POCUS Journal

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

Dear friends,

As we enter the new year, it's hard not to feel a mix of concern and, to some extent, disappointment. The state of global affairs continues to pose significant challenges, and closer to home, the slow progress of integrating Point-of-Care Ultrasound (POCUS) into everyday medicine remains a source of frustration for our community. Our own International POCUS Academy has seen limited growth over the past six years, which makes me wonder: is it a matter of not enough "aggressive" outreach, or is this simply the natural pace of medical progress?

The medical community's resistance to change is nothing new. Take the stethoscope - invented by René Laennec in 1816, it took nearly a century to be widely accepted. Perhaps the same is happening with POCUS: slow but steady progress, and eventually, it will be as ubiquitous as the stethoscope.

So, let's stay optimistic and keep pushing for POCUS integration.
In the meantime, here's to a year of continued growth, breakthroughs, and a little humor to lighten the way. Happy New Year to all!

Editor

POCUS BETWEEN EDUCATORS AND ULTRASOUND MACHINE MANUFACTURERS

Ivica Zdravkovic, MD, IPA Secretary General

Point-of-Care Ultrasound (POCUS) is a diagnostic tool that is revolutionizing healthcare delivery. While its popularity has surged in recent years, POCUS has a history spanning several decades.

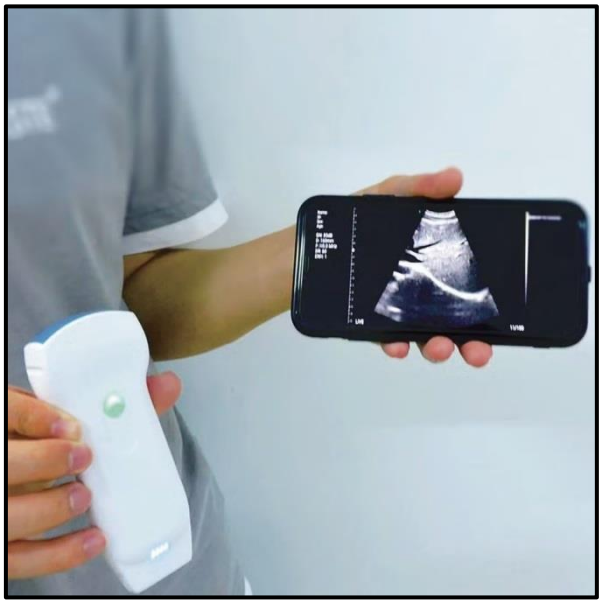
The term "POCUS" was coined in the 1990s to describe the use of portable ultrasound devices in point-of-care settings, meaning "where the patient is." Initially used by emergency medicine physicians, POCUS quickly expanded to other specialties, including intensive care, general/family medicine, anesthesiology, and more.

By the early 2000s, POCUS placed ultrasound probes into the hands of all physicians—not just radiologists, gynecologists, and cardiologists. Portable POCUS devices became indispensable in disaster zones, military conflicts, remote areas, rural environments, and underserved or developing regions—anywhere traditional imaging methods were less accessible.

Today, POCUS is in use worldwide. Numerous studies have demonstrated that it improves patient outcomes by enabling rapid diagnosis and timely initiation of appropriate therapy. Beyond diagnostics, POCUS is also used to guide specific medical procedures, such as central venous catheter placement, thoracentesis, and arthrocentesis.

However, the growing market for ultrasound devices faces a significant challenge: while machines are available, there is often a lack of knowledge (and sometimes willingness) to use them. Most healthcare workers have received little to no training in ultrasound diagnostics. As a result, many institutions refrain from acquiring portable POCUS devices, knowing their medical staff may lack the skills to use them effectively.

Collaboration between ultrasound device manufacturers and distributors on one side and organizations and institutions providing POCUS training on the other is in everyone's best interest.



ULTRASOUND OF THE CAROTID AND VERTEBRAL ARTERIES

Authors: 1.Popović Ž, 2.Ristić S, 3.Blagojević Pavlović Z.

