is not indicative of malignancy. With some exceptions, only nodules >1cm in size should be evaluated since they have a greater potential to be clinically significant. Fine needle aspiration (FNA) biopsy under US guidance is the procedure of choice for the detection of malignancy. European Thyroid Association (ETA) set up European guidelines on US risk stratification of thyroid nodules called EU-TIRADS, to select those patients who should have a fine needle aspiration (FNA) biopsy performed, define benign and low-, intermediate-, and high-risk nodules, with the estimated risks of malignancy in each category and indications for FNA biopsy. The EU-TIRADS aims to standardize reporting guidelines and enhance the interobserver reproducibility.

The incidence of thyroid cancer has significantly increased in the last few decades all over the world. According to latest available date for Croatia in 2019, the age-standardized incidence rates were 27.98/100.000 for women and 7.97/100.000 in men, which is the fourth highest incidence of thyroid cancer in Europe. The increased incidence is mostly a result of intense imaging and aggressive use of fine-needle aspiration biopsy. Most of the detected thyroid neoplasms were papillary microcarcinomas.

Is the identification and eradication of papillary microcarcinomas a worthwhile goal? The current approach is costly and exposes patients to the risk of surgical complications and morbidity associated with hypothyroidism. Evidence continues to emerge that many patients with papillary microcarcinomas may be over-diagnosed, and updated management guidelines recommend a more conservative management appraoch for these patients.

FNAB of the thyroid nodules in correlation to the EU-TIRADS US Classification

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Introduction: Thyroid nodules are common and usually benign, the risk of malignancy varying from 5 to 10%. Steps to diagnose malignancy should include a careful clinical evaluation, laboratory tests, a thyroid US exam, and a fine-needle aspiration (FNA) biopsy. **EU-TIRADS** is a classification system designed by the European Thyroid Association, for ultrasound assessment of thyroid nodules and stratification of requirement for FNAB. FNAB has high sensitivity and specificity in distinguishing benign from malignant thyroid lesions

The aim of our study was to determine whether the EU-TIRADS US classification correlates with cytological findings obtained after FNAB of the thyroid nodules.

Results: 53 patients with thyroid nodules were referred for FNAB.

The nodules were classified according the EU-TIRADS classification as: EU-TIRADS 2 - 13(24%), EU-TIRADS 3 - 7(13%), EU-TIRADS 4 - 15(29%), EU-TIRADS 5 - 18(34%)

Benign cytology was found in 46(87%) of the biopsied nodules, and malignant cytology was found in 7(13%) of the biopsied nodules.

The nodules that were cytologically classified as benign nodules, previously were referred to FNAB as: EU-TIRADS 2 – 13(28%), EU-TIRADS 3 – 7(15%), EU-TIRADS 4 – 13(28%), EU-TIRADS 5 – 13(28%)

The nodules that were cytologically classified as malignant nodules, previously were referred to FNAB as: EU-TIRADS 2 – 0, EU-TIRADS 3 – 0, EU-TIRADS 4 – 2(28%), EU-TIRADS 5 – 5(72%)

Conclusion: Almost equal number of biopsied nodules, that were cytologically classified as benign, were previously referred to FNAB as EU-TIRADS 2, 4 and 5

The malignant nodules were previously referred as high classified EU-TIRADS 5 (most of them) and EU-TIRADS 4 (none of them was classified as EU-TIRADS 2 or 3)

EU-TIRADS US classification is very useful tool in our everyday US practice for prediction of the malignant nodules.

Key words: EU-TIRADS, US stratification of the thyroid nodules, FNAB

Management of subacute thyroiditis in patients after Sars-Cov-2 infection and vaccine for Sars-Cov-2

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Introduction

Subacute thyroiditis (SAT) is a thyroid disease of viral, post-viral origin or it may be complication after vaccinations. Corona virus and vaccine for covid-19 can cause thyroid dysfunction.

Objectives

Presentation of cases with SAT after Sars-Cov-2 infection and vaccine for Sars-Cov-2.

Materials and methods

We present series of two cases of SAT after receiving vaccine for covid -19 (Sputnik V and Astra Zeneca) one case of SAT after infection with Sars-Cov-2, one case as an idiopathic presentation and one additional case which is overlapped in post partum period within 40 days after kovid-19 infection. All five cases are women.
In SAT after receiving vaccine, clinical presentation revealed ten or eleven days after receiving the first dose while in patients after infection, clinical presentation reviled after 15-30 days. Only one patient had positive test for covid-19. In all cases laboratory tests were performed with standard elevation of SE, thyreoglobulin, FT4, FT3, decreased TSH and negative antibodies. Ultrasound investigation revealed enlarged gland with heterogeneous echo texture. 2SW elastography was performed in three cases with elevated elasticity value of more than 100 k Pa (max.170 k Pa) in the acute faze. All patients were treated with NSAID in high doses and propranolol. In two cases corticosteroids were given in median doses of 20 mg within 2-3 weeks. In one patient with idiopathic presentation thiamazole was given due to the repeated clinical presentation of thyreotoxicosis.

