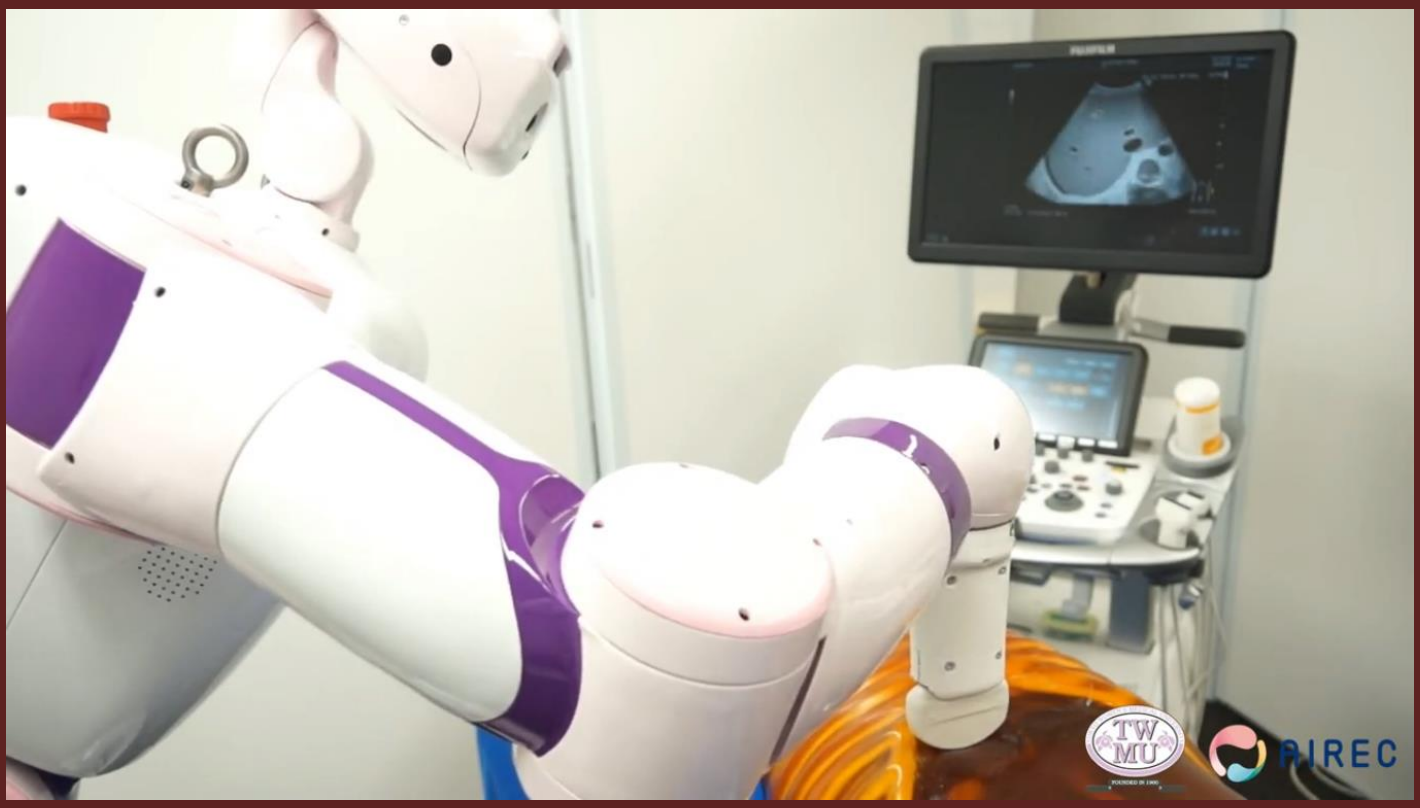
POCUS Journal

International POCUS Academy

JULY 2024

Non-profit organization of national Point-Of-Care-UltraSound schools



Dear colleagues and friends,

Before you is the latest edition of the POCUS Journal. This time, the cover illustration may certainly cause us concern. For nearly a quarter of a century, we have strived to promote the concept of POCUS diagnostics among often conservative and change-fearing medical circles. Meanwhile, as we exert ourselves in our pioneering efforts, Artificial intelligence advances at an incomprehensible pace. Recently, we witnessed a robot performing an ultrasound examination. Additionally, we have seen remote systems enabling a diagnostician to manipulate the probe tens or even hundreds of kilometers away from the examination site. How much does all this threaten the physician, the ultrasonographer? Does it (and to what extent?) render our efforts to popularize POCUS and modernize medicine meaningless? As always, time will tell. For now, we must continue doing what we do best: helping people, encouraging our colleagues, and nurturing the humanity and nobility of the craft and profession to which we have dedicated our lives.

Editor

POCUS Academy of Serbia
Activities for the first 6 months of 2024

In the past six months, the POCUS Academy of Serbia has continued to educate physicians at several of its training centers in Požarevac, Pančevo, and Svilajnac. Additionally, we conducted a workshop at the Health Center in Čajetina. We have successfully trained about twenty new POCUS practitioners and a few new specialists according to our training program, primarily following the PROBE protocol designed for physicians in general/family medicine, emergency medicine, and internal medicine.

Workshop in Health Center Čajetina, May 19th 2024

Dr. Marko Kalinic receiving POCUS certificate from Academy instructor Dr. Danijel Oderković, Žabari, April 2024

Dr. Vanja Malobabić receiving POCUS certificate from Academy instructor Dr. Dava Vojnović, Pančevo, April 2024

Dr. Ana Trailović receiving POCUS certificate from Academy instructors Dr. Dejan and Dr. Vekoslav Zajić, Svilajnac, March 2024

Dr. Adrian Gerga, Dr. Miloš Hadžifejzović, Dr. Nikola Munić and Dr. Dragan Novaković receving certificates in Pančevo from Dr. Sava Vojnović

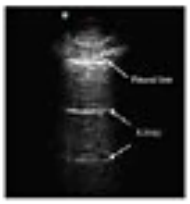
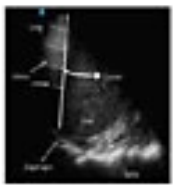
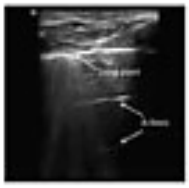
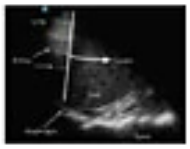
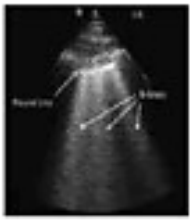
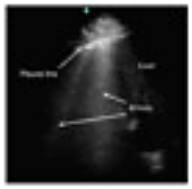
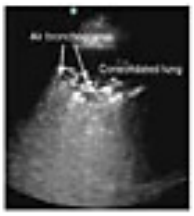
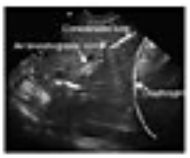
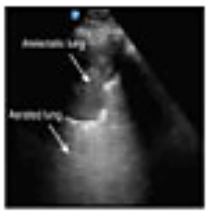
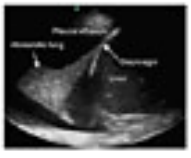
Dr: Gordana Bojović receiving certificate of POCUS specialist in Požarevac, February 2024, from Dr. Ivica Zdravkovic and Dr. Kristina Stević, POCUS instructors

Dr. Miloš Trajković, Požarevac, February 2024

LUNG ULTRASOUND REMINDER

Specification of the typical ultrasound lung images

(source: Nilam J Soni; Robert Arntfield; Pierre Kory: Point-of-Care Ultrasound. Second Edition, April 2019, 5-6)

Condition	Lung and pleural exam findings		
	Upper Lobe (Anterior)	Middle Lobe (Anterolateral)	Lower Lobe (Posterior Basal)
Normal COPD, Asthma Pulmonary embolism	• Sliding • A-lines • M-mode: seashore sign 		• Sliding • A-lines • Curtain sign • Negative spine sign 
Pneumothorax	• No sliding • A-lines • M-mode: stratosphere or barcorde sign 		• Sliding • A-lines • Curtain sign  • Large pneumothorax: no sliding, A-lines
Pulmonary edema	• Diffuse bilateral B-lines • Sliding • Thin pleural line 		• B-lines • Simple pleural effusion may be present 
Pneumonia	• Early: focal unilateral B-lines, sliding • Advanced: consolidation, dynamic air bronchograms, shred sign, thickened pleural line, reduced sliding 		• Early and advanced: same as upper lobe findings • Complex pleural effusion may be present 
Atelectasis	• Reduced/absent lung sliding with pronounced lung pulse (resorptive) • Consolidation • Static air-bronchograms • Focal B-lines 		• Pleural effusion (compressive) • Elevated hemidiaphragm (resorptive) • Consolidation • Static air-bronchograms • Focal B-lines 

News from HAITI

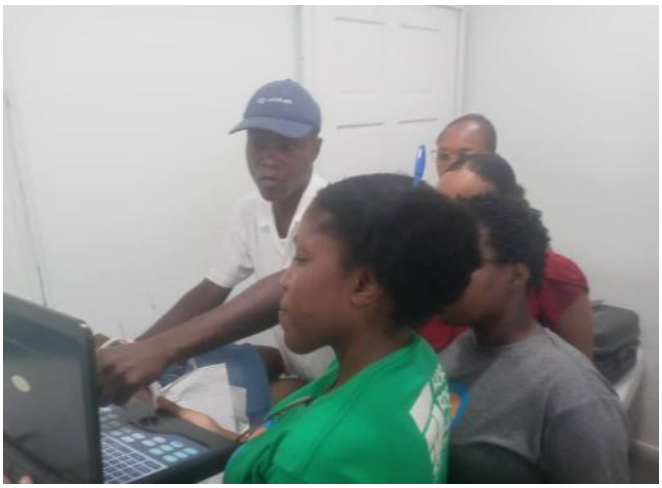
Dear friends and colleagues of the “Ultrasound World”,

News are not always bad. Haiti IPA chapter ceased operations in February 2024 following Prof. Gedeon GELIN’s departure from Pernier, a suburban area of Petion-Ville that had been overrun by gangs since January 2022. Dr Gelin has been practicing and training health professionals (physicians, nurses) in General Ultrasound, and Basic EKG integrated to Clinical Cardiology for more than 20 years.

Since February 15, 2024, under its leadership, IPA Haiti launched again its ultrasound training program in Port-au-Prince. Ultrasound training videos are available online in creole for Haitian health professionals. Currently, twenty physicians are taking ultrasound hybrid classes (online and live) in their mother tongue. Hands-on trainings sessions are held in Delmas and Bellaldere (two cities of Haiti) under the leadership of certified assistant professors, all of them graduated from HAITI IPA Ultrasound School.

IPA Haiti Chapter offers many ultrasound certifications training programs. These range from a 10 days intensive training course on “Basic Point-of-care Ultrasound” covering abdomen, obstetrics,heart, eyes,thyroid,breasts and testes for busy physician and nurses to one-year training program on “Head-to-toe ultrasound” for those who inspiring to become General Ultrasound Specialists. IPA Haiti is highly regarded in the Haitian medical community.

Below are two pictures of Dr Gedeon GELIN who is currently conducting a training in Les Cayes, Haiti



If you know any physician or nurse who want to be trained in General ultrasound in Haiti, please, let them know that IPA Haiti will bring this opportunity to them “in their mother tongue” wherever they are in the country.

Comparative Analysis of Spinal and Conduction Anesthesia in Lower Limb Surgeries: Assessment of Efficacy, Safety, and Patient Satisfaction

Authors: V.S. Solovyev[12], V.N. Lykhin[2], R.B. Gudantov[1], D.E. Agafonov[1], K.S. Krasnov[3], N.V. Krasnova[3]

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Abstract

Objective: To compare the efficacy and safety of spinal and conduction anesthesia in lower limb surgeries.

Materials and Methods: This study included 40 patients randomized into two groups of 20 each. The first group received spinal anesthesia (SA), and the second received conduction anesthesia (CA). Parameters studied included the frequency of hypotension, ST segment dynamics on ECG, pain assessment via visual analog scale (VAS), need for postoperative analgesia, time to recovery of sensitivity and motor activity, time to first independent movement, complications and side effects, and patient and medical staff satisfaction.

Results: Hypotension requiring vasopressor support was registered in 25% of patients in the SA group and in 5% of patients in the CA group ($p<0.05$). Significant changes in the ST segment on ECG were not detected. Pain levels at 2 and 12 hours post-operation, time to recovery of sensitivity and motor activity were comparable in both groups. The average time to first independent movement was 8.4 ± 1.4 hours in the SA group and 6.1 ± 1.6 hours in the CA group, a statistically significant difference indicating faster recovery in the CA group. No complications or side effects were registered. Patient and medical staff satisfaction was high and did not significantly differ between the groups.

Conclusions: Both anesthesia methods provide adequate pain relief and have acceptable safety profiles. Spinal anesthesia is associated with a higher incidence of hypotension requiring vasopressor support, necessitating careful monitoring. Conduction anesthesia demonstrates a lower risk of hemodynamic complications and is preferable for patients with high cardiovascular risk.

Keywords: Spinal anesthesia, Conduction anesthesia, Lower limb surgeries, Anesthetic methods.

Introduction

In modern urban society, fractures of the lower limb bones hold a leading position in the structure of long bone fractures. Numerous scientific studies have established that for most patients with such injuries, only the use of surgical methods of fragment fixation creates optimal conditions for fracture consolidation and limb function restoration.

Currently, various anesthetic techniques are used for osteosynthesis surgeries of lower limb bone fractures, with the primary goal being analgesia, while sedation, relaxation, and neurovegetative blockade play a secondary role. Therefore, the use of general combined anesthesia is limited due to significant post-anesthesia depression, hemostasis disorders, and the toxic effects of anesthetics on parenchymal organs.

Surgeries on the lower limbs require precise and effective pain management to ensure maximum patient comfort and optimal conditions for surgical intervention. In modern anesthesiology practice, two main methods of regional anesthesia are widely used: spinal (neuraxial) anesthesia and conduction (regional) anesthesia. Both methods have their features, indications, and contraindications, differing in the degree of invasiveness and the spectrum of possible complications, making them a subject of active discussion and research.

Spinal anesthesia involves the introduction of an anesthetic into the subarachnoid space of the spine, leading to nerve impulse blockade at the spinal cord level and providing complete analgesia for the lower half of the body. This method is characterized by a rapid onset of action and a high degree of effectiveness, making it a preferred choice for many major lower limb surgeries. However, spinal anesthesia requires precise execution and has a number of potential complications, including the risk of hypotension and post-puncture headache.

Conversely, conduction anesthesia involves the blockade of specific peripheral nerves or nerve plexuses, allowing targeted analgesia for a specific area. This method is less invasive and is often used for outpatient procedures and in patients with contraindications to or limitations for spinal anesthesia. Conduction anesthesia avoids some of the systemic effects associated with spinal anesthesia and can provide prolonged postoperative analgesia.

Objective

To conduct a comparative analysis of spinal and conduction anesthesia in lower limb surgeries. This comparative analysis will allow medical professionals to make informed decisions when choosing the optimal anesthesia method for a specific patient, taking into account individual characteristics and the specifics of the planned surgical intervention.

Materials and Methods

The study included 40 patients aged 18 to 70 years with various lower limb injuries requiring osteosynthesis surgery.

Inclusion criteria:

- Patients who signed informed consent to participate in the study.
- Physical status class I-III according to the American Society of Anesthesiologists (ASA) classification.

Exclusion criteria:

- Presence of contraindications to spinal or conduction anesthesia (e.g., allergy to anesthetics, infections at the injection site).
- Severe comorbidities (e.g., uncontrolled hypertension, severe heart failure) classified as physical status IV or higher by the ASA.
- Patient refusal to participate in the study.
- Intraoperative blood loss exceeding 500 ml.

Anesthesia specifics, techniques for performing spinal and conduction blocks, and the principles of the visual analog scale (VAS) for pain assessment were explained to each patient during the preoperative examination. All patients received premedication with intramuscular midazolam solution (1 ml, 5 mg) 40 minutes before surgery. Upon arrival in the operating room, infusion with a Sterofundin solution was conducted based on physiological needs and intraoperative losses.

All patients received humidified oxygen insufflation at 4 l/min. Monitoring included an electrocardiogram (lead II with ST segment analysis), pulse oximetry, and non-invasive blood pressure measurement at 5-minute intervals.

Patients were randomly assigned to two groups:

- **Group I**: Spinal Anesthesia (SA). Spinal anesthesia was performed by introducing 3 ml (15 mg) of 0.5% bupivacaine solution into the subarachnoid space at the L3-L4 or L4-L5 level using standard technique.
- **Group II**: Conduction Anesthesia (CA). Conduction anesthesia was performed by blocking the femoral and sciatic nerves (popliteal access) for lower leg surgeries, and the femoral, obturator, and sciatic nerves (transgluteal access) for hip surgeries using ultrasound navigation. A single injection of 15 ml (75 mg) of 0.5%

bupivacaine solution for the femoral nerve, 5 ml (25 mg) for each branch of the obturator nerve, and 15 ml (75 mg) for the sciatic nerve was administered.