1. Family medicine specialist, Health Center Doboj BIH;
2. Head of the Department of Physiology, Faculty of Medicine, East Sarajevo BIH;
3. Family medicine specialist, Health Center Doboj BIH

ABSTRACT

Indications for ultrasound of the carotid arteries include symptoms of stroke, transient ischemic attack, and amaurosis fugax. Ultrasound can assess the morphological appearance of the carotid arteries, the thickening of the intima-media complex, the presence of plaques, and especially their appearance in terms of irregular edges and rupture risk. Hemodynamics are also analyzed, with special emphasis on PSV (peak systolic velocity). If stenosis is detected, its grading is performed, and for stenosis of 70-90%, CT angiography is considered, along with potential surgical treatment.

KEYWORDS: indications, carotid arteries, stroke, carotid artery stenosis.

A 63-year-old female patient, a nurse by profession, presented to her family doctor with complaints of weakness in her right arm and neck pain radiating to the right arm. The symptoms had been present for three days and started after a physical therapy session that involved the use of direct current for pain relief in the cervical spine. She suddenly felt severe pain in her neck and arm, along with general weakness. The treatment was discontinued, but the symptoms persisted.

On examination, the patient was conscious and oriented in time and space. No neurological deficits were observed except for slightly reduced strength in her right hand during a grip test. Her blood pressure was measured at 200/100 mmHg, despite the patient stating she usually has low blood pressure. In addition to chronic back pain, the patient had no other medical conditions and was not on any medications. She is not obese and does not smoke.
An urgent ultrasound of the carotid arteries was performed, revealing significant stenosis of the left common carotid artery (ACI) of hemodynamic significance. The patient was urgently referred for CT angiography, which confirmed the ultrasound findings, leading to surgical intervention.

This was not a typical case of transient ischemic attack (TIA), as the patient's symptoms were more indicative of brachiocephalic syndrome or a hypertensive crisis. However, prompt intervention prevented a stroke. Given the high mortality and disability rates that may arise, timely action, the experience of the physician, and basic knowledge of POCUS (Point-of-Care Ultrasound) are crucial.

ANATOMY OF THE CAROTID ARTERIES

On both sides of the neck, there is one common carotid artery (CCA) with different origins. The left common carotid artery (LCCA) arises directly from the aortic arch, while the right common carotid artery (RCCA) originates from the right brachiocephalic trunk. Lateral to each CCA lies the internal jugular vein. At the level of the thyroid cartilage (C4), the common carotid arteries bifurcate into the external and internal carotid arteries. The external carotid artery supplies the face and neck, while the internal carotid artery supplies the brain.

The external carotid artery, after branching off from the CCA, reaches the lower jaw and neck, extending to the parotid gland, where it gives off the superficial temporal artery and the maxillary artery. At the bifurcation point, the external carotid artery lies anterior and medially to the internal carotid artery, which is why it is often said to be “external inside of internal artery” for easier identification. Essentially, pathological changes in the CCA are not of significant clinical importance if the internal carotid artery (ICA) does not have stenosis or occlusion.

The majority of internal carotid arteries originate at the levels between C3 and C5. It is directed upward and laterally. The cervical segment lies before the entrance into the carotid canal. In this part, it does not give off any branches. The most significant branch is the ophthalmic artery with its branches, the supraorbital artery and supratrochlear artery, whose direction serves as an indicator of circulation in the internal carotid artery (ICA) and is one of the criteria in Doppler sonography.

CLINICAL PRESENTATION OF CAROTID ARTERY STENOSIS

The most common indications for performing ultrasound of the carotid arteries are stroke, transient ischemic attack (TIA), and sudden monocular blindness – amaurosis fugax.
TIA (transient ischemic attack) is a temporary disturbance in blood flow to the brain, causing symptoms similar to a stroke but without permanent damage. Essentially, TIA is a "mini stroke." Symptoms usually last from a few minutes to several hours and completely resolve within 24 hours. TIA occurs when blood flow to a certain part of the brain is temporarily reduced or blocked, usually due to a blood clot or narrowing of blood vessels.
TIA is a serious indicator of increased risk for a later stroke and requires urgent medical intervention to prevent permanent brain damage.

The risk of stroke after a TIA is assessed using the **ABCD2 scale.**

The ABCD2 scale is a tool used to assess the risk of stroke in patients who have experienced a transient ischemic attack (TIA). The goal is to estimate the probability of a stroke occurring in the next two days after the TIA. This scale considers five key factors:

A - Age:
Patients over 60 years old get 1 point.