Conclusion

Our cases didn't deffer from those published in the literature. The greatest challenge was distinguishing symptoms of SAT from those of upper respiratory infection. 2SWE as imaging modality was of great value, following SAT through elasticity value. Together, thyreoglobulin, SE and 2SWE were successfully following clinical presentation and resolution of the inflammation. All patients healed with no consequences of the thyroid function.

Key words: subacute thyroiditis (SAT), elastography in subacute thyroiditis, Sars-Cov-2.

Neck ultrasound in the hands (and eyes) of an otorhinolaryngologist

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Ultrasonography (US) of the neck is extremely important and useful examination in management of Head and Neck (H&N) pathology. In the hands of attending otorhinolaryngologist it presents an in vivo diagnostic tool which can be used as a POCUS in emergency clinic, as a complete diagnostic procedure in the diagnostic of the H&N pathology, or even as a part of therapeutic procedures in management of specific therapeutic challenges (i.e., management of deep neck abscesses and/or purulent lymph nodes with US guided needle aspiration).

In the hands of a skilled ENT clinician US represents 4th dimension in initial assessment of H&N pathology (history, inspection, palpation, US) and can therefore importantly reduce the Time to diagnosis (TTD). In the neck region most of the pathology palpable by hand, therefore the conjunction of both US and palpation gives the attending otorhinolaryngologist more precise information about underlaying pathology. However, as both methods are "operator dependent", it is extremely important that attending otorhinolaryngologist possesses a wide clinical knowledge end experience in ENT and H&N area, as well as strong skill set in operating and interpreting US.

Majority of the patients initially presents with "lump" in the neck. US helps to distinguish between the organ/area affected (lymph nodes, salivary glands, thyroid gland, vascular and neural pathology) and helps in accessing malignant or benign nature of pathology especially in conjunction with US guided (fine) needle biopsy.

Imaging after inguinal hernioplasty

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Abstract

Strong recommendations exist in favor of open Lichtenstein repair - „gold standard“. Competition is continuing between open and laparoscopic mesh repairs (cca 15 % laparoscopic UKC Maribor). Use of mesh in emergency repair of complicated hernias is under debate - prosthetic repair creates a risk for surgical site infection in cases where a gangrenous intestine. Newer lighter polypropylene meshes are most frequently used. There are available in most institutions, non-absorbable, and strong enough to avoid recurrence. Hernia mesh complications include: moderate to severe pain (dicomfort, swelling) 1-5%, seroma 2%, foreign body sensation, infection (chronic, redness) 3%. In rare cases bowel obstruction, rejection and migration, erectile dysfunction, hydrocele. Ultrasound shows echogenic structure with mild acoustic shadowing and the shape is either wavy or straight linear depending on the method and time elapsed from surgery. Significantly different changes depending on the method of mesh fixation and time of postoperative period. Mesh cannot be visualized with X-ray due to its nonradiopaque material, but sometimes it is visible on CT due to their high attenuation value. Seroma, fistula, bowel obstruction, mesh retraction, granuloma and recurrent hernia are able to evaluate with CT. “Meshoma” is colloquial term for mesh retraction (folded mesh, surrounded by fibrous reaction). Ultrasound-guided injections can help in neuropatic postoperative pain. During open hernia repair, the ilioinguinal, iliohypogastric, and the genitofemoral nerves are most commonly injured while the lateral femorocutaneous nerve is more commonly injured during laparoscopic herniorraphy.

Pelvic entrapment neuropathies and ultrasound-guided injections

Ž. Snoj, V. Salapura

Entrapment neuropathies in the pelvic region represent a wide group of chronic pain syndromes that importantly reduce the quality of life. Nerve entrapments occur at specific anatomic locations. Several causes induce pelvic entrapment neuropathies, such as inflammation with scarring of surrounding tissues or intrinsic nerve abnormality, and surgical interventions in the pelvic region. Entrapment neuropathies in the pelvic region are not widely recognized, and are still underdiagnosed due to diverse differential diagnoses with overlapping symptoms. It is important to correctly diagnose entrapment neuropathies, as they can be successfully treated. The lateral femoral cutaneous nerve, genitofemoral nerve, ischiadic nerve, ilioinguinal nerve, obturator nerve and pudendal nerve are the nerves most frequently affected in the pelvic region. Understanding the anatomy as well as nerve motor and sensory functions is essential in recognizing and locating nerve entrapment. The cornerstone in the diagnostic work-up is detailed physical examination. Imaging modalities play an important role in the diagnostic process. Key modality in the diagnostic work-up is of pelvic entraptment neuropathies is ultrasound. Its use has become increasingly widespread in therapeutic procedures.