The VAS pain assessment principle was explained to all patients, where a score of zero corresponds to no pain and ten corresponds to the worst intolerable pain. Postoperative analgesia was provided with ketoprofen (100 mg IV, three times a day), and additional analgesia (if VAS > 3) was administered with tramadol (100 mg IM) or morphine (10 mg IM) if VAS ≥ 6.

Parameters evaluated:

- Blood pressure (frequency of intraoperative hypotension requiring vasopressor support).
- ECG: ST segment dynamics during surgery and 12 hours postoperatively.
- Pain assessment (VAS) at 2 and 12 hours postoperatively.
- Need for postoperative analgesia.
- Time to recovery of sensitivity and motor activity.
- Time to first independent movement.
- Complications and side effects (if any): Infectious and neurological complications, hypotension, post-puncture headaches, allergic reactions.
- Patient and medical staff satisfaction: Assessment using standardized questionnaires.

Patients in all groups were comparable in age, weight, physical status according to the ASA classification, and duration of surgery. (Table 1.).

Table 1. Clinical characteristics of patients and features of the operation.

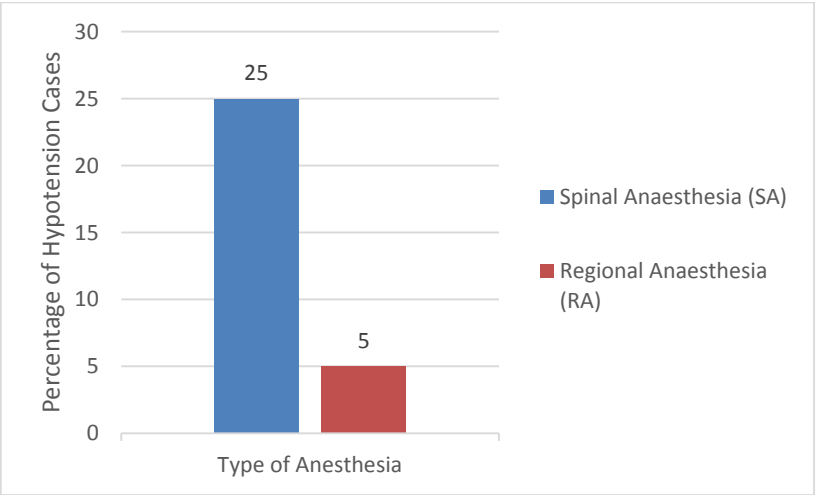
	Group I n=20	**Group II** n=20
Age, years	42±13	41±12
Weight, kg	89±3	90±2,5
ASA (I/II/III)	3/10/7	4/11/5
Operation time (min.)	57±6	55±8

Results

Frequency of intraoperative hypotension requiring vasopressor support:

- Hypotension requiring vasopressor support was registered in 5 patients (25%) in the SA group and 1 patient (5%) in the CA group. The statistically significant difference ($p < 0.05$) indicates a higher frequency of hypotension in the spinal anesthesia group. This is explained by the sympathetic block and accompanying vasoplegia associated with spinal anesthesia. (Schedule 1.).

Schedule 1. Frequency of hypotension cases during surgery that required vasopressor support.



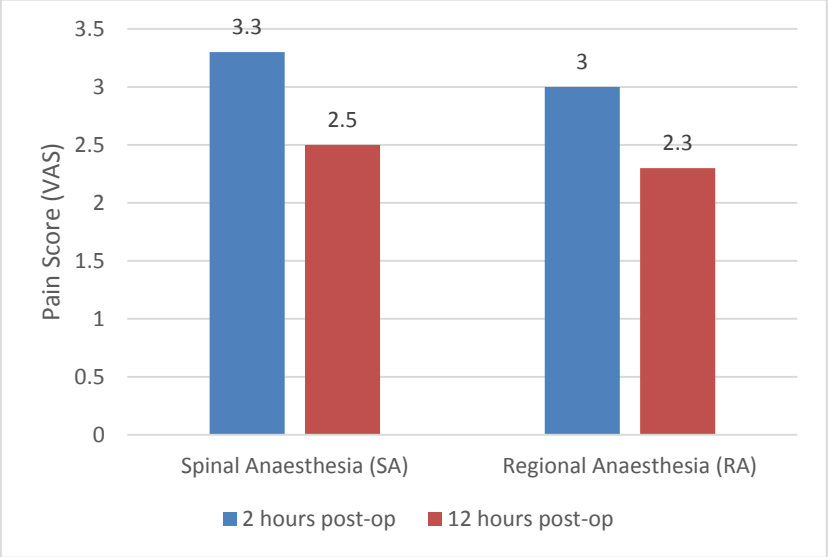
ST segment dynamics on ECG:

- Analysis of ST segment dynamics revealed no significant changes either during surgery or 12 hours postoperatively in both groups. The magnitude of changes in the ST segment did not exceed 0.05 mV, and no differences were found between the groups ($p > 0.05$).

Pain assessment (VAS):

- Two hours postoperatively, the mean pain score on the VAS was 3.3 ± 1.0 in the SA group and 3.0 ± 1.2 in the CA group. Twelve hours postoperatively, the pain level decreased to 2.5 ± 0.8 in the SA group and 2.3 ± 0.9 in the CA group. Differences between the groups were not statistically significant ($p > 0.05$). (Schedule 2.).

Schedule 2. Assessment of pain syndrome on the VAS scale in the postoperative period (average values). (0 = no pain, 10 = worst, unbearable pain.).



Need for postoperative analgesia:

- The need for additional postoperative analgesia occurred in 8 patients (40%) in the SA group and 6 patients (30%) in the CA group. No statistically significant differences were observed between the groups ($p > 0.05$).

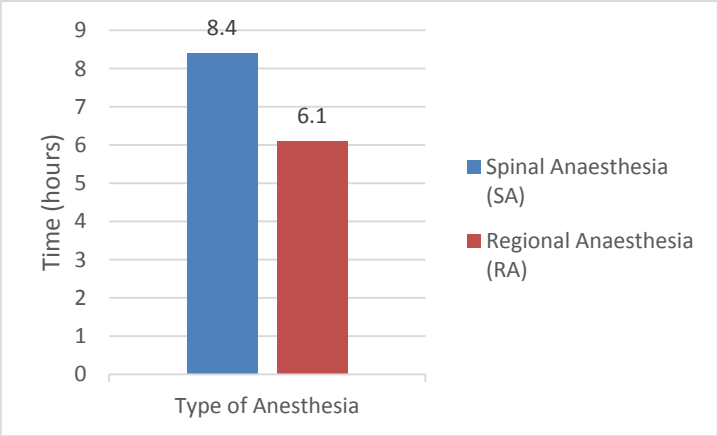
Time to recovery of sensitivity and motor activity:

- The average time to recovery of sensitivity was 5.1 ± 0.7 hours in the SA group and 4.6 ± 0.6 hours in the CA group. The time to recovery of motor activity was 6.2 ± 1.0 hours in the SA group and 5.6 ± 0.9 hours in the CA group. Differences between the groups were not statistically significant ($p > 0.05$).

Time to first independent movement:

- The average time to first independent movement was 8.4 ± 1.4 hours in the SA group and 6.1 ± 1.6 hours in the CA group. The statistically significant difference ($p < 0.05$) indicates faster recovery in the CA group. This can be explained by the bilateral block of the lower limbs with spinal anesthesia, leading to a longer recovery period for independent movement. In the CA group, the contralateral limb was not involved, playing a leading role in faster recovery. (Schedule 3.).

Schedule 3. Time until the first independent movement.



Complications and side effects:

- No tracked complications or side effects of anesthesia were registered in this study.

Patient and medical staff satisfaction:

- The average patient satisfaction level according to standardized questionnaires was 8.9 ± 0.6 in the SA group and 9.1 ± 0.5 in the CA group. Medical staff satisfaction was rated at 8.2 ± 1.0 in the SA group and 7.6 ± 1.2 in the CA group. Differences between the groups were not statistically significant ($p > 0.05$).

Conclusions

Overall, the study demonstrated that spinal and conduction anesthesia have similar efficacy and safety profiles for lower limb surgeries. Spinal anesthesia is associated with a higher incidence of hypotension requiring vasopressor support and requires a longer period for recovery of independent movement. However, other parameters did not show significant differences between the methods. The level of postoperative pain, the need for additional analgesia, time to recovery of sensitivity and motor activity, as well as patient and medical staff satisfaction, were comparable in both groups.

Spinal and conduction anesthesia each have unique advantages and disadvantages that must be considered when choosing the optimal method for lower limb surgeries. Both methods provide adequate pain relief and possess acceptable safety profiles, but differences in their effects on hemodynamics and the risk of significant complications require careful consideration.

Advantages of spinal anesthesia:

- Rapid onset of action: Spinal anesthesia provides quick onset of anesthesia, which can be beneficial in time-limited situations.
- Complete analgesia and motor block: This method ensures reliable analgesia and is often used for extensive lower limb surgeries.
- Duration of action: The duration of spinal anesthesia is usually sufficient for most lower limb surgeries without the need for additional anesthetic administration.

Disadvantages of spinal anesthesia:

- High risk of hypotension: The incidence of hypotension requiring vasopressor support was 25%, related to sympathetic block and vasoplegia, requiring constant monitoring and readiness to correct hemodynamic disturbances.

- Post-puncture headaches: Although not observed in this study, this rare but significant complication affects postoperative recovery.
- Invasiveness and risk of infection: Introducing anesthetic into the subarachnoid space requires high sterility and skills to minimize the risk of infections.

Advantages of conduction anesthesia:

- Low risk of hypotension: In the CA group, hypotension requiring vasopressors was observed in only 5% of patients, making it a preferable choice for patients with unstable hemodynamics.
- Targeted analgesia: Conduction anesthesia allows for the blockade of specific nerves, which can be beneficial for more precise and individualized pain management.
- Lower risk of systemic effects: This method is less invasive and carries a lower risk of systemic side effects, making it safer for patients with various comorbidities.

Disadvantages of conduction anesthesia:

- Time required for preparation and procedure: The onset of the block may take longer compared to spinal anesthesia due to the need for preparation, positioning, and multiple injection sites.
- Need for high precision: Requires highly skilled personnel and the use of ultrasound navigation for accurate nerve blockade.
- Risk of inadequate block: In some cases, insufficient analgesia may occur, requiring additional anesthetic administration.

Both anesthesia methods have proven effective in controlling postoperative pain and providing conditions for successful surgical intervention. Spinal anesthesia is a more invasive technique but offers rapid and reliable analgesia, making it preferred for major and prolonged surgeries. However, the high incidence of hypotension and significant complications requires anesthesiologists to be prepared to respond quickly to potential issues.

Conduction anesthesia offers a more targeted and safer method of analgesia, particularly for patients with a high risk of cardiovascular complications. The lower risk of hypotension and systemic effects makes this method attractive for a wide range of patients, including those with comorbidities.

The choice of anesthesia method should be based on a thorough analysis of the individual needs of the patient, the specifics of the planned surgery, and the qualifications of the medical staff. Both methods have their strengths and weaknesses, and their combined use may offer the best approach to pain management and patient safety.

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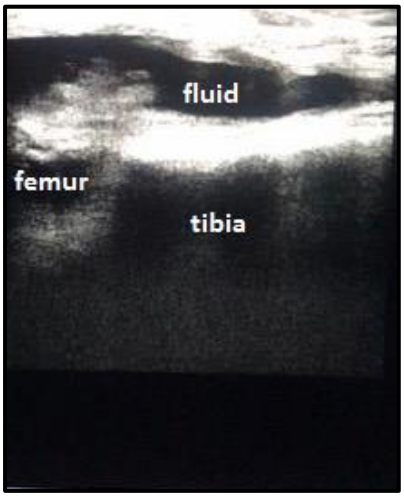
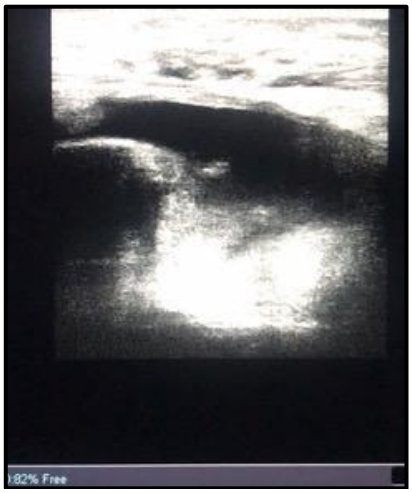
The importance of POCUS in the work of GPs for diagnosing knee diseases and injuries

Contributed by: Dr. Danijel Oderković,
general practitioner and specialist in POCUS ultrasonography

Case report 1:

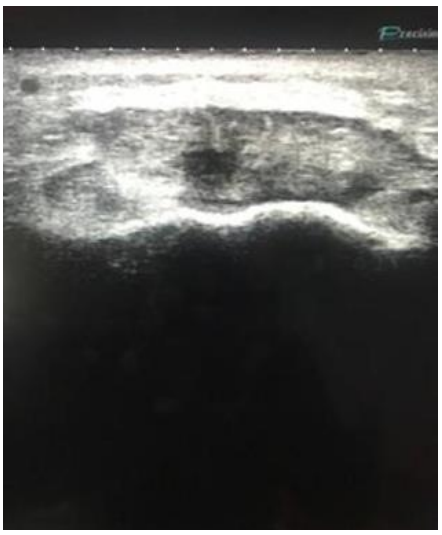
A 65-year-old patient comes to the office due to pain and swelling in the left knee. The pain and swelling have been present for 6 months. An ultrasound scan of the knee immediately reveals a large amount of free fluid in all compartments of the knee, with synovial hypertrophy, small marginal osteophytes on the medial femoral condyles, a narrowed medial meniscus space, and signs of osteoarthritis. The patient was recommended a puncture to evacuate the fluid.





Case report 2:

A 50-year-old patient complains of pain in the left knee during flexion. From the history, we learn that the patient is a farmer and engages in heavy physical work. After a physical examination, which was inconclusive, an ultrasound examination of the knee was performed. The image, in a transverse section, shows a partial rupture of the tendon fibers of the lower attachment of the patellar ligament with signs of inflammation (patellar tendinitis or "Jumper's knee"). The patient was given therapy for pain and tendon repair, and physical therapy was also advised.



Application of POCUS in the Diagnosis of Benign Kidney Tumors

Author: Dr. Vekoslav Zajić, specialist in emergency medicine and POCUS ultrasonography, Svilajnac, Serbia, July 2024

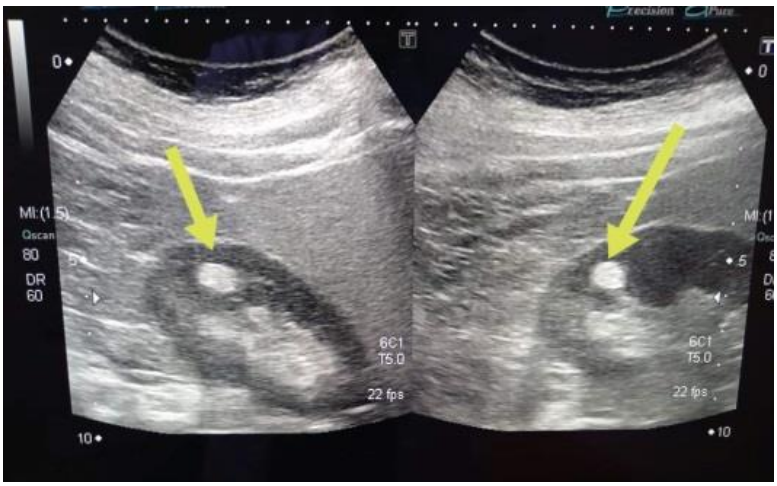
Co-authors: Dr. Dejan Živanović, specialist in general medicine and POCUS ultrasonography, Dr. Danijel Oderković, general practitioner and specialist in POCUS ultrasonography

Non-invasive tumors of the renal parenchyma, such as angiomyolipomas, oncocytomas, and the most common adenomas, do not cause patient mortality. The ten-year survival rate of patients with these tumors does not differ from the average survival rate of the population of the same age and gender, and therefore they can be safely considered benign. They do not cause regional or distant metastases, do not invade renal tissue, nor do they infiltrate neighboring organs.

The major challenge with benign tumors of the renal parenchyma lies in the preoperative differential diagnosis from invasive renal parenchyma carcinoma, especially in the case of adenomas, some of which are considered to undergo malignant transformation in 4.6% of cases when larger than 3 cm.