Ultrasound evaluation of the most common groin pathology: approach and examples

Vid Matišić, M.D.

Most commonly experienced by (but not reserved for) professional athletes, groin pain or more commonly named athletic pubalgia is a condition that can be caused by various etiologies and has a broad spectrum of differential diagnosis. The groin presents a diagnostic challenge as it is an anatomically complicated region. Therefore, in addition to a clinical exam, imaging methods have a role in detecting the underlying cause of pain. Magnetic resonance imaging is usually the method of choice for evaluation of groin related pathology but is not always immediately available.

Ultrasound can be very useful in sports medicine for a quick evaluation of common sites and conditions that can cause groin pain. A structured approach to ultrasound evaluation is best used to evaluate and image the most common underlying causes of groin pain and should always include the hip, the extensor muscles, the adductor muscles, and the pubic symphysis, as suggested by leading professional guidelines. Additionally, the inguinal region is also available for evaluation of hernias as a possible cause of groin pain.

Another definitive benefit of ultrasound evaluation is the ability to perform ultrasound-guided injection or other treatment in order to alleviate the symptoms.

US guided treatment of pelvic tendinopathy with autologous platelet rich plasma infiltration - our experience

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ABSTRACT

Key words: platelet-rich plasma, PRP, proximal hamstring tendinosis, sport pubalgia, minimally invasive therapy

BACKGROUND

Platelet rich plasma (PRP) is an autologous blood product harvested from patient's own blood which contains high platelet concentration and therefore high growth factor concentration which induce tendon healing. Athletic pubalgia or ¨sport herniä is a clinical syndrome of chronic groin pain due to musculotendinous or osseous injury that involves the insertion of abdominal muscles on the pubis or upper aponeurotic insertion of the adductor muscles. Proximal hamstring tendinosis is a consequence of multiple overuse injuries at its attachment to ischial tuberosities. With ultrasound examination we usually find thickened tendon with heterogenous echo structure and possible calcification with or without hyperaemia

METHODS

Indication for PRP treatment is a proven tendinopathy with or without small partial rupture.
All PRP infiltration procedures are done under ultrasound guidance in standardised protocol.
After treatment with PRP slight discomfort due to the procedure for 2-3 days is expected which resolves with analgetic therapy. Pain relief and improvement is expected 3-4 weeks after treatment due to slow regeneration of tenocytes in tendons.

RESULTS

Two patients were treated at our institution with above mentioned pathology. Male patient, a 35-years-old professional sportsman had a sport hernia and experienced a significant improvement after PRP application. Female patient, a 40-years-old occasionally active had a proximal hamstring tendinosis and also experienced a significant improvement after PRP application. Both patients had post treatment pain in the treated area, which was expected and was resolved with analgetic therapy.

CONCLUSION

PRP treatment is an alternative therapeutic option for symptomatic proximal hamstring tendinopathy and adductor muscles tendinopathy.

CEUS of nodular splenic extramedullary hematopoiesis in a patient with essential thrombocythemia

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Introduction

Extra-medullary haematopoiesis (EMH) is a physiological compensatory response due to insufficient bone marrow function seen in myeloproliferative diseases such as essential thrombocythemia (ET). Intra-abdominal EMH frequently occurs in the liver and spleen and classically presents as hepatosplenomegaly. Nodular EMH is rarely found in the spleen.

Case report

A 55-year-old woman with a past history of essential thrombocythemia converted to myelofibrosis (MF) presented with left-upper quadrant abdominal pain since 10 days. Abdominal ultrasound identified splenomegaly, length upwards of 17 cm, with solitary heterogeneous hyperechoic round, well-delineated splenic mass in the inferior splenic region, measuring 5,8x5,6x6,2 cm (APxLLxCC). Colour doppler imaging (CDI) showed marginal and internal vascularization of the splenic formation. Contrast-enhanced ultrasound (CEUS) by using sulfur hexafluoride microbubbles manifested peripheral ehancement pattern with gradual centripetal filling during the arterial phase, followed by washout in the venous phase. Further evaluation included contrast-enhanced computed tomography (CECT) and magnetic resonance imaging (MRI). Since the imaging features of a splenic lesion were undetermined, an ultrasound-guided fine needle aspiration cytology (FNAC) was performed. It suggested rare morphologic variant of the splenic nodular EMH in the context of an underlying MF.

Conclusion

EMH can present as a focal mass in the spleen and should be listed as one of the differential diagnoses of focal splenic tumors, especially in patients with hematological disorders. To date only two cases about nodular splenic EMH investigated by CEUS are reported so further case reports are warranted to determine the value of CEUS for the diagnosis of EMH of the spleen.

Quantitative contrast-enhanced ultrasound for the differentiation of kidney allografts with significant histopathological injury

Eva Vičič, Nika Kojc, Tomaž Hovelja, Miha Arnol, Damjana Ključevšek

Abstract

Objective

To identify specific quantitative contrast-enhanced ultrasound (CEUS) parameters that could distinguish kidney transplants with significant histopathological injury.

Methods

Sixty-four patients were enrolled in this prospective observational study. Biopsies were performed following CEUS and blood examination.

Results

28 biopsy specimens had minimal changes (MC group), while 36 had significant injury (SI group). Of these, 12 had rejection (RI group) and 24 non-rejection injury (NRI group). In RI and NRI groups, temporal difference in time to peak (TTP) between medulla and cortex (TTPm-c) was significantly shorter compared to the MC group (5.77, 5.92, and 7.94 s, p=0.048 and 0.026, respectively). Additionally, RI group had significantly shorter medullary TTP compared to the MC group (27.75 vs. 32.26 s; p=0.03). In a subset of 41 patients with protocol biopsy at 1-year post-transplant, TTPm-c was significantly shorter in the SI compared to the MC group (5.67 vs. 7.67 s; p=0.024). Area under receiver operating characteristic curves (AUROCs) for TTPm-c was 0.69 in all patients and 0.71 in patients with protocol biopsy.

Conclusions

RI and NRI groups had shorter TTPm-c compared to the MC group. AUROCs for both patient groups were good, making TTPm-c a promising CEUS parameter for distinguishing patients with significant histopathological injury.

Key words: allograft injury, contrast-enhanced ultrasound, kidney transplantation, time-intensity curve

Pitfalls in the diagnosis of the DVT and SVT

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Introduction

CUS is the first-line tool used for diagnosis of DVT and PVT, but there can be many pitfalls, that even an experienced examiner can face with.

The pitfalls can be associated with: the technique of the CUS performance; anatomical anomalies of the venous system; other pathological changes that can be misunderstood as DVT or SVT; compression effect of some tumor masses; carcinoma associated thrombosis; conditions that lead to increased D-dimers without DVT or SVT

Pitfalls associated with the technique of the CUS performance can be in: obese patients; lymphedema; CHD; CKD; cirrhosis. These pitfalls often appear when the CUS I performed on the middle and distal part of the femoral vein, as well as middle and distal parts of the peroneal and tibial veins. Usually this conditions need full DUS evaluation.

Pitfalls associated with the anatomical anomalies of the venous system: the most common anatomical variations are the duplicates of the femoral and popliteal vein, less often the duplicates of the tibial and peroneal veins;

Pitfalls associated with other pathological changes that can be misunderstood as DVT or SVT: most common – Becker's cyst misunderstood as popliteal vein; less often - aneurism of the popliteal vein

Pitfalls associated with compression effect of some tumor masses: most common TU masses in the inguinal region or in the small pelvis; In the cases of malignant tumors, full DUS should be performed, because of the possibility of carcinoma associated thrombosis.

Pitfalls associated with conditions that lead to increased D-dimers without DVT or SVT: cellulitis, phlegmon, erysipelas; surgery; Becker's cyst rupture; hematomas

For each of the groups of pitfalls we have cases, from our everyday practice, to present.

Testicular torsion in an adolescent - case report

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Introduction

Testicular torsion is, together with acute epididymitis or epididymo-orchitis, and torsion of the testicular appendages, one of the most common differential diagnoses of the acute scrotum. Out of the three, testicular torsion is potentially the most serious because it may lead to the loss of the testicle. While testicular torsion has two peak incidences - the small one in the neonatal period and the bigger one in adolescence - it can occur at any age.
The most common cause of testicular torsion in adolescents is the abnormality called the "Bell-Clapper deformity" and the most common symptom is testicular pain.
Although diagnosis can be made clinically, when in doubt, ultrasound is the modality of choice for a conclusive diagnosis.
The blood flow in the testicle on color Doppler is absent in complete torsion, but can be preserved in incomplete. The appearance of the spermatic cord called "the whirlpool sign" is the most specific and sensitive sonographic sign, in both complete and incomplete torsion.

Clinical case

In our clinical case, ultrasound was performed on a 17-year-old boy with a week-long scrotal pain. His pediatrician had diagnosed epididymo-orchitis and prescribed antibiotics; the diagnosis was based on the presence of pain and the slightly elevated C-reactive protein. In days following the initial diagnosis, the right scrotum got swollen and tender, the pain persisted.
During the ultrasound examination the right testicle was elevated, enlarged, and hetero-echogenic. The color Doppler imaging showed the absence of blood flow in the testicle. A spermatic cord was edematous and twisted, "the whirlpool sign" was visualized.
The patient was diagnosed with testicular torsion. The diagnosis was later surgically confirmed and the right-sided orchiectomy was performed.