International classification of benign renal tumor forms:

Epithelial tumors:	➢ Papillary and tubulopapillary adenoma ➢ Oncocytoma ➢ Metanephric adenoma
Non-epithelial tumors:	➢ Angiomyolipoma ➢ Leiomyoma ➢ Renomedullary interstitial cell tumor ➢ Hemangioma ➢ Lymphangioma ➢ Juxtaglomerular cell tumor

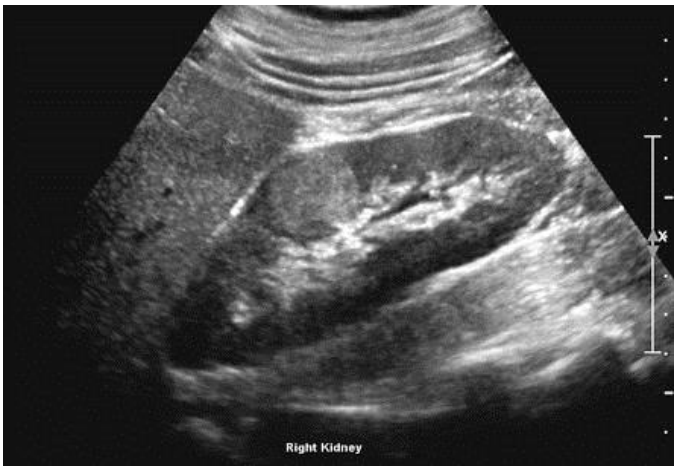


Angiomyolipoma is a benign mesenchymal tumor composed of fatty tissue, spindle-shaped smooth muscle cells, and abnormal thick-walled blood vessels. Women are four times more likely to develop it than men. Tuberous sclerosis is considered a precipitating factor for the development of the tumor. Angiomyolipoma can arise in both the cortex and the medulla of the kidney. It can also spread retroperitoneally.

The clinical presentation varies and primarily depends on the presence or absence of tuberous sclerosis (TS). Patients with TS are usually asymptomatic. Patients without TS typically seek medical attention due to hemorrhage, hip pain, and a palpable abdominal mass. Symptoms associated with this tumor include dull pain, a palpable abdominal mass, and spontaneous rupture causing bleeding (among all renal tumors, this one most frequently causes bleeding, with pregnancy increasing the risk of hemorrhage).

Ultrasound characteristics of angiomyolipoma (according to Helweg and Frauscher):

- Hyperechoic mass,
- Size 1-3 cm (sometimes <5 cm),
- Globular shape,
- No distal acoustic shadowing,
- Solitary occurrence (except in TS),
- Rarely causes bulging of the kidney contour,
- Detectable vascularization,
- Multiple in 80% of patients with TS; only angiomyolipomas associated with this condition can undergo malignant transformation!

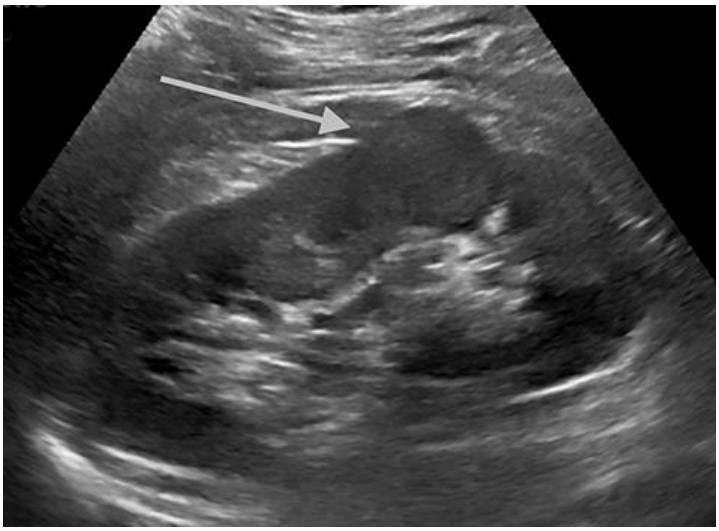


Papillary adenoma (PA) of the kidney is a tumor with a diameter of 5 mm or less, characterized by papillary or tubular architecture of low nuclear grade. Papillary adenomas are among the most common neoplasms of epithelial origin in renal tubules. Numerous studies have shown that the incidence of these tumors is 10% in individuals up to 40 years old, and increases to over 40% in those older than 70 years. Hemodialysis and polycystic kidney disease are also mentioned as possible causes of papillary tumors.

According to current classification, the only difference between PA and papillary renal carcinoma is size. Defining tumors solely based on size remains controversial because although there are no documented cases of metastasis in lesions smaller than 5 mm in the literature, it cannot be completely ruled out, thus necessitating further consideration of this criterion. Throughout history, changes in diagnostic criteria for PA have solely revolved around the size below which lesions were considered benign. Initially, this size was 3 cm, then reduced to 1 cm, and finally set at 5 mm.

Ultrasound characteristics of papillary adenoma:

- Small lesions (<5mm), typically solitary,
- Often located subcapsularly,
- Extremely hypoechoic mass with smooth contours,



Oncocytoma is a benign epithelial tumor of the kidney. It constitutes approximately 5% of all renal neoplasms of renal origin. It occurs at all ages, with a peak incidence in the seventh decade. Men are affected twice as often as women. For most patients, the disease progresses asymptomatically. It may cause symptoms such as hematuria and abdominal pain, but these symptoms are present in less than 20% of patients, which is why most oncocytomas are discovered incidentally during POCUS examination for other indications.

Ultrazvučne osobine onkocitoma:

- Typically smooth, well-defined lesion,
- Homogeneous solid lesions,
- Often hypoechoic or isoechoic in echotexture,
- Difficult to distinguish from RCC (renal cell carcinoma),
- Small lesions (<6cm) - 50% chance of RCC,
- Larger oncocytomas often contain necrotic zones or calcifications, making them indistinguishable from RCC,
- Sometimes appears as a spoke-wheel pattern,
- Central fibrotic scar

Benign tumors of renal parenchyma are not as rare as previously thought. Preoperative diagnosis is possible based on several clinical data and diagnostic signs:

- Benign tumors are usually asymptomatic (without hematuria),
- They are more common in women (unlike carcinomas),
- They have typical ultrasound characteristics,
- They may require additional diagnostic procedures.

Literature:

1. *Benigni tumori bubrežnog porekla, Ruđer Novak i Zoran Božić, Klinika za urologiju Kliničke bolnice, Medicinski Vjesnik, Zagreb, 1990.*
2. *Ultrazvučna dijagnostika, diferencijalna dijagnoza, Guenter Schmidt, Atlas, DATA STATUS, Beograd 2010; str. 303; 307-310*
3. *Ivica Z. et al. PROBE protocol, Point-of-Care-UltraSound, Rapid Overall Body Exam. 2023; str. 63*
4. *Tumori bubrega, Mladen Sorić, Sveučilište u Zagebu, Medicinksi fakultet, Zagreb 2019.*

THE FUTURE OF POCUS IN BOSNIA

By Prof. Željka Popović,
Director of IPA School of Bosnia and Herzegovina

There is a wonderful sentence by a Serbian writer, a Nobel Prize winner, who said: "Where Bosnia begins, logic ends." The healthcare system is organized in such a way that it often confuses both patients and doctors. The pricing regulations for healthcare services are drafted by doctors who are not in practice or by lawyers who do not understand the everyday challenges faced by doctors.

As a result, the fee schedule not only fails to recognize family doctors, but also unjustly demeans them. Specifically, the regulations od ultrasound education for specialization in radiology are the same for family medicine residents and pediatricians, meaning that all are required to spend one month in radiology and learn the basics of abdominal ultrasound diagnostics. To be honest, neither group learns much, and they all seek further education from the same professors in the same places.

However, once they start performing POCUS, family doctors are paid three times less than radiologists and pediatricians! The prices for ultrasound depend on who holds the probe, not on the quality of the examination.

According to the Health Insurance Fund's fee schedule, if a family doctor performs the ultrasound, the price is minimal. But if, by chance, a pediatrician decides to perform the ultrasound, the price magically triples. It's as if pediatricians possess a special superpower that adds extra value to ultrasound, or they have a golden probe that produces images straight from Rembrandt!

To make the absurdity greater, in Bosnia, both family doctors and pediatricians examine children equally. Admittedly, pediatricians mainly examine children up to 6 years old, while family doctors see older children, but there is no difference in emergency duties, so all children are seen by family doctors regardless of age.

Yet... every year when registrations open for the Doboj symposium, the website overheats from visitors, phones at the organizing committee ring as if it were Christmas, and open slots for participant at the seminar disappear faster than free cakes at a congress. Family doctors apply in such numbers that one might think they're giving away free tickets to the World Cup final.

The question arises - why would family doctors be interested in something that, compared to pediatricians' pay, is three times less lucrative? Could it be that they have a passion for ultrasound deeper and stronger than the desire for financial security? Or perhaps they have finally realized that uncovering the secrets hidden behind those mysterious black-and-white images could catapult them into medical elite? Family doctors sign up for ultrasound workshops, hoping that one day their ultrasound probe will be worth more. Or perhaps they simply love traveling to Doboj and enjoying seminars, regardless of cost. Time will provide answers, and until then, I hope the Fund will finally realize that their examinations are equally valuable.

Prof. Željka Popović is one of the organizers and ultrasound instructors at the Doboj Symposium, an event that traditionally gathers numerous family doctors from the region.

4. SIMPOZIJUM
DOKTORA MEDICINE DOBOJ 2024
Promocija znanja - prevencija bolesti

https://simpozijumdoboj.com/

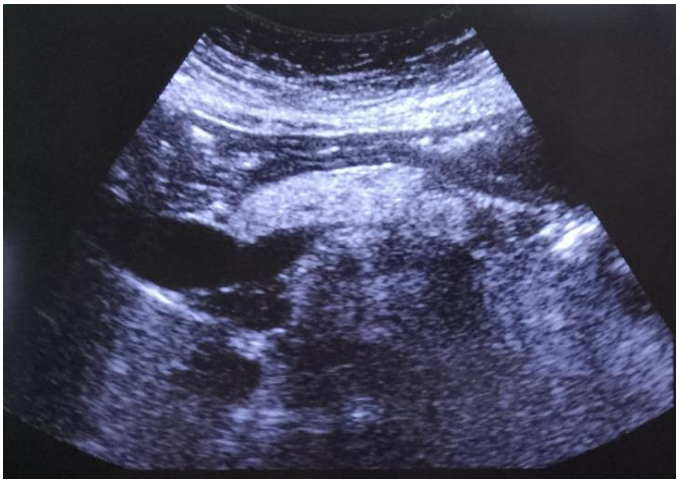
POCUS CASE REPORTS

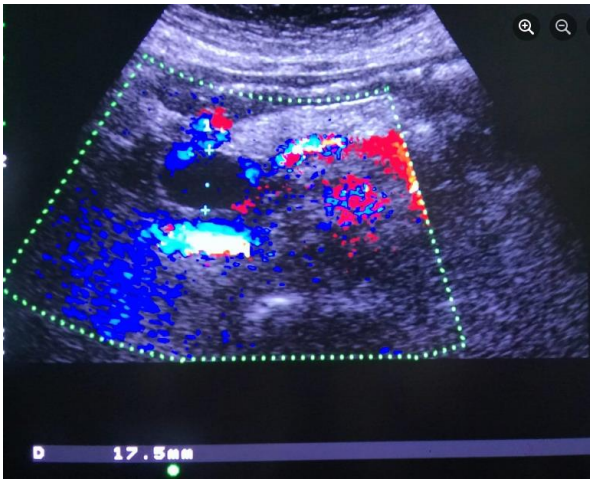
Contrubuted by
Dr. Ivica Zdravkovic, associate professor
Director of POCUS Academy of Serbia,
IPA Secretary General

Here is a selection of some of the ultrasound findings we have recorded in our clinic over the past 6 months:

1. Pancreatic pseudo-cyst

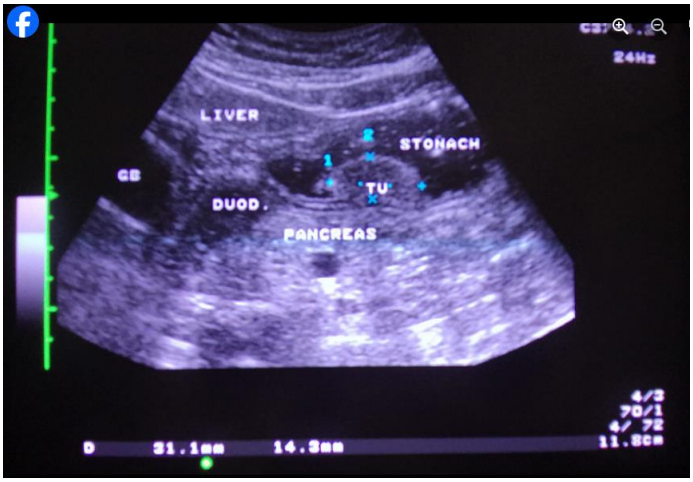
Choledochal ectasia post-cholecystectomy, pancreatic head pseudocyst, common bile duct 21 mm wide inside liver, and 17,5mm at the level of pancreatic head

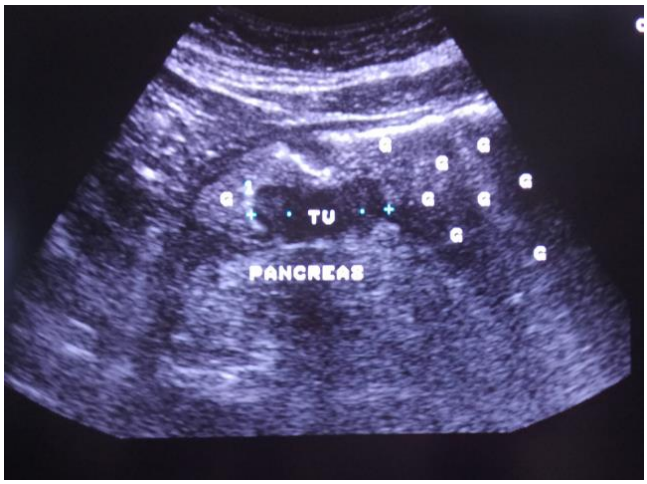




2. STOMACH TUMOR

Patient: 70-year-old male. Main complaints/reason for visit: Over the past few months, the patient has experienced bloating and mild pain in the upper abdomen after meals, with the pain slightly radiating towards the chest. There is no chest pain or shortness of breath. The patient has gas, no nausea, and does not vomit. He does not have heartburn. Bowel movements are regular. The patient denies any other symptoms in his medical history across different systems.





The pancreas is of usual echogenicity, with normal shape and dimensions. Along the anterior edge of the pancreas, practically within the lumen of the stomach (imaged in a standing position), originating from the mucosa of the posterior wall of the stomach, there is a polypoid lesion on a

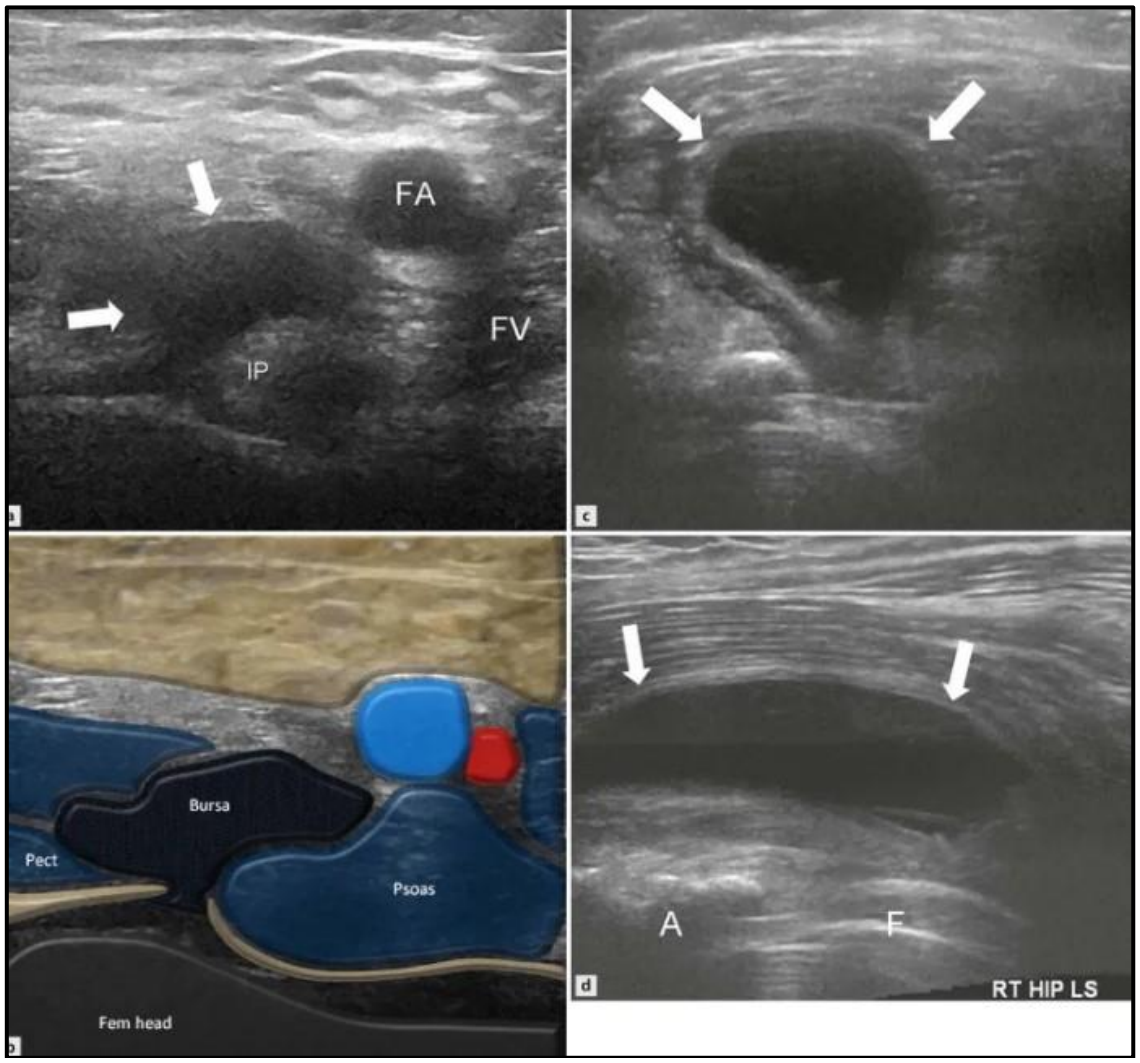
broad base measuring approximately 41 mm, with a thickness of up to 30 mm, containing noticeable smaller vascular elements. The imaging was performed after 17 hours of fasting, and the patient drank 300 mL of water immediately before the examination. The lesion does not move after turning the patient, lying down, or standing up. Images are attached.