Conclusion

Testicular torsion must be included in every differential diagnosis of acute scrotal pain, especially when the patient is adolescent. It can result in the loss of testicle if not diagnosed and treated in time. Since the differentiation between testicular torsion and epididymo-orchitis based on the clinical presentation only can be difficult, ultrasound plays a crucial role in the confirmation of the diagnosis.

Case report of the breast pseudoaneurysm after vacuum-assisted stereotactic breast biopsy

Ana Bojko Jagnjić, Filip Vujević, Luka Pfeifer, Anamarija Božić, Martina Suton Glavinić, Vid Matišić, Eugen Divjak, Boris Brkljačić, Gordana Ivanac

Introduction

Stereotactic breast biopsy is a percutaneous sampling of breast tissue using mammographic guidance for targeting when the target of interest is best seen on mammography. Here we present the case of a right lateral thoracic artery pseudoaneurysm (PSAN), an extremely rare and potentially fatal complication, associated with a vacuum-assisted stereotactic breast biopsy.

Case report

A 53-year-old woman without any significant medical history underwent vacuum-assisted breast biopsy of the area with suspicious microcalcifications in the right breast. Post procedural the patient developed excessive bleeding at the biopsy site. Steady pressure with a gauze pad was applied. Later that day, the patient noticed bleeding at the incision site and swelling of the breast tissue. The breast ultrasound scan showed 4 cm wide heterogeneous soft tissue haematoma with central hypo-/anechoic areas. Color Doppler with spectral analysis showed swirling high-velocity blood flow at the centre of the lesion with a typical to-and-fro pattern suggestive of a PSAN. Contrast Enhanced Ultrasound (CEUS) scanning showed contained extravasation of the microbubbles through the vascular injury. Based on insignificant medical history and while consulting a plastic surgeon we decided to take a conservative approach in treatment using continuous external compression and frequent ultrasound control in the next few days.

Conclusion

Although PSANs are extremely rare complications of interventional breast procedures, only by thorough physical examination accompanied by diagnostic imaging, clinical suspicion of the PSANs can be confirmed. This report shows that CEUS is complementary method in diagnosing PSANs by which we can avoid additional costs and unnecessary radiation exposure.

Case Report of the gastric intramural hematoma

Anamarija Božić, Ana Bojko Jagnjić, Luka Pfeifer, Filip Vujević, Vid Matišić, Eugen Divjak, Boris Brkljačić, Gordana Ivanac

Introduction

Intramural gastric hematoma (GIH) is very rare entity and usually associated with peptic ulcer, coagulopathy, trauma, complications of endoscopy, pancreatitis, amyloid-associated microaneurysms and spontaneous. They are more common in male patients. Usually, GIH are asymptomatic and rarely cause any symptoms such as epigastric pain, nausea and hematemesis.

Case report

A 23-year-old male patient was referred to our department due to 2-week history of epigastric pain following vomiting and a palpable abdominal mass. Ultrasound (US) examination of the abdomen showed oval, well circumscribed, expansile, heterogenous, mostly hypoechoic lesion that measured 15x10 cm. Lesion was located in the epigastric and left hypochondrium region and suppressed the stomach, transverse colon and the left kidney. Color Doppler manifested no internal vascularity of the lesion. No free intraabdominal fluid was detected. Multislice computed tomography (MSCT) was performed to further investigate the lesion, its location and relation to surrounding structures, detection of active hemorrhage or visceral artery aneurysms. No active hemorrhage was detected. Patient was treated conservatively. Follow-up ultrasound was performed after 2 weeks that showed decrease in size of the hematoma.

Conclusion

Intramural lesions within gastrointestinal tract can sometimes cause a diagnostic and therapeutic problem. Although its poor specificity to determine gastric masses, transabdominal ultrasound is a good follow-up imaging modality due to its cost-effectiveness, accessibility and no ionizing radiation.

Endoscopic ultrasound - guided drainage of an intraabdominal abscess - a case report followed by short review of literature

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57- years old female was admitted to the emergency department due to abdominal pain in the left lower abdominal quadrant. Laboratory tests showed high level of CRP (353). CT scan revealed 8x8x5 cm well-encapsulated abscess of sigmoid colon, surrounded by numerous diverticula. Three days after admission we performed a transrectal endoscopic ultrasound (EUS), which showed a fluid collection lying in direct contact with the sigmoid colon. Transluminal drainage was performed, and a self-expanding metal stent (LAMS) was inserted into the collection. A follow-up CT scan showed regression of the collection. We performed transrectal EUS again, the collection was no longer visible, the splint was removed.