3. Ileopsoas Bursa - Cyst Presenting as Chronic Hip Pain

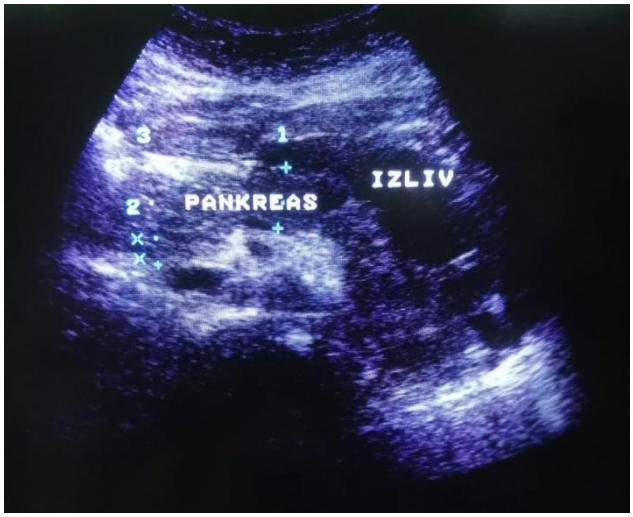
A 60-year-old male presented with a six-month history of mild pain in the right hip, exacerbated during walking. The patient denied any history of trauma or prior hip-related issues. Physical examination revealed no signs of sciatic pain or coxarthrosis. Ultrasound examination identified a cyst anterior to the hip joint, located laterally to the femoral vein and common femoral artery.

Ultrasound-guided puncture was performed, and 11 milliliters of synovial yellow fluid were successfully aspirated. Analysis of the synovial fluid confirmed the diagnosis of a ileopsoas cyst. Subsequently, betamethasone was administered into the cyst to alleviate inflammation and promote resolution.

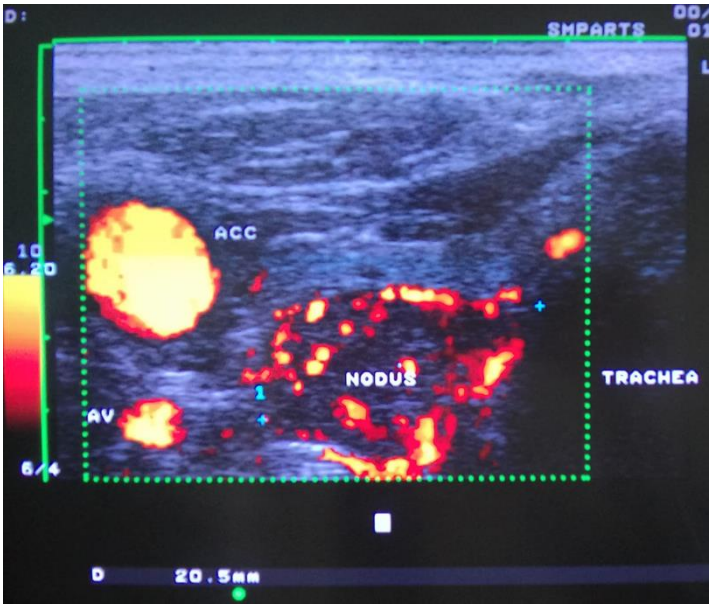
The patient was prescribed oral ketoprofen for its anti-inflammatory effects and recommended to take Nodol capsules containing MSM (methylsulfonylmethane), glucosamine, collagen, and hyaluronate for joint support and pain relief. The combination of corticosteroid therapy and non-steroidal anti-inflammatory drugs aimed to address both inflammation and pain associated with the cyst.



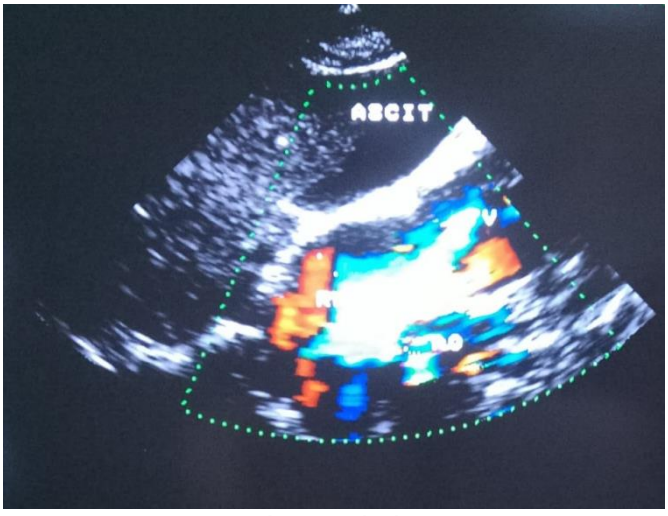
4. Effusio peripancreatis, Pancreatitis chronica



5. Nodus glandulae thyreoideae

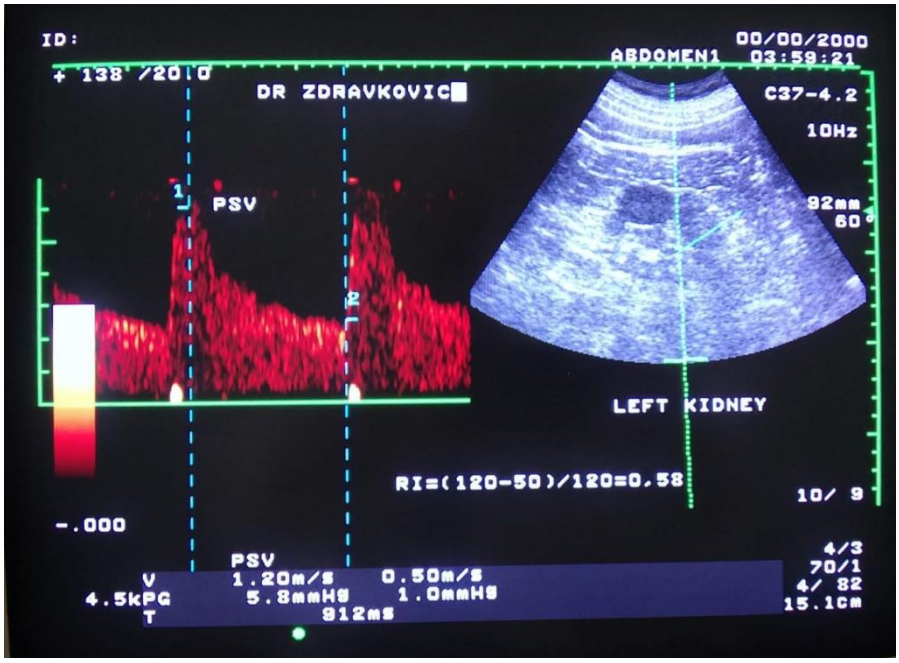


6. Severe tricuspid regurgitation, Ascites



Subcostal view

7. Doppler of renal artery

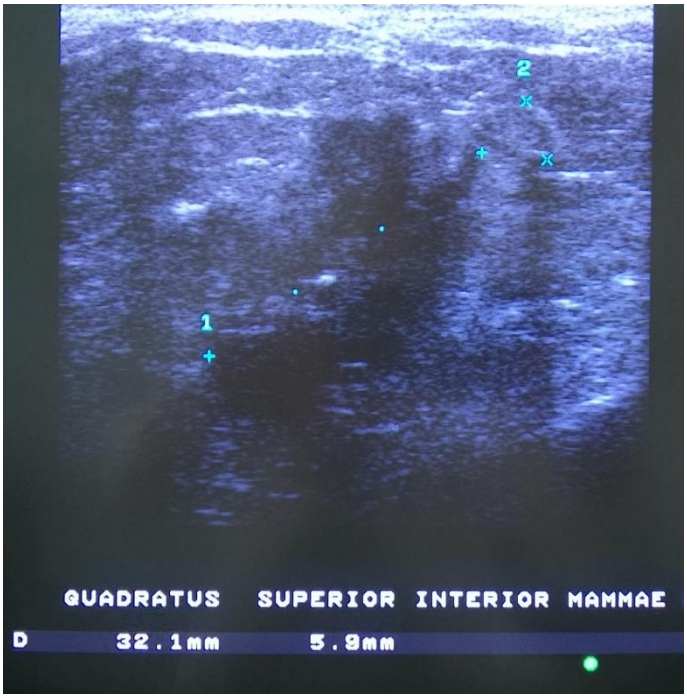


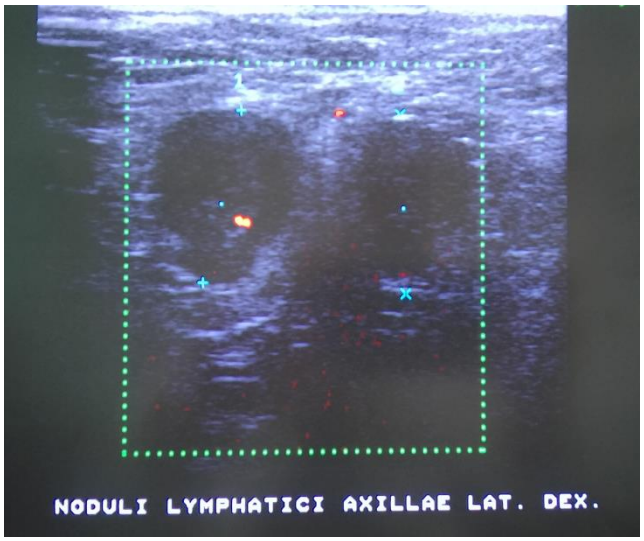
Using PulsWave to measure PSV and PDV, and then calculate RI.
Formula is: RI=(PSV-PDV)/PSV

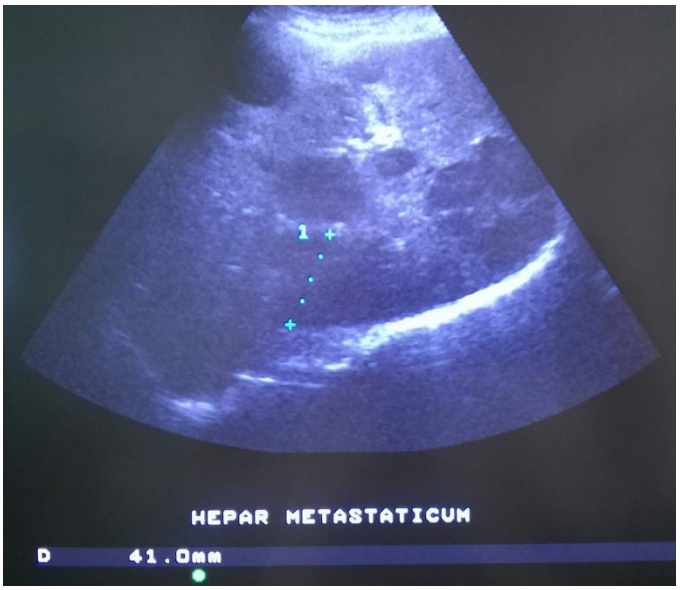
Normal PSV is up to 1,5m/s, normal RI is up to 0,80.

8. Breast cancer

Carcinoma mammae lat. dex.
Meta in LND et hepar, cum splenomegaliam.

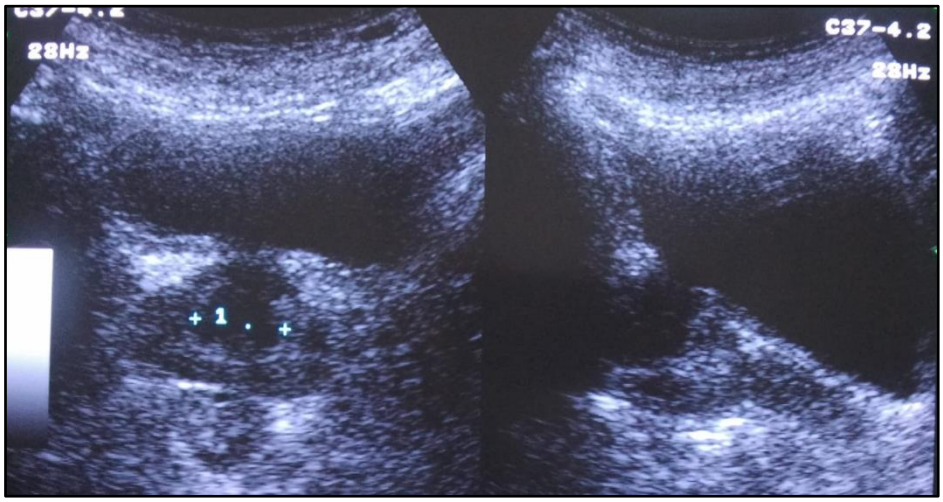






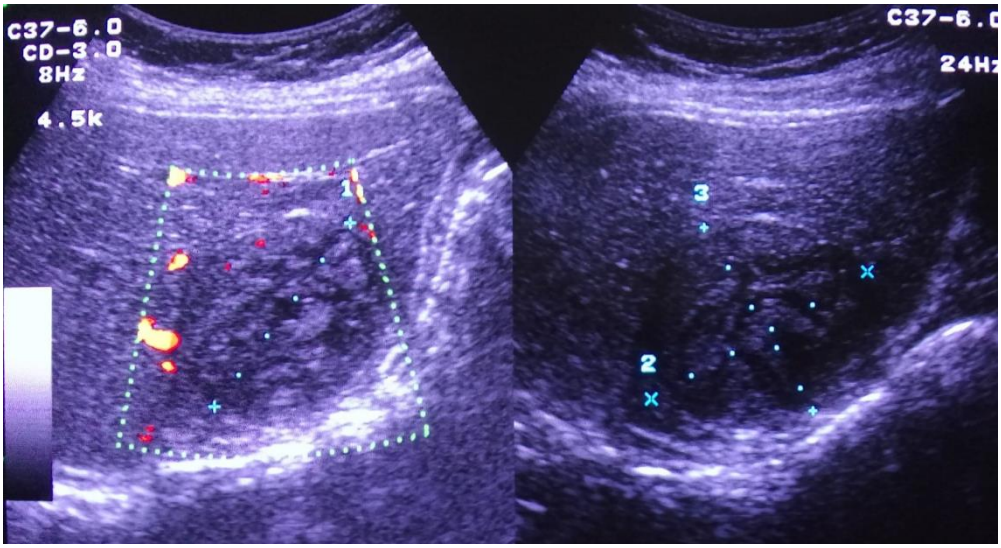
9. Prostatic pseudocyst

Diverticulum pars prostatica urethrae (pseudocystis prostatae)

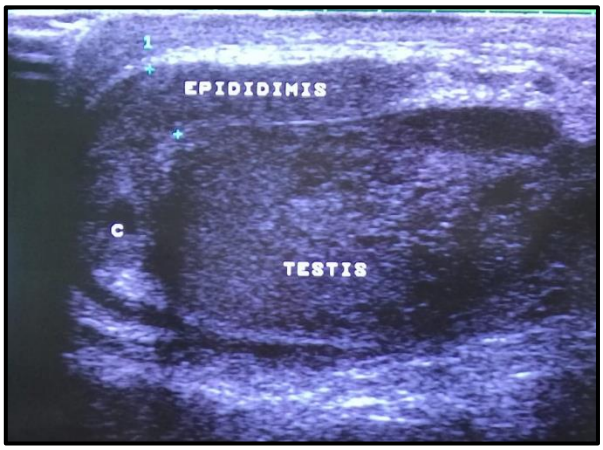


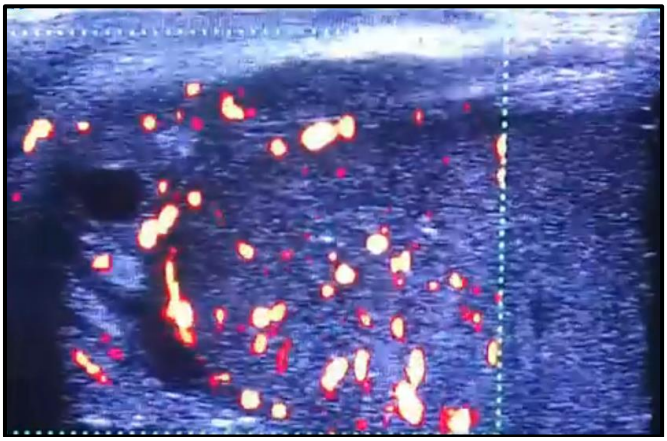
10. Liver lession

Echinococcosis hepatis, cysta hydatidosa



11. Scrotal US

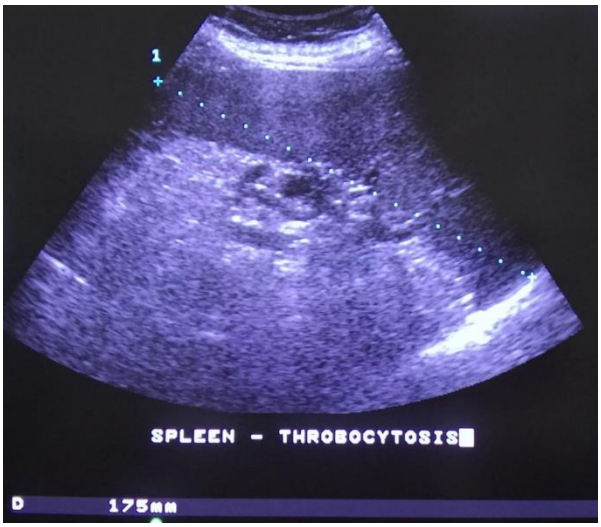


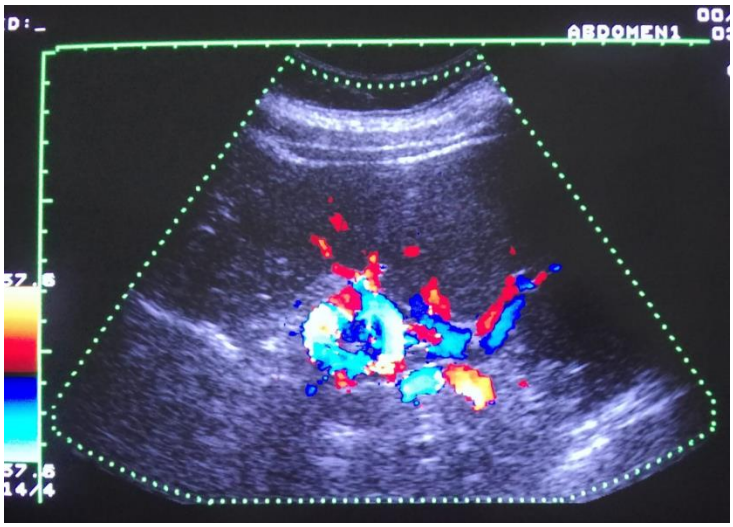


Orchiepididimitis

12. Coiling of splenic artery

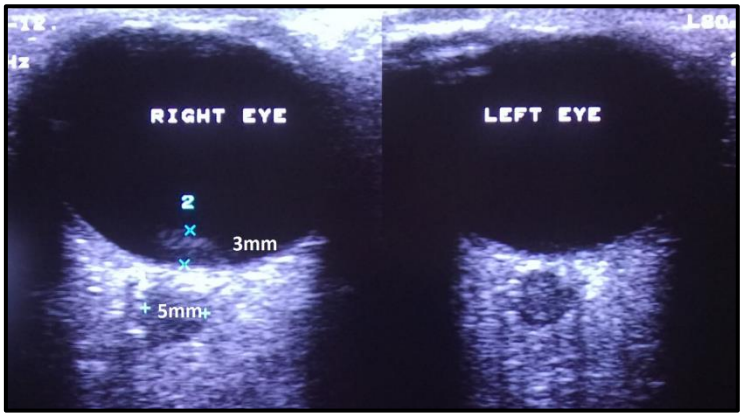
Patient is a 72 years old lady with thrombocythaemia (platelets above $700x10^9$) and severe splenomegalia (splenic craniocaudal diameter 180cm). In the hilus of the spleen we see "coil" created by splenic artery around the vein. Lienal artery is the most tortuous artery in the body.





13. Eye POCUS

The mnemonic "5x3" refers to 5mm maximum Optic Nerve Sheath Diameter (ONSD) and 3mm maximum Optic Disc Elevation (ODE). Here we see optic nerve papilla edema.



Fluid Overloaded Assessment
VExUS Ultrasound

Emad Khater, MD, Consultant physician, SKC
Leen Khater, Medical student, RAKMHSU

Assessment of fluid status is very crucial in managing any patient in particular cardiac and renal patients. Although the physical examination is very helpful in evaluation, but sometime difficult and misleading in certain conditions, for example in advanced chronic kidney disease or dialysis patients where significant number of patients do not present with classical picture of symptoms and sings of volume overload.

Point of care ultrasound is an important non invasive, easy accessible diagnostic procedure that can help for proper and accurate evaluation of volume status.

Historically measurement of inferior vena cava diameter by ultrasound is an initial step for fluid evaluation (Figure 1-2.) but it has limitation, since it may be dilated in patient without volume overload (example: patient with pulmonary hypertension, valvopathies and even in normal individual like athletes).

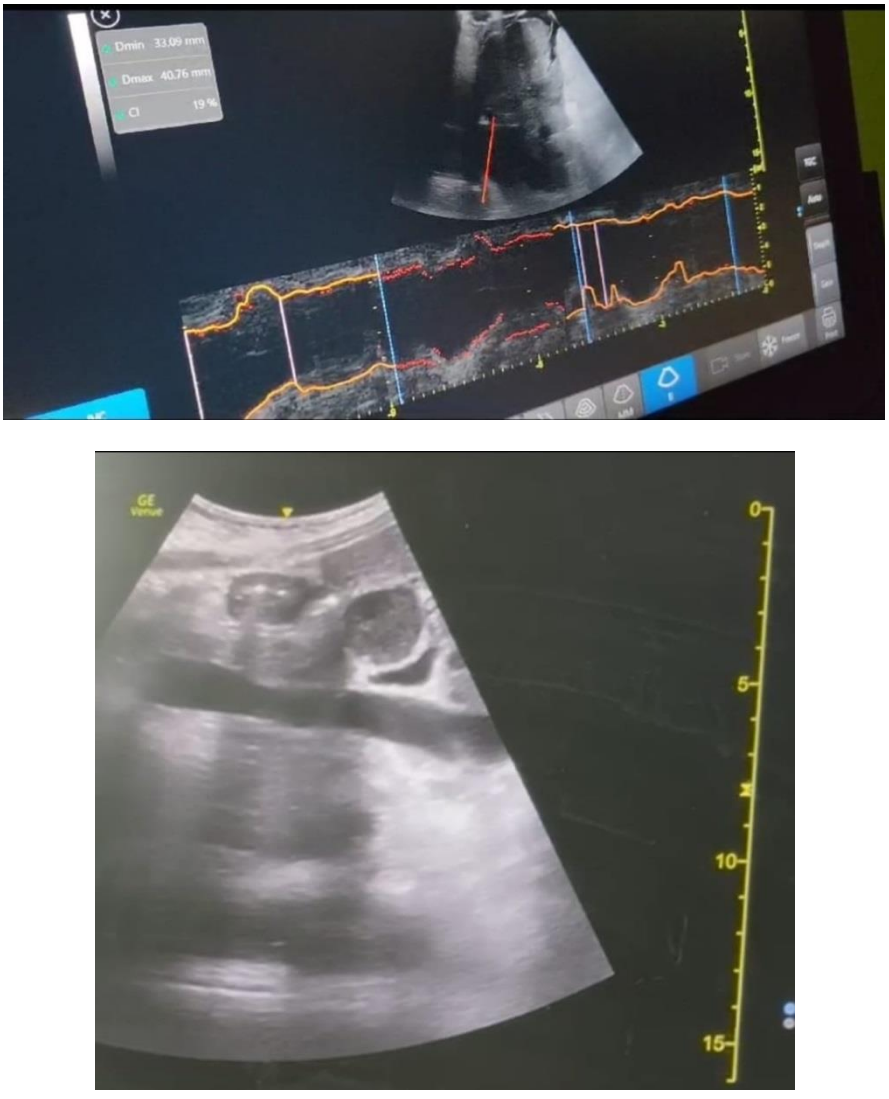


Figure 1-2 Pocus US for severly dilated IVC. Patient presented to ER with sever volume overload

Pulmonary congestion can be detected by lung ultrasound. However venous congestion in internal organ like kidney, liver and gut needs specific ultrasound approach, which allow early diagnosis and management.

Venous Excess Ultrasound (**VExUS**) is scoring scales of 4 steps ultrasound protocol which helps to evaluate the severity of venous congestion in internal organ. VExUS is helpful in different clinical conditions, in particular acute kidney failure, congestive heart failure and septic shock.

The exam started by IVC measurement and collapsibility. If the IVC size is less than 2 cm, that means there is no volume overload. If the size is more than 2 cm, that may suggest there is a volume overload.

Then we proceed to 2nd step, which is hepatic vain Doppler assessment. The hepatic vein Doppler vaweform is composed of a systolic (S wave) and diastolic (D wave) portion. Depending on the degree and severity of congestion, there will be alterations of these waves (please see Figure 3).

Third step in VexUS is PORTAL Vein Doppler Assessment

The Portal vein Doppler vaweform is monophasic, with little to no variation. Again, depending on the degree and severity of venous congestion there will be increasing amount of pulsatility. (see Fgure 3).

Fourth step is Intrarenal Venous Doppler assessment - although clonally difficult to perform, but most of the time can be obtained.

The Intrarenal vein Doppler pattern is usually continuous monophasic flow. As venous congestion increase in severity and progression, it will ultimately lead to complete absence of systolic flow, showing only monophasic flow (only diastolic phase) - please see Figure 3.

After performing the 4 steps, all information is put together to interrpret the overall severity of the volume status of the patient - from mild to severe.

This point of care ultrasound exam should be performed in association with other traditional approaches, including clinical examination, clinical history finding, lab values, and hemodynamic status of the patient, in order to reach the final diagnosis and to start appropriate management. Usually other point of care ultrasound exams like lung US, as well as cardiac US are performed in combination with VexUS, and all together will help to evaluate the clinical condition.

(Please, see Figure 3 - VExUS Scoring, on the next page)

References

1. POCUS101: VExUS Ultrasound Score – **Fluid Overload and Venous Congestion Assessment** (see **here**)
2. *Marik, P., Baram, M., Vahid, B.* (2008). **Does central venous pressure predict fluid responsiveness? A systematic review of the literature and the tale of seven mares.** CHEST 134(1), 172 – 178. **https://dx.doi.org/10.1378/chest.07-2331**
3. *Beaubien-Souligny, W., Rola, P., Haycock, K., Bouchard, J., Lamarche, Y., Spiegel, R., Denault, A.* (2020). **Quantifying systemic congestion with Point-Of-Care ultrasound: development of the venous excess ultrasound grading system** The Ultrasound Journal 12(1), 16. **https://dx.doi.org/10.1186/s13089-020-00163-w**

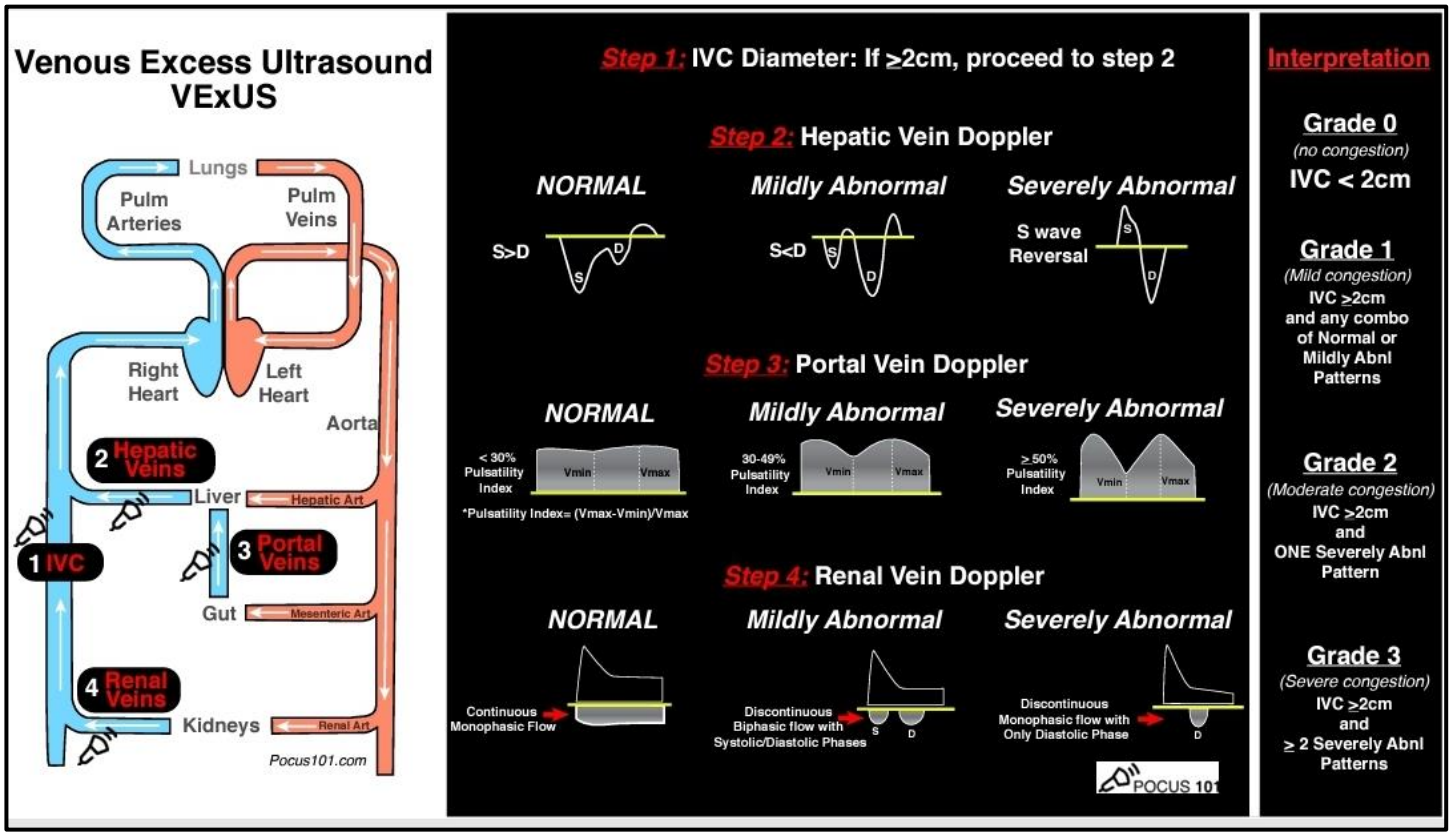


Figure 3: **VExUS Ultrasound Score** and doppler waves characteristics according to volume congestion severity.

POCUS READER'S DIGEST

Selected and suggested POCUS related online articles

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9959768/

Artificial Intelligence (AI) versus POCUS Expert: A Validation Study of Three Automatic AI-Based, Real-Time, Hemodynamic Echocardiographic Assessment Tools

By: Eyal Gohar et al.

An intriguing comparison between AI-based tools and the expertise of POCUS specialists. One of the conclusions is particularly inspiring:

"These tools, if accurate, can be beneficial for novice users, but the basic need for an accurate automatic measurement is good image quality. This may be an obstacle for the less experienced POCUS operator. **If the automatic tools are accurate only in the hands of the experts, then the utility of such tools is questionable**."

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https://www.healthcareitnews.com/news/how-ai-can-increase-effectiveness-point-care-ultrasounds

How AI can increase the effectiveness of point-of-care ultrasounds

By: Kat Jercich

Excellent article about the advantages and challenges in current POCUS education and application:

Dr. Mark Favot says learning to use point-of-care ultrasound devices can be "**very humbling**" for physicians – but artificial intelligence can make it easier for them to acquire new skills.

"(...) Many physicians learned POCUS by attending one- or two-day Continuing Medical Education courses that are hosted by a large group of POCUS experts. (...) The "problem" for people that attend these courses begins **when they return to their own institution** and now have to scan with their older, often outdated equipment, on patients that may have issues that make ultrasound imaging challenging and without the expert right there next to them coaching them on probe movements to improve the images or assisting with interpretation when **things don't look exactly like the textbook or lectures** they recently attended."

Scarry:

https://cardiovascularbusiness.com/topics/artificial-intelligence/fda-clears-new-ai-guide-point-care-cardiac-ultrasound-exams

FDA clears new AI to guide point-of-care cardiac ultrasound exams!

"(...) Lang said the technology allows anyone to perform an echo exam and produce high-quality diagnostic images. This is why the technology is initially being aimed at the point-of-care ultrasound (POCUS) market, so non-sonographers can capture the proper views needed for a cardiologist or the AI to make measurements. "It is easy to do. Actually, **my grandson can now obtain an echo**," Lang said."