Intra-abdominal abscess occurs after inflammatory urogenital and gastrointestinal conditions or as a complication of a previous surgical procedure. Adequate drainage of an intra-abdominal abscess is crucial for a favorable treatment outcome. Abscesses deep in the pelvis often present a clinical challenge, as they are surrounded by adjacent organs that impede safe access to percutaneous drainage. Good experiences with LAMS, obtained in the treatment of peripancreatic collections, open up new possibilities for the treatment of other liquid collections as well. EUS guided transluminal drainage is a safer procedure than surgical or percutaneous drainage as it is associated with a minimal risk of injury of vessels and leakage at the puncture site. The method is suitable for the drainage of intra-abdominal abscesses, regardless of the etiology of their formation, which are larger than 4 cm, have a well-formed capsule and lie in close contact with the intestinal wall of the left colon.

Gallstone ileus - case report and the role of ultrasound

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Small and large bowel obstruction are pathologies with many causes. They might be caused by an impacted gallstone, which leaves the gallbladder and enters the bowel through a cholecystoenteric fistula. The condition is known as gallstone ileus. Although this mechanism of bowel obstruction is rare in the general population, it becomes more frequent in the elderly and it has to be on our list of differential diagnoses.

The condition was classically diagnosed on abdominal x-ray, where it is associated with a famous radiological triad termed the Rigler triad.

The triad consists of plain x-ray findings of aerobilia, bowel obstruction and an ectopic gallstone. These sets of signs, while being highly specific, have low sensitivity.

Computed tomography (CT) is the modality of choice in diagnosing the cause of bowel obstruction, including gallstone ileus. It enables better visualization of the components of the Rigler triad as well as associated complications. Not infrequently however, the gallstones might not be seen even on computer tomography.

Ultrasound can adequately demonstrate the signs of bowel obstruction. It is also the modality with the highest sensitivity for confirming stones in the gallbladder, making it an interesting method in the workup of gallstone ileus.

In our work, we report a case of gallstone ileus in an elderly woman, where the diagnosis was established on abdominal ultrasound, demonstrating all the components of the Rigler triad. The findings were nearly identical as those reported on the subsequent CT scan and the diagnosis was later surgically confirmed.

B-mode ultrasound in combination with shear-wave elastography (SWE) for assessment of supraspinatus tendon reconstruction in the postoperative period

Vid Matišić[1], Gordana Ivanac[2,3], Eugen Divjak[2], Luka Pfeifer[2], Ana Bojko[2], Borut Dobričić[4], Marko Bagić[4], Boris Brkljačić[2,3]

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Rotator cuff pathology is a common health problem, among which, in terms of incidence, impact on quality of life and approach to treatment, conservative or surgical, rotator cuff tendon ruptures occupy a special place. In the postoperative period, significant pathophysiological processes take place in the affected tendons, the result of which can be the successful rehabilitation of the patient or the absence of the expected positive outcome of the treatment. The dynamics of the aforementioned processes within the muscles and tendons of the rotator cuff can be successfully quantified and monitored by shear-wave elastography (SWE), which potentially has significant implications in the rehabilitation and monitoring of patients in the early postoperative period that can guide the rehabilitation process to better patient outcomes.

In the case series we present B-mode and SWE findings using Supersonic Aixplorer® after supraspinatus tendon reconstruction in a 3-month follow-up period. Surgical outcomes, American Shoulder and Elbow Society Index (ASES) questionnaire and Visual Analog Pain Scale (VAS) were also followed-up in order to objectify the findings.

Using both B-mode ultrasound and SWE may provide a better understanding of the postoperative processes after supraspinatus tendon reconstruction surgery.

Suspicious gallbladder polyps detected by contrast enhanced ultrasound (CEUS) - case report

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INTRODUCTION

Gallbladder polyps are outgrowths of the gallbladder mucosal wall, commonly seen on US examinations (2.6% –12.1% of cholecystectomy specimens).
For the diagnosis of gallbladder disease B-mode and color Doppler US are the first-line imaging modalities. The use of CEUS improves the diagnostic accuracy of US in selected cases.
In gallbladder malignancy, a heterogeneous enhancement pattern, the presence of perfusion defects, and an irregular vessel pattern are typical features with CEUS. Homogeneous or absent enhancement occurs with benign lesions.

CASE REPORT

A 68-year-old male patient was examined at our Radiology department with US because of non-specific abdominal pain.
The gallbladder was painless and distended, with normal wall thickness. Gallbladder stones with distal shadowing were found, additionally, there was heterogenous content in the lumen, without signal with Doppler US.
After application of intravenous contrast agent, lesion enhanced obviously. The patient underwent cholecystectomy and our diagnosis - polypoid tumor exophytic lesion was confirmed. Histologically it proved to be intracholecystic papillary neoplasm, invasive adenocarcinoma of mixed type. Luckily there was no regional spread or distant metastases yet.