POCUS MOSCOW
Activities for the first 6 months of 2024

Dear Colleagues,

We are pleased to share the latest news and achievements of our POCUS MOSCOW team within the framework of the INTERNATIONAL POCUS ACADEMY. Numerous significant events have occurred recently, and we are excited to tell you about them.

Events and Achievements:

1. Academician Perelman Student Olympiad (April 9-10, 2024):

This year, we proudly organized the Academician Perelman Student Olympiad, which featured exciting and intense competitions using the RUSH protocol. Our students demonstrated not only their knowledge but also high practical skills and the ability to make quick decisions in critical situations. This event provided an excellent platform for exchanging experiences and knowledge between students and professionals in the field of ultrasound diagnostics.




2. POCUS MOSCOW Competitions (April 20, 2024):

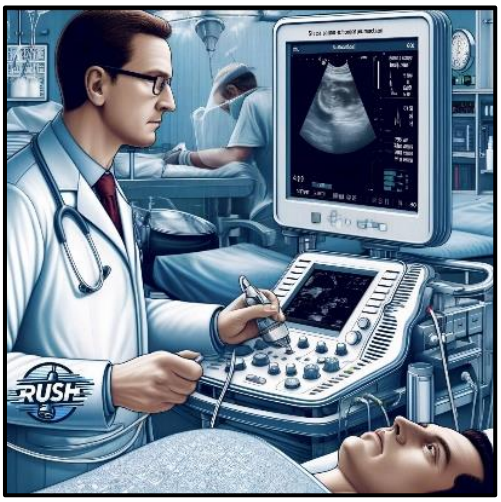
As part of the Moscow Congress of Anesthesiologists and Intensivists, we held large-scale competitions that included several key disciplines: eFAST, ultrasound control of correct tourniquet application for limb bleeding, and ultrasound-guided needle navigation. These competitions not only identified the best specialists but also contributed to enhancing professionalism and sharing advanced techniques among participants.





3. Opening of the Practical Ultrasonography Department:

We are delighted to announce the opening of the Practical Ultrasonography Department, an important step in the development of POCUS. The department will focus on training new specialists and conducting research aimed at improving ultrasound diagnostic and treatment methods. This event opens new opportunities for growth and professional development for our students and specialists.



4. Registration of the POCUS MOSCOW Trademark:

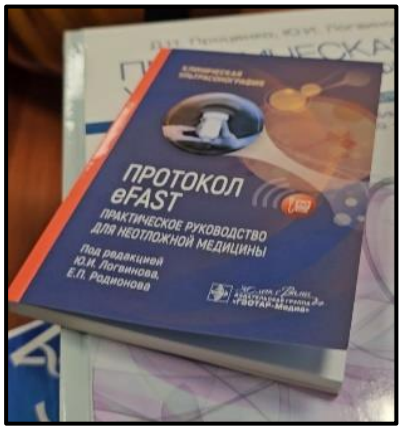
In April 2024, we successfully registered the POCUS MOSCOW trademark, confirming our high level of professionalism and innovative approach in the field of ultrasound diagnostics. This trademark will become a symbol of quality and reliability, strengthening our position on the international stage and expanding our influence.

5. Cadaver Courses on Regional Anesthesia in St. Petersburg (May 25-26, 2024)

At the end of May, another expert-level cadaver course on regional anesthesia under ultrasound control took place in St. Petersburg. Our esteemed colleague from Turkey, Tolga Ergonek, participated in this course. The courses served as an important platform for exchanging advanced techniques and methods, allowing participants to deepen their knowledge and skills in regional anesthesia.



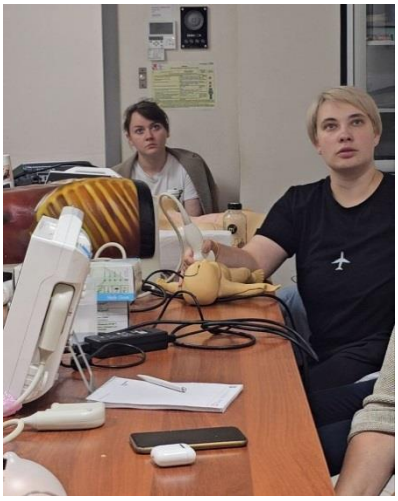
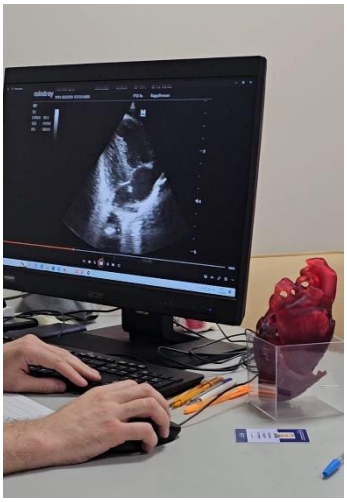

6. Release of the eFAST Protocol Book:



We proudly present our new joint book on the eFAST protocol, co-authored by Ivica Zdravkovic, a board member of IPA. This book is the result of years of work and collaboration, containing detailed instructions and recommendations for applying the eFAST protocol in clinical practice. We are confident it will become an invaluable guide for all specialists involved in ultrasound diagnostics.

7. POCUS Courses for Newborns SAFE-R Protocol:

As part of our educational programs, we conducted the first POCUS courses for newborns, developed according to the SAFE-R protocol. These courses, led by a new team of neonatologist instructors, were a significant step in developing the neonatal direction of ultrasound diagnostics. Andrey Sakerin conducted the first such course, and we plan to continue developing and improving this area.

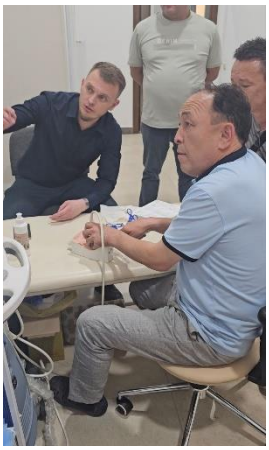




8. Formation of the POCUS Tajikistan School (June 13-15, 2024)

Thanks to our colleagues from Moscow, the first POCUS course in Dushanbe was conducted by Lykhin Vsevolod and Sherzod Dzhumaboev. The POCUS Tajikistan School was formed, with leaders appointed and a plan for further development activities outlined. This grand event opened new horizons for the development of ultrasound diagnostics in Tajikistan.

9. First Joint Master Class in Almaty, Kazakhstan (June 22-23, 2024):

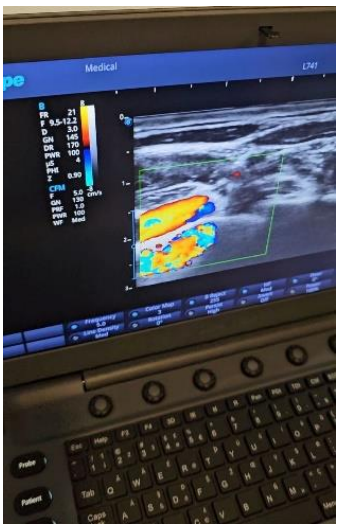
In Almaty, on the remarkable ZEIN ACADEMY platform, we held the first joint master class with the POCUS KAZAKHSTAN team. This educational event was a crucial step toward further developing the POCUS direction in Kazakhstan. We see great potential and interest in ultrasound diagnostics among Kazakhstani specialists and are ready to actively support them in this endeavor.

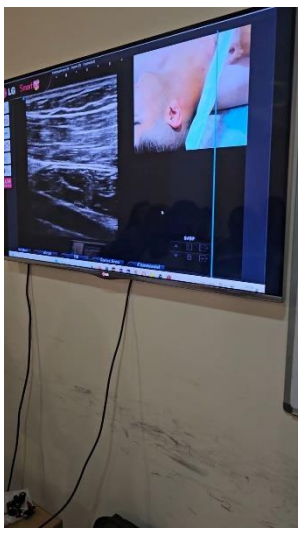


10. POCUS Events in Armenia (June 27-29, 2024):

In Armenia, we conducted an intensive practical course from POCUS MOSCOW, marking the start of the POCUS methodology in this country. The POCUS ARMENIA school was formed, with a leader appointed and the first participants listed. Armenia, with its deep history and vast potential, has enormous opportunities for developing ultrasound diagnostics, and we look forward to successful cooperation and further growth.



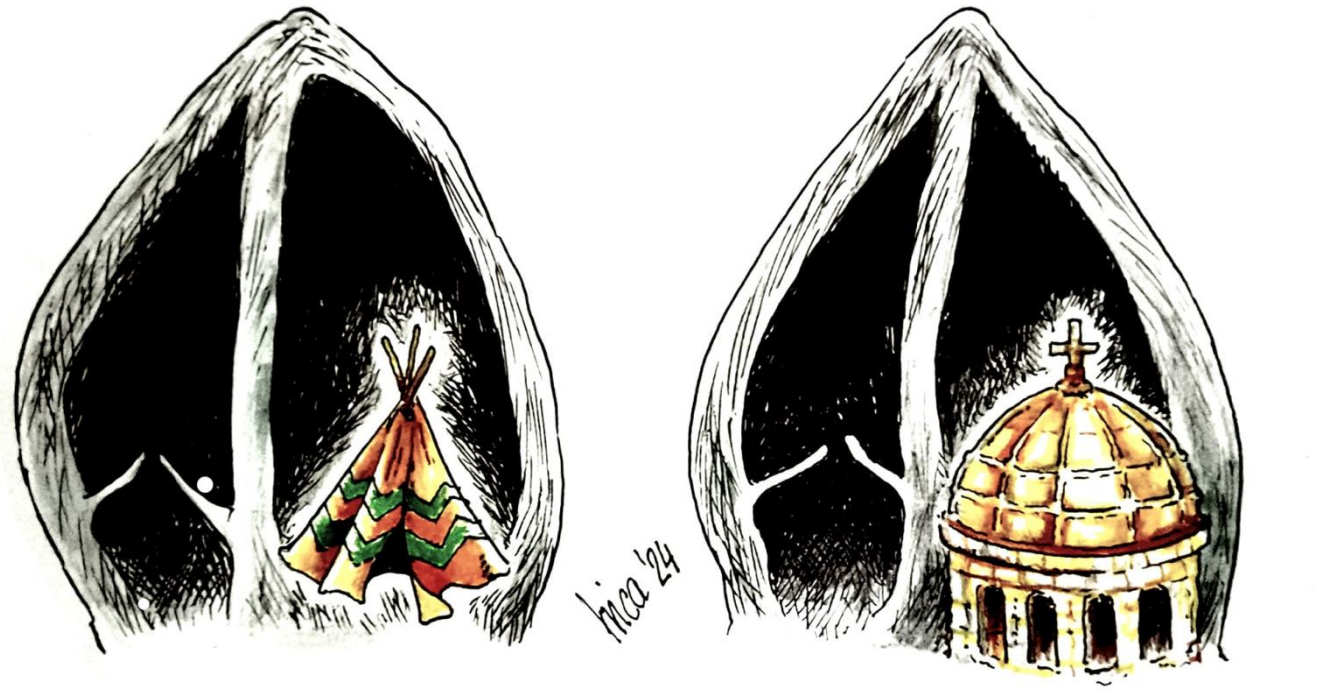



The beginning of 2024 has been eventful for the POCUS MOSCOW team. We will strive to maintain our pace and dynamic development to continue sharing our achievements and successes.

POCUS Tips and trics 1:

The mnemonic for recognizing mitral regurgitation: if the mitral valve leaflets form a triangular shape resembling a tent, the valve is likely competent. If the shape of the leaflets resembles a church dome, mitral insufficiency is likely present.

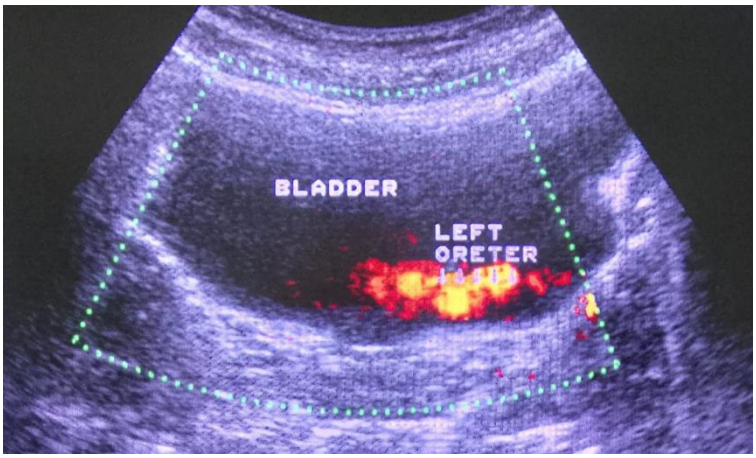


Art by: Ivica

Tips and tricks 2:

In patients where ultrasound reveals findings such as a small kidney (ren parvus), polycystic kidney disease, kidney with advanced hydronephrosis, or any other kidney alteration suggesting loss of function, verification of functionality can be performed by observing the ipsilateral ureteral orifice using Doppler ultrasound. In a functional kidney with an unobstructed ureter, urine influx can be clearly seen.

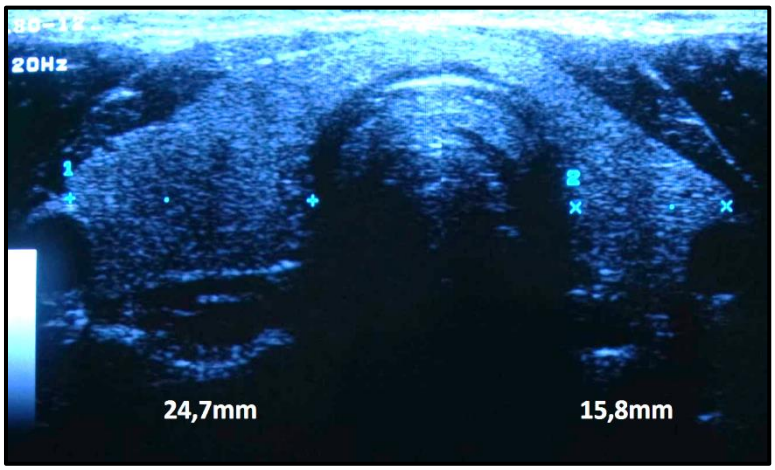
Doppler-visible jets of urinary influx typically appear alternately from both ureters, occurring every 20-30 seconds or less frequently. The appearance of these jets can be accelerated by administering Lasix to the patient, either orally or parenterally.

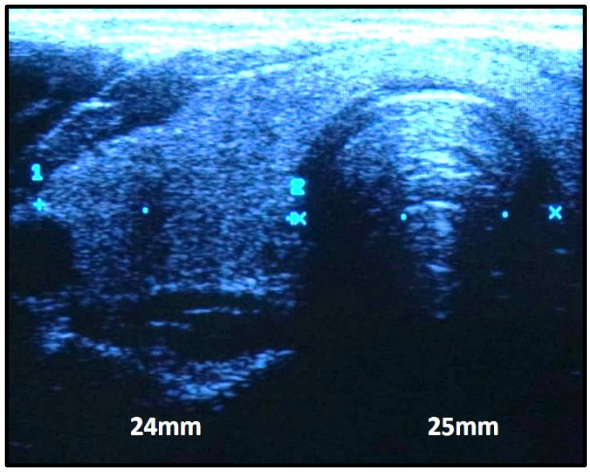


Tips and tricks 3:

Measurement of the thyroid gland:

An asymmetric thyroid gland, with the right lobe larger than the left. Here's the rough assessment method: compare the width of each lobe with the width of the trachea.

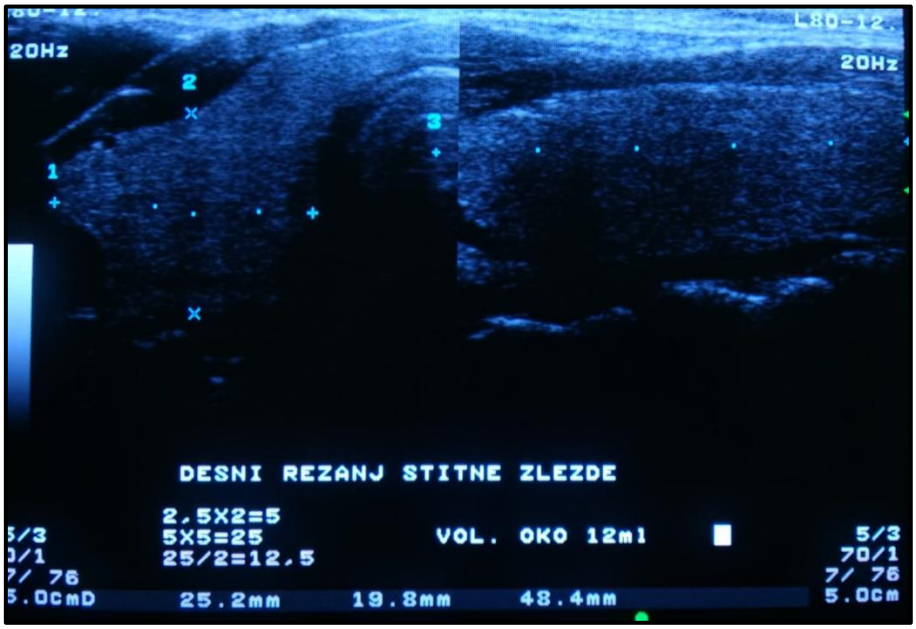




For a more precise measurement:

On a split screen, on the left, in a transverse scan, determine the width and thickness; on the right, in a longitudinal scan, measure the length of each lobe. Multiply these three values (expressed in cm) and divide the result by 2. This gives the volume of each lobe in milliliters.

The normal volume of one lobe is up to approximately 10 ml. In males, the combined volume of both lobes totals around 20 ml, with an additional 5 ml for the isthmus, making the normal thyroid gland volume in males up to 25 ml. In females, the normal thyroid gland volume is up to 20 ml.



Look for IPA cases on Facebook:

International POCUS Academy

Aneurysm of the ascending aorta

**Author: Dr. Gordana Bojović, GP and POCUS specialist,
scientific advisor of POCUS Academy of Serbia**

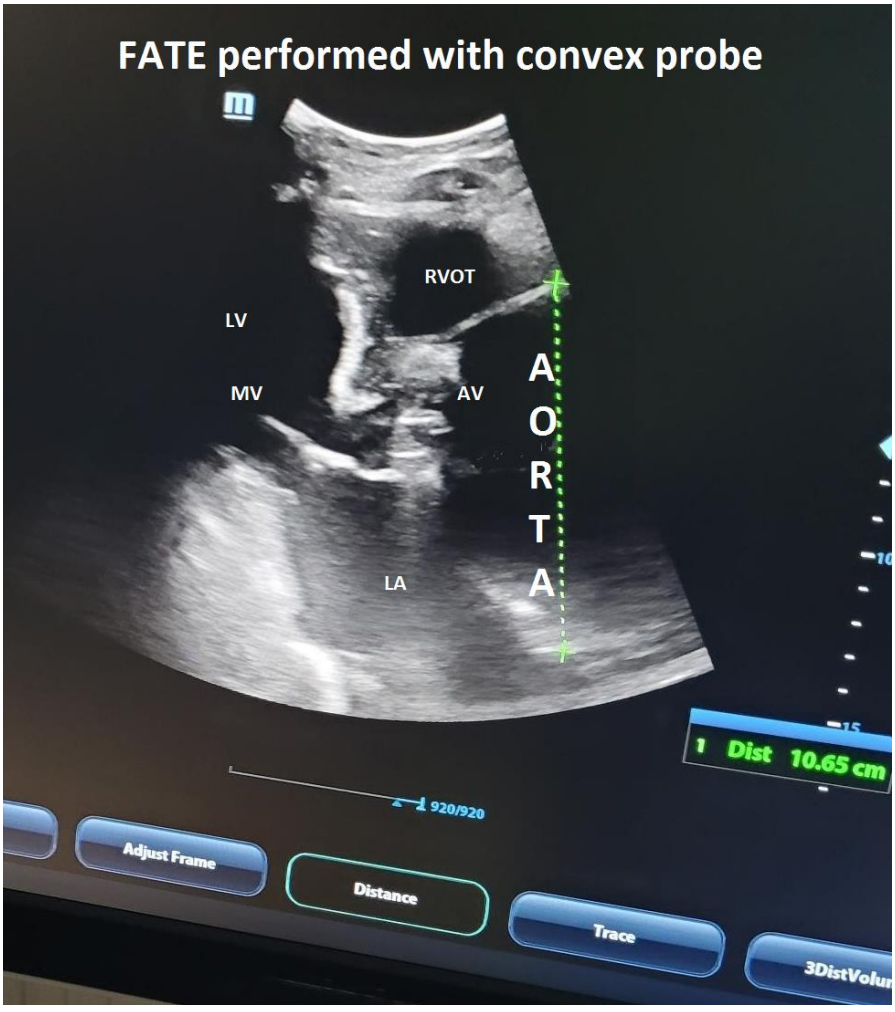
Patient M.A, 72 years old, visits their primary care physician with complaints of difficulty in swallowing food, feeling as if the food gets stuck in the upper part of the esophagus.

Gastroscopy performed 6 months ago showed no significant narrowing or spasms of the esophagus, so the patient was not referred to a gastroenterologist. An ultrasound of the abdomen and heart (FATE) revealed a dissecting thoracic aorta (aortic arch) enlarged to 10.6 cm. The patient had an artificial aortic valve implanted approximately 10 years ago.

An echocardiogram done 10 days ago by cardiologist indicated that the aortic arch measured 35 mm, while a report from December 2023 noted it as 53 mm.

Today's FATE exam, conducted 5 days after the last one, urgently referred the patient to a surgeon. A CT scan diagnosed a dissecting thoracic aorta at 14 cm (the radiologist's report indicated it was chronic).

Outcome: The patient underwent surgery on June 6, 2024 (15 days after the aneurysm was diagnosed by FATE) and unfortunately passed away on the operating table.



PLAX view

Telemedicine in a Megalopolis

Authors: Gumenyuk S.A., Filyavin R.E., Lykhin V.N., Smetanin G.A., Egorov K.V.

In the conditions of growing megacities, technologies determine trends and directions of development, and the challenges of the time that we face inevitably reflect our problems and limitations. In a megalopolis, in order to effectively provide medical care to people, we need the technologies of our time and conditions for the development of future opportunities, which ideally anticipate possible scenarios.

In the context of a global pandemic and the concentration of the majority of the population in cities, it is increasingly difficult to provide all types of assistance to the population, while all services are working to the limit of their capabilities. For the best organization of care, telemedicine monitoring technology with the possibility of ultrasound in real time will provide conditions for the identification of many urgent conditions, monitoring the condition of patients, both at the prehospital and hospital stages.

The monitoring technology includes monitoring of the basic parameters of monitoring blood pressure, heart rate, breathing rate, SpO2, body temperature, ECG, as well as ultrasound monitoring using portable ultrasound devices using the POCUS (Point-of-Care-Ultrasound-ultrasound at any place and at the right time, and all the data obtained can be converted into digital format and transmitted via the Internet (Wi-Fi, 4G, 5G) to any mobile device (smartphone, tablet, laptop) or a doctors stationary remote control for consultation, in the form of a dialog box for the visual parameters of the patient, with the transmission of images from the cameras of the tele-medical complex from the venue.

An example of a portable ultrasound device from a Russian manufacturer.

The technology allows ultrasound to be performed within the framework of the protocols EFAST (ultrasound for polytrauma), RUSH (ultrasound for shock and hypotension), BLUE (ultrasound assessment of the lungs), including in patients with COVID-19, taking into account all recommendations on infectious safety, as well as to perform invasive manipulations under ultrasound control (vascular catheterization, puncture of the pleural-pericardial-abdominal cavities, blockade of nerve trunks and plexuses.

In complex clinical cases, you can get a second expert opinion on-line, on the interpretation of the images obtained or correction of the position of the ultrasound sensor to obtain standard images in the scanning areas, as well as remote ultrasound, when the medical staff performs the placement of the ultrasound sensor at standard scanning points, and the doctor remotely evaluates the result and at the same time He sees the entire research process and monitor indicators for the main baseline values (blood pressure, heart rate, BH, SPO2, BODY TEMPERATURE, ECG).

Чек-лист оценки eFAST-протокола.

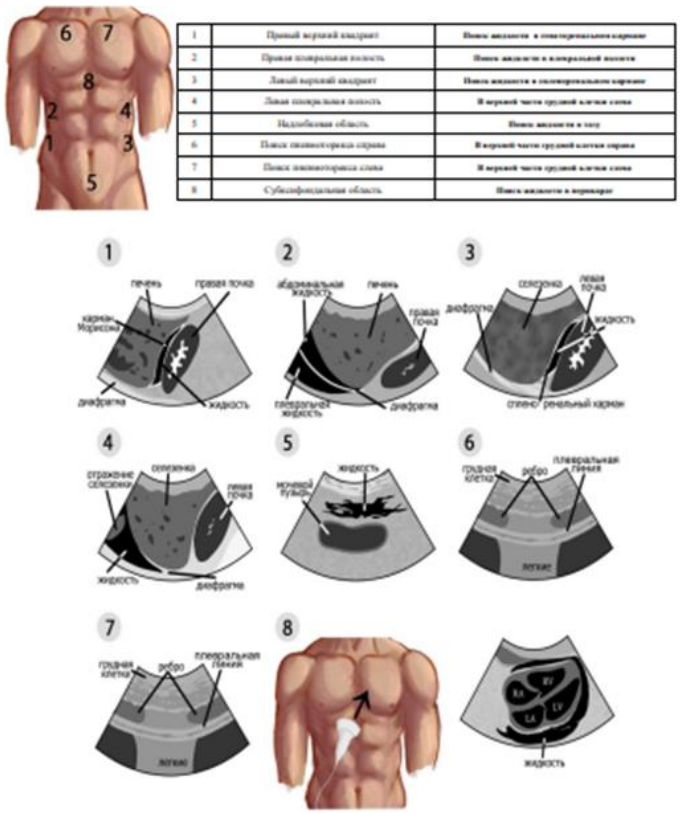
ФИО_____ЛЕТ_____

Наряд_____, бригада_____

Время и механизм травмы_____

Диагноз_____

Область визуализации	Результат оценки свободной жидкости и пневмоторакса			Интерпретация
Гепато-ренальный карман	отсутствует	сомнительный	наличие	<5 мм 5-10 мм >10 мм
Правая плевральная полость	Отсутствует: -Есть зеркальный артефакт -Эффект «занавески» -Движение диафрагмы на вдох	Наличие: -Нет зеркального артефакта -Есть\нет движения диафрагмы		Гемо-гидроторакс: -минимальный -умеренный -массивный
Поиск пневмоторакса Справа\Слева	Отсутствует: -Есть скольжение плевры -М-режим «Морской берег»	Наличие: -Нет скольжения плевры -М-режим «Штрих код»		Точка лёгкого: -Передне-подмышечная линия -Задне-подмышечная линия
Сплено-ренальный карман	отсутствует	сомнительный	наличие	<5 мм 5-10 мм >10 мм
Левая плевральная полость	Отсутствует: -Есть зеркальный артефакт -Эффект «занавески» -Движение диафрагмы на вдох	Наличие: -Нет зеркального артефакта -Есть\нет движения диафрагмы		Гемо-гидроторакс: -минимальный -умеренный -массивный
Надлобковая область	отсутствует	сомнительный	наличие	<5 мм 5-10 мм >10 мм
Перикард из Субкостальной области	отсутствует	сомнительный	Наличие: -есть коллабирование стенок сердца -нет коллабирования стенок сердца	-Тампонада -гемо-гидроперикард
Прочие находки				



The checklist for the FAST protocol.

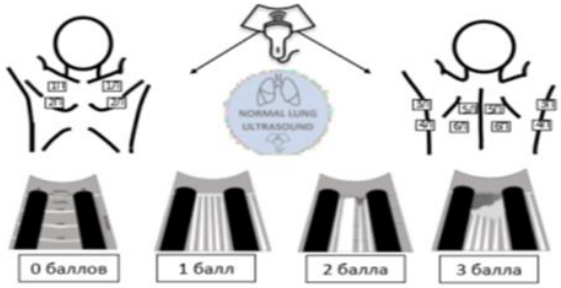
УЗИ-ЛЁГКИХ

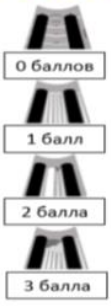
Протокол УЗИ лёгких

Ф.И.О._____Возраст_____Наряд _____

дата	ТºС	SpO 2	ЧДД	1 п	2 п	3 п	4 п	5 п	6 п	6 л	5 л	4 л	3 л	2 л	1 л

УЗИ ЛЕГКИХ ПО ЗОНАМ





А-линии; 1 или 2 В-линии;
ГЛАДКАЯ ТОНКАЯ ПЛЕВРАЛЬНАЯ ЛИНИЯ

> 2 раздельных В-линий;
ПРЕРЫВИСТАЯ/УТОЛЩЕННАЯ ПЛЕВРАЛЬНАЯ ЛИНИЯ

сливающиеся В-линии;
СУБПЛЕВРАЛЬНЫЕ КОНСОЛИДАЦИИ < 1 СМ

БОЛЬШИЕ КОНСОЛИДАЦИИ (> 1 СМ);
+/- ВОЗДУШНАЯ БРОНХОГРАММА
+/- УСИЛЕННАЯ ВАСКУЛЯРИЗАЦИЯ В ЦВЕТНОМ КАРТИРОВАНИИ

КЛАССИФИКАЦИЯ СТЕПЕНИ ТЯЖЕСТИ	ИТОГОВАЯ ОЦЕНКА В БАЛЛАХ	НЕОБХОДИМОСТЬ ВСПОМОГАТ О2	МАРШРУТИЗАЦИЯ
норма	0	нет	амбулаторно
		да	рассмотреть альтернативные причины
легкая	1-5	нет	амбулаторно + телемедицинский контроль
		да	амбулаторно с мониторингом SPO2+/-кислород; рассмотрите возможность госпитализации в палату
средняя	> 5-15	нет	
		да	госпитализация в палату / рассмотрите необходимость ОРИТ
тяжелая	> 15	нет	госпитализация в палату
		да	госпитализация в ОРИТ

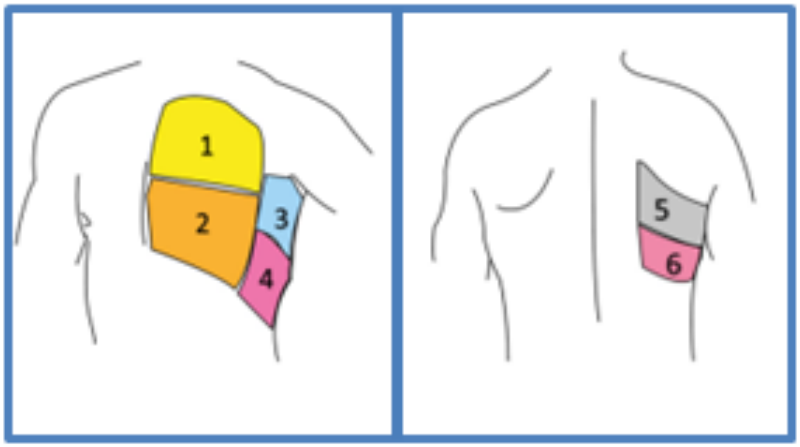
Checklist of ultrasound of the lungs (BLUE protocol).

An example of a consultant doctor's dialog box (monitoring, ultrasound, brief information from the event site and camera).

The described technology can be implemented according to the scenario of a planned consultation in an outpatient setting or home-based patronage, the hospital stage between departments, in the operating room, an interhospital consultation, and at the prehospital stage of emergency medical care with a remote consultation, when the doctor sees the actual monitor indicators and, if necessary, an ultrasound is performed (according to the EFAST protocol method), and a decision is made on further tactics of the SMP brigade.

An example of the embodiment of an ultrasound machine and a vital signs monitor system with a tele-medicine function in one device.

Separately, the technique can be used in patients with COVID-19 and the clinic of respiratory failure, when the younger med. The staff or doctor conducts medical monitoring and ultrasound of the lungs by zones (the principle of palms or 6 zone assessment for each lung), then an assessment is performed according to the protocol and a decision is made on the spot or a remote consultation is conducted in real time.



6-zone examination protocol for ultrasound of the lungs.

A special place is occupied by the use of the described technology in conducting medical triage, when it is necessary to divide patient flows according to the scenario of mass trauma at the scene, with simultaneous admission to the hospital of victims or patients with somatic pathology (as an example, lung damage in COVID-19 by severity into sorting groups, and thus delimiting admission flows and optimizing treatment algorithms As a result, the decision-making time is reduced and the survival rate of patients, especially with polytrauma, is increased. It should be noted that the technology can be used for sorting in combat conditions, when the described algorithm for reading parameters is already on the employee in the form of sensors, and a compact communication console transmits it to the medical control command console.

If tracheal intubation is necessary, both on a planned and emergency basis, a video laryngoscope is connected to the monitor via tele-medical monitoring (via wire or Wi-Fi, with simultaneous display of capnography and Sp02 parameters from the patient on the screen. The technique will allow performing prosthetics of the respiratory tract in any situation at the pre-hospital stage (by a doctor and a paramedic), and at the hospital stage of medical care, in order to avoid all adverse consequences in the form of ingestion and "difficult airways". As well as diagnose foreign bodies at the laryngeal level that caused respiratory arrest. The technique is carried out under the control of capnography and Sp02 parameters, which will immediately display the result of tracheal intubation under video control. The technology has a built-in function for transmitting the received image remotely via the Internet with recording and fixing the time and place of the event.

An example of an implementation based on a single device with the function of ultrasound, monitor, and video laryngoscopy.