CONCLUSION

CEUS improves the diagnosis of malignant gallbladder polyps and wall thickening over B-mode US. It enables to differentiate between vascular and nonvascular structures e. g. polyp or a sludge ball. None of the available imaging modalities can unequivocally distinguish benign from malignant polyps. This can only be achieved by histologic examination of the gallbladder after cholecystectomy.

Littoral cell angioma of the spleen – a case report

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Introduction

Littoral cell angioma (LCA) is a rare splenic tumor. Most of a reported cases are benign, but also a few cases of malignant variants have been reported. We present a case report of an incidentally discovered splenic lesion in a young woman.

Case Report

A 27 - year old female was referred to a primary physician for unspecific pain in the lower abdominal region. Un ultrasound examination of the abdomen revealed a well-defined, 15 mm hypoechogenic solid lesion without hyperemia in normal sized spleen. CEUS was performed for characterisation; where the lesion showed a discrete, central, nonhomogeneous enhancement in arterial phase, with a gradually wash out in a portal and late venous phase. On the basis of enhancement pattern we excluded the possibilty of a haemangioma or a dense cyst, but we could not exclude a lymphoma. The possibilty of a malignant disease was the indication for the referral of the patient for MRI examination to the spleen. MRI with Gadovist contrast agent demonstrated a 17 mm T2 hypointense solid lesion with septal enhancement, no restriction diffusion and without wash out, which are non specific findings. The final diagnosis was achieved with US guided percutaneous biopsy and histological examination, which were consistent with LCA.

Conclusion

LCA is a rare splenic neoplasm and mostly an incidental finding in asymptomatic patients. Because of the possibilty of a malignant alteration a long term follow up of the patiens is needed.

Xanthogranulomatous cholecystitis or gallbladder carcinoma: a diagnostic conundrum

K. Paušek, E. Divjak, N. Katavić, R. Huzjan-Korunić, M. Vukelić-Marković, A. Morency, G. Ivanac

Abstract

Xanthogranulomatous cholecystitis is an uncommonly occurring form of chronic cholecystitis. Clinical features and imaging findings are comparable to those of gallbladder carcinoma which may cause diagnostic uncertainty. A 61 year old man presented to hospital with painless jaundice. Blood tests showed elevated liver enzymes. Ultrasound was performed in the emergency room setting which revealed diffuse gallbladder wall thickening. Gallstones were found within the gallbladder lumen, and the common bile duct. There were multiple hypoechoic cystic spaces within the gallbladder wall suggesting the diagnosis of xanthogranulomatous cholecystitis. The patient went on to have a CT examination which showed local infiltration of IV and V liver segments, a hypodense lesion in the I liver segment, and bile duct dilatation. ERCP was performed with biliary stent placement. The diagnosis was upgraded to carcinoma. Differentiating between carcinoma and xanthogranulomatous cholecystitis, two radiologically similar entities, is vital as it considerably influences patient management.

Keywords: xanthogranulomatous cholecystitis, gallbladder carcinoma, ultrasound

Pure mucinous breast carcinoma: a case report

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INTRODUCTION

Pure mucinous carcinoma is a rare form of breast cancer that accounts for 1- 4 % of all cases. Pure mucinous carcinomas often express a low level of human epidermal growth factor receptor 2 (HER2) and test positive for both the estrogen receptor (ER) and the progesterone receptor (PR). Prognosis is usually good.

CASE REPORT

In this case study, we describe an 81-year-old woman who had a sizeable breast tumor for six years, apparently without any nodal involvement. A mammogram showed a lobulated, well-demarcated dense mass in the fatty right breast with a residual glandularity <25 %. Additionally, a well-defined heterogeneous lesion involving the medial quadrants was confirmed by ultrasound examination. This lesion was approximately 38 x 26 x 28 mm in size and had poor vascularity. The breasts' ultrasound examination revealed no further pathology. Axillary adenopathy was absent.
The patient underwent a core biopsy which confirmed a low nuclear grade (G1), mucinous breast cancer. Histopathology revealed a pure mucinous breast carcinoma that was ER (>95 %), PR(>95 %), 3 % Ki-67 (+), and HER2 (-) on immunohistochemistry. The clinical staging was T2N0M0, with pathological grade I, subtype luminal A. Finally, a quadrantectomy was performed.

CONCLUSION

We present this case because of its rarity. Despite the size of the tumor, axillary lymph nodes were spared, increasing the probability of a favorable outcome. Ultrasound-guided core biopsy is a key technique for the early diagnosis of breast cancer that is solely mucinous.