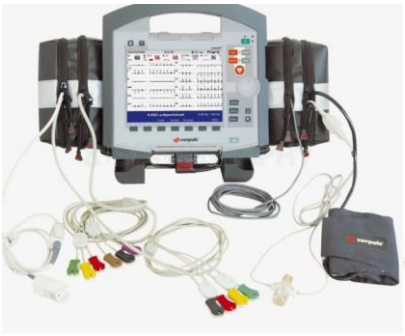
The technology of telemedicine consultations has a multidisciplinary approach, allowing to monitor the condition of patients on a planned and emergency basis, conduct a remote on-line consultation, conduct medical triage at a qualitatively new level, delimiting and directing patient flows at both the

pre-hospital and hospital stages, and can be used in a pandemic at all stages of the organization of medical care and determine the tactics of conducting such patients.
All the described advantages of the telemedicine complex make it easier to control and find the right solution in difficult clinical situations, and also has a clear and intuitive interface. In a megalopolis, telemedicine monitoring technology is promising and necessary in the near future for fast, affordable, and high-quality medical care.

Clinical examples of performing practical ultrasonography using the POCUS technique at the prehospital stage by disaster Medicine teams of the territorial center of Moscow.

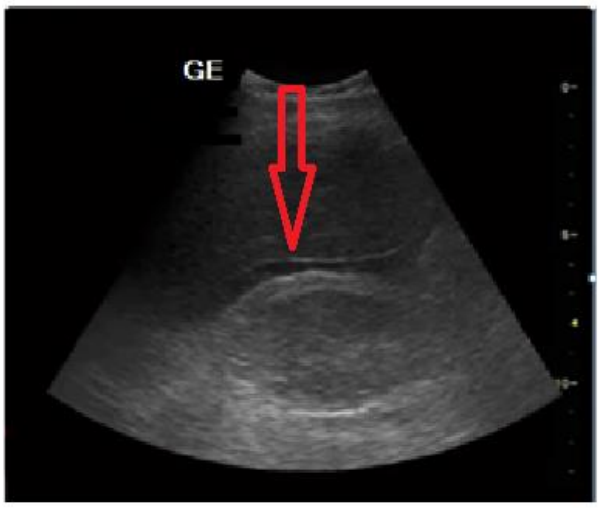
https://cemp.msk.ru

Disaster medicine teams are equipped with modern medical equipment that allows them to carry out a wide range of diagnostic and therapeutic measures, up to extended resuscitation measures during transportation to a clinical hospital using the CORPULS-3 defibrillator monitor and with the function of automatic chest compressions CORPULS-CPR, and using a portable ultrasound device GE Logiq E, including including in the conditions of air medical teams.



Case 1.

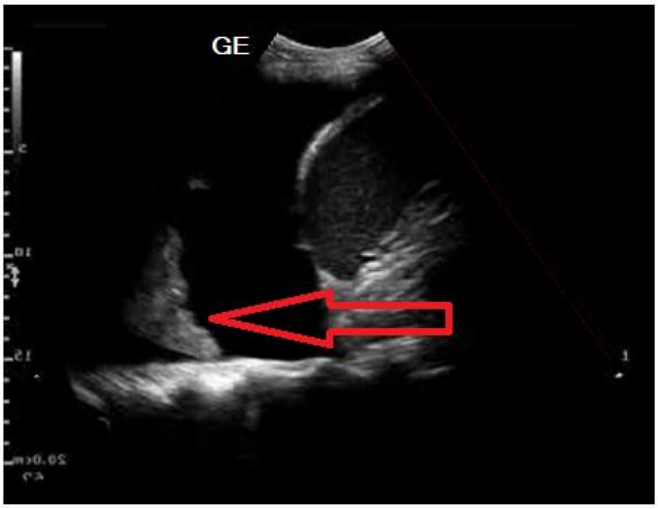
A call with an excuse of a car injury on the highway. A medical helicopter of disaster medicine was sent to the site. Man 51 years old, with multiple injuries, with an objective examination of blood pressure 100/60 mmHg, heart rate 105 per minute, BPD 19 per minute, SpO2 95%

During the FAST-protocol screening study, the patient revealed free fluid of traumatic origin in the abdominal cavity (splenic-renal pocket), there was no pneumothorax. The patient underwent anesthesia with the use of fentanyl, immobilization of a vacuum mattress in poverty, infusion therapy and was taken by helicopter to trauma centers.

Case 2.

During inter-hospital transportation, a 45-year-old woman with polytrauma. There was a deterioration in the condition, in the form of a decrease in saturation against the background of ventilation. On objective examination, blood pressure 110/70 mmHg, heart rate 95 per minute, BH 22 per minute, SpO2 88%, temperature 37.9 C. There is a decrease in respiratory noises when breathing on both sides.

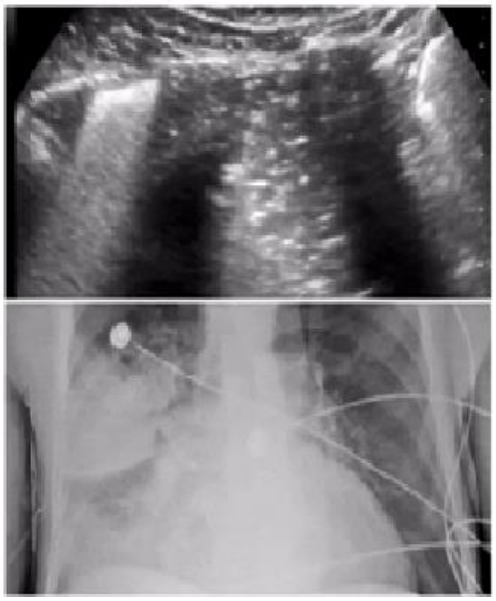


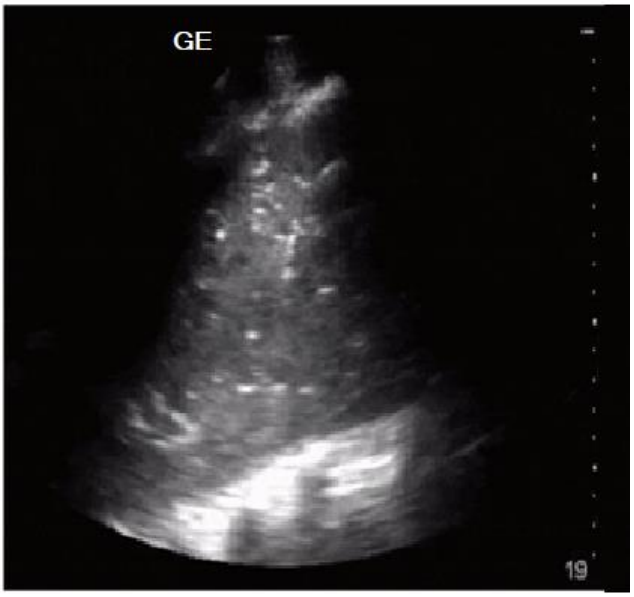
Lung ultrasound (BLUE protocol) revealed compression atelectasis of the left lung, no pneumothorax. After that, the ventilation regime was adjusted and the patient was successfully taken to a specialized hospital in a stable condition.

Case 3.

A call to a man with respiratory failure at home. There is a history of chronic lung disease, chronic heart failure, venous insufficiency of the veins of the lower extremities, atherosclerotic lesion of the cerebral vessels and vessels of the lower extremities. It is known that dynamic deterioration occurs within 12 days.

On objective examination, blood pressure 140/90 mmHg, HR 105 per minute, HR 22 per minute, SpO2 90%, temperature 38.4 C. Auscultation revealed wheezing in the lungs and weakening of breathing in the lower parts. A BLUE protocol was performed: ultrasound signs of pneumonia of the lower lung were revealed (consolidation of lung tissue and multiple B-lines, with minor effusion in the pleural cavity). The patient was hospitalized with respiratory support and subsequently confirmed by lung X-ray and CT scan.





Conclusions:

The use of ultrasound-assisted examination of patients in the prehospital stage allows us to clearly and objectively understand the cause of clinical deterioration of patients' condition, and timely carry out therapeutic measures at the place of medical care. At the prehospital stage in Moscow, the EFAST and BLUE protocol is used in practice by medical teams in patients with trauma, arterial hypotension, respiratory failure and decreased SpO2, in shock and during extended resuscitation, which has been proven reduces the time of differential diagnosis in urgent practice.

All this is possible thanks to the regular training of medical staff, the development of teamwork skills and the ability to use modern technological equipment.

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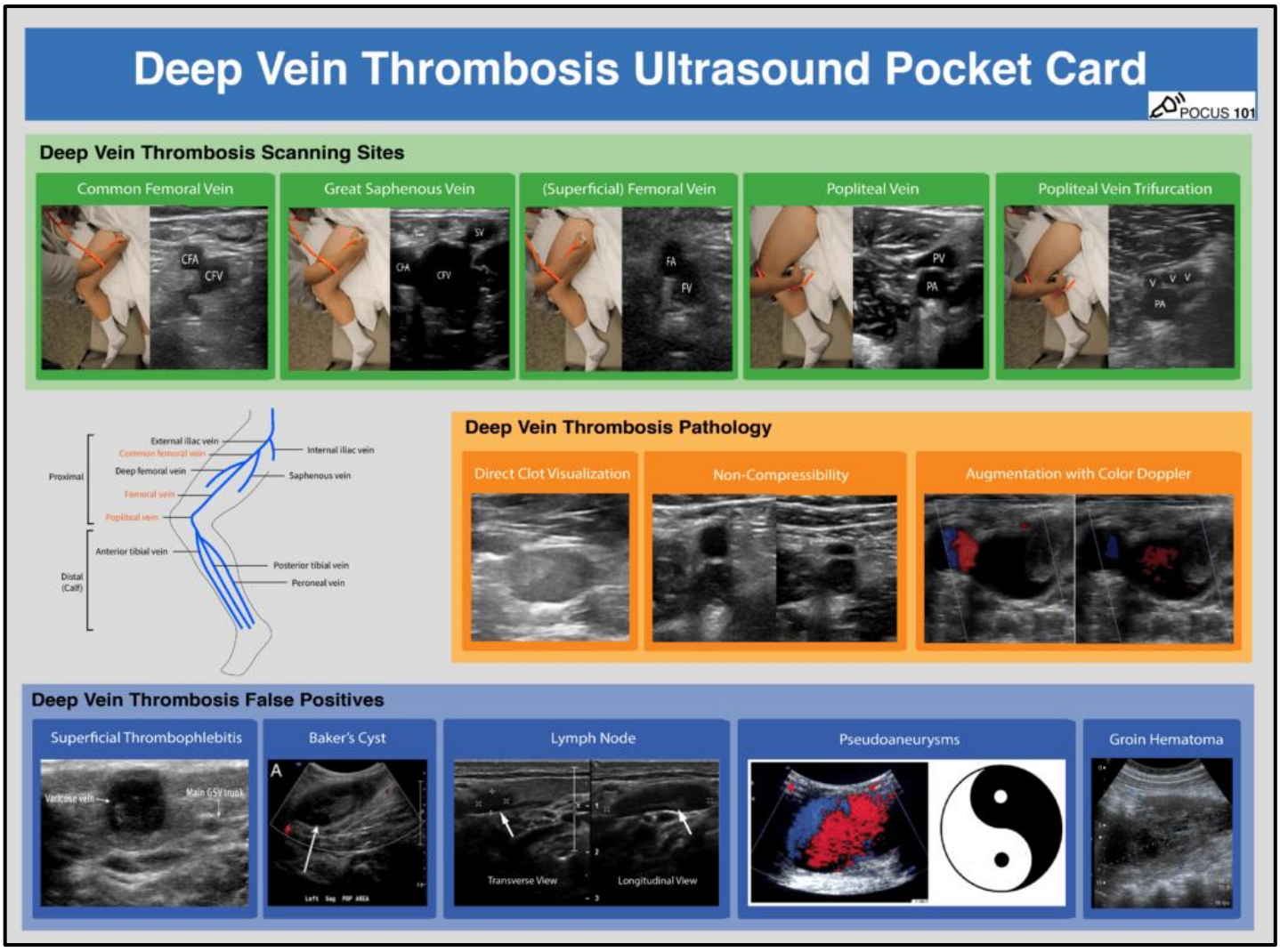
POCUS 101:



PEARLS Protocol

Point-of-Care-Ultrasound (POCUS) Multiorgan Exam

by Michael Wagner, Janice Boughton

Interpreted by: Dr. Ivica Zdravkovic

PEARLS is a mnemonic for a quick POCUS examination of a patient, incorporating elements of the eFAST, RUSH, and BLUE protocols, among others. This serves as a good guideline for the content of introductory "crash" courses in ultrasonography for physicians in primary healthcare, general medicine, emergency medicine, internal medicine, and more.

Parasternal *(position for PLAX and PSAX FATE exam)*

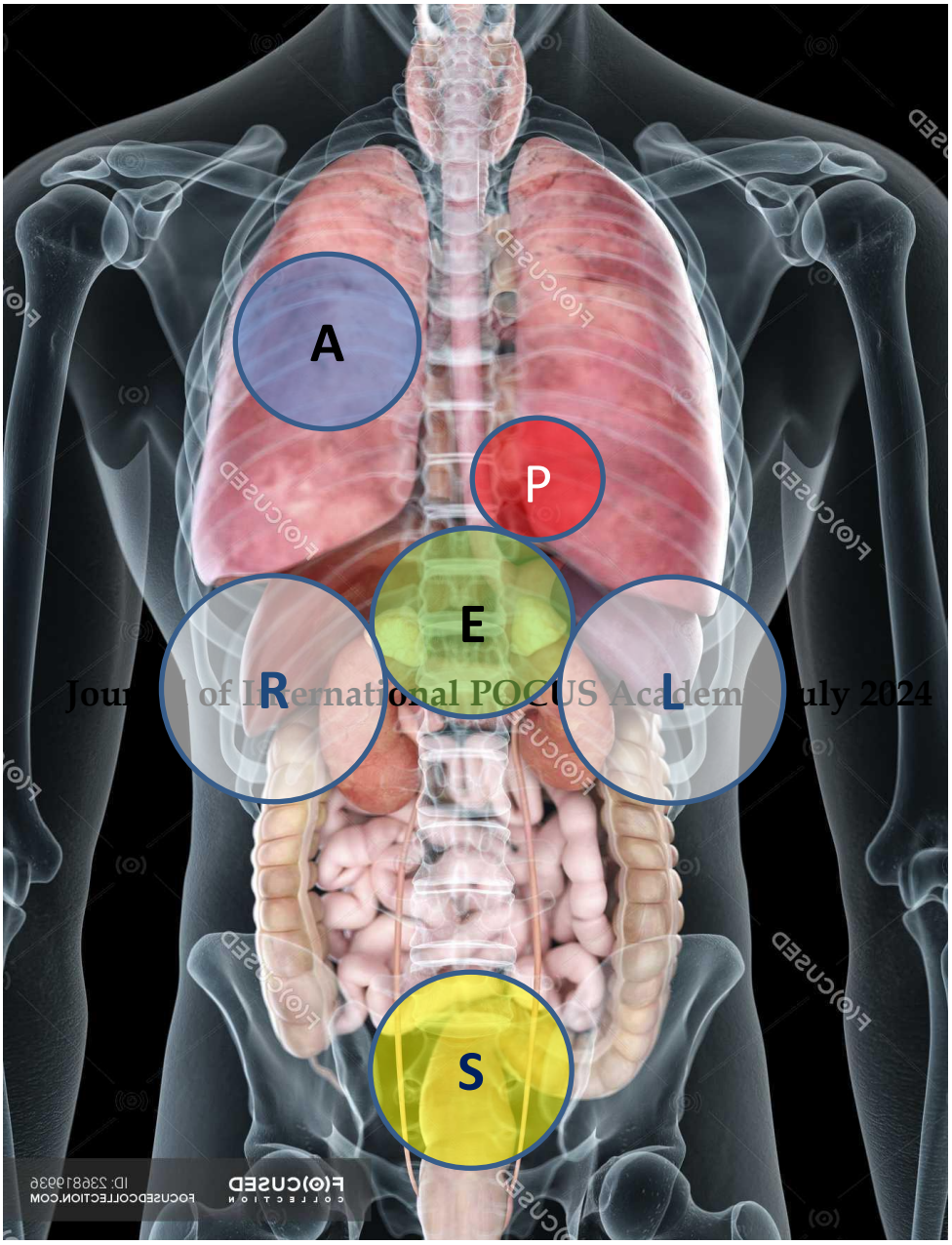
Epigastric *(position for subxyphoid FATE exam, exam of pancreas and AAA scanning)*

Anterior Lung *(look for B lines and pneumotorx "barcode" sign)*

Right upper quadrant *(position for PLAPS LUS, pleural recessus, Morrison pouch, gallbladder, liver, right kidney)*

Left upper quadrant *(position for PLAPS LUS, pleural recessus, Koler, spleen, left kidney)*

Suprapubic *(position for bbladder exam, prostate scan, uterus, ovaries and Douflas pouch exam)*



CONTENT:

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To submit your articles, you don't need to be a member of the International POCUS Academy. Our main guideline is that all articles, case reports, reviews, and research papers must be related to POCUS or echosonography in general. Articles should be sent in Word format, with images wrapped "in line" or "top and bottom" with text. The font used in articles should be Times New Roman 12 or Arial 12. Please send your articles to ivicaserbia@yahoo.com at least a few weeks before the next edition. We usually publish our Journal on July 1st and January 1st of every year.