Key words: Mucionous breast carcinom, ultrasound, core biopsy

Case report of the malignant peripheral nerve sheath tumour of the brachial plexus

Filip Vujević[1], Ana Bojko Jagnjić[1], Luka Pfeifer[1], Anamarija Božić[1], Martina Suton Glavinić[1], Vid Matišić[3], Eugen Divjak[1], Boris Brkljačić[1,2], and Gordana Ivanac[1,2]

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Introduction

Malignant peripheral nerve sheath tumours (MPNSTs) are very aggressive soft tissue sarcomas with an incidence rate of 0,001% in the general population. Most commonly they are found in the extremities and pelvis and their most common metastatic sites are the lungs.
MPNSTs are clinically manifested as rapidly enlarging mass that may be painful or cause local neurologic deficits such as skeletal muscle weakness and paraesthesia.

Case report

A 45-year-old patient was referred to our department due to a rapidly growing palpable painful mass in her left axillary region and paraesthesias in her left arm.
Ultrasound (US) examination of the left axillary region showed a round, well circumscribed, expansile, inhomogenous, hypoechoic lesion that measured 2x1.5 cm. Soft tissue elasticity measured with sheer wave elastography showed a soft lesion with no significant di erence in sti ness compared to the surrounding fat tissue. Color Doppler Ultrasound Examination manifested increased vascularity of the lesion due to feeding arteries arising directly from the posteriorly positioned axillary artery. Histopathologic examination remains the gold standard for the diagnosis of MPNST. To determine the anatomical extent of the tumour for surgical planning, MRI was performed, which showed a hyperintense lesion on T1-TIRM images arising from the medial cord of the brachial plexus. After surgical extirpation, the lesion was immunohistochemically definitely characterised as a MPNST.

Conclusion

Although its ability to detect malignancy is low, ultrasonography remains the first- line imaging modality for palpable masses due to its cost-e ectiveness and high sensitivity for demonstrating soft tissue tumours. The radiologist should be aware of the ultrasonographic appearance of neurogenic tumours so that proper diagnostic workup can be performed.

Ultrasound-guided percutaneous renal biopsy in pediatric population

A. Zafirovski; M. Thaler; M. Zafirovska; M.Brovc; D. Kljucevsek

Purpose or Learning Objective

This retrospective study aims to investigate if the number of renal core samples has an impact on the number and severity of post-biopsy complications in children with percutaneous renal biopsy (PRB) in the same medical center in two different time periods.

Methods or Background

PRB is an invasive procedure performed in native and transplant kidneys. Clinical data were obtained from the electronic record for consecutive pediatric patients who underwent a PRB from the 1st of January 2012 to 31st of July 2021 and compared with previous study from 1994 – 1999. Number of core samples and complications were searched. Complications were separated into minor and major depending on the further engagement. Quantitative data were presented by descriptive statistics and analyzed using Pearsoǹ s chi-squared test.

Results or Findings

This study consisted of 223 PRB in 156 children. 23.71% of children had more than one biopsy. 60.9% minor complications were noted in the first period, without any major complication. 20 years later 26.9% instances had minor complications and only one child (0.6%) had a major complication that resulted in nephrectomy.
One core biopsy was never performed in the first period, compare to second period when 35% of total biopsies were one core and yielded satisfactory pathological material in 94.87% cases.

Conclusion

There is a reduction of minor complication rate by 34% between the two time periods, due to better PRB protocol, more experience, and reduced number of core samples. One core biopsy has become increasingly common and yields with better results than two core biopsies did in the first period.

Ultrasound guided puncture of rotator cuff calcifications - retrospective study of results in Diagnostic center Bled from 1.3.2019 to 29.2.2020

Irena Žnideršič MD, specialist of radiology[1], Maruša Mencinger MD, resident of radiology[2]

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[2] *General Hospital Trbovlje*

We collected informations about pain relief in certain times after the procedure that had been held at our institution. On the basis of our results we can recommend such a method as very effective therapeutic option for shoulder pain relief.

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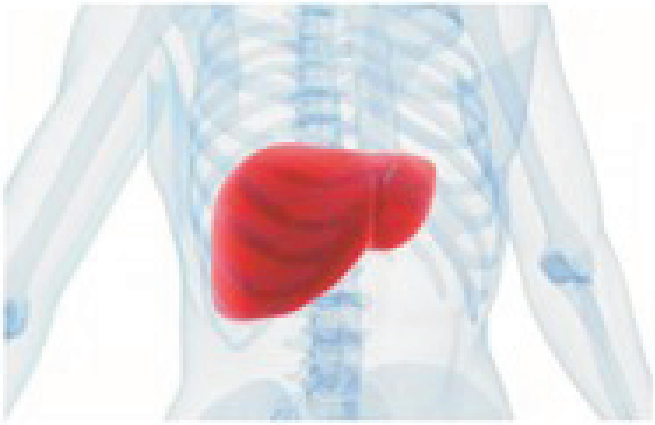

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