B - Blood pressure:
Blood pressure greater than 140/90 mmHg gets 1 point.

C - Clinical features:
If the TIA symptoms are related to one part of the body (e.g., only the arm or leg), 0 points are given.
If the symptoms are bilateral (on both sides of the body) or there was speech impairment without paralysis, 2 points are assigned.

D - Duration of symptoms:
If the symptoms lasted less than 10 minutes, 0 points are given.
If they lasted between 10 and 59 minutes, 1 point is assigned.
If they lasted 60 minutes or more, 2 points are assigned.

D - Diabetes:
Diabetic individuals get 1 point.
Based on the total number of points, the risk of stroke in the next 2 days is estimated as follows:

0–3 points: Low risk (less than 1% probability of stroke).
4–5 points: Moderate risk (about 4–5% probability of stroke).
6–7 points: High risk (more than 8% probability of stroke).

This scale helps physicians decide on further diagnostics and treatment, including the need for hospitalization and stroke prevention.

NASCET (North American Symptomatic Carotid Endarterectomy Trial) is a clinical study conducted to determine the effectiveness of carotid endarterectomy (CE) surgery in patients with severe carotid artery narrowing, which increases the risk of stroke.

The main results and conclusions of the NASCET study are:

1. Carotid endarterectomy (CE) is effective in reducing the risk of stroke in patients with carotid artery narrowing greater than 70%, especially in those who already have symptoms (e.g., transient ischemic attack or ischemic stroke). In this group of patients, CE significantly reduces the risk of future strokes.
2. Surgical recommendation: The study showed that surgery provides significant benefits in reducing the risk of stroke in patients with symptomatic carotid artery narrowing greater than 70%. For patients with narrowing less than 50%, surgery did not provide significant benefits over medical therapy.
3. Reduction of mortality and disability: The results showed that carotid endarterectomy reduced the stroke, mortality, and disability rates in patients with severe carotid artery narrowing who had symptoms, compared to those who received only medical treatment.

In summary, NASCET confirmed the importance of surgical intervention (carotid endarterectomy) in patients with symptomatic carotid artery narrowing greater than 70% as a method for stroke prevention and improving long-term outcomes.

The most common mechanisms of stroke can be divided into three main groups: ischemic, hemorrhagic, and ischemic-hemorrhagic (rarely). Within each group, there are several specific mechanisms that can lead to a stroke.

Upon a patient's arrival at the family doctor's office with symptoms of TIA or stroke, urgent ultrasound of the carotid arteries should be performed, as rapid treatment of the cause is the only thing that separates the patient from death or permanent disability.

ULTRASOUND OF THE CAROTID ARTERIES

The standard equipment for carotid artery ultrasound, or Color Duplex ultrasound, includes specific devices and tools that allow for a detailed assessment of the condition of the carotid arteries, detection of narrowing, blockages, or other abnormalities in blood flow. This method combines Doppler ultrasound (which measures blood flow velocity) with B-mode (which provides images of blood vessel structure).

The standard equipment includes:

1. Ultrasound Device

- High-frequency ultrasound machine with capabilities for 2D imaging and Doppler assessment.
- High-resolution monitor for displaying real-time images.
- Probes that enable high-precision images. The most commonly used is a linear transducer probe with a frequency between 7 and 12 MHz for visualizing the carotid arteries.

2. Doppler System

- Pulsed Doppler for measuring blood flow velocity in the arteries, allowing for the detection of narrowing (stenosis) and determining its degree.
- Color Doppler for visualizing blood flow in color, making it easier to identify flow abnormalities (e.g., turbulent flow due to blockages or narrowing).
- Spectral Doppler for precise analysis of flow velocity and dynamics of blood vessels.
- Image and Data Analysis Software
- Specialized computer programs for measuring artery width, determining flow velocity, and quantifying stenosis.

3. Software for tracking and analyzing changes over time (documentation).

- Patient Position during Carotid Ultrasound Examination
- During the examination, the patient must be in a position that allows for optimal visualization of the carotid arteries and precise blood flow measurement. The standard position includes:

Patient positioning during carotid ultrasound examination

- The patient should lie on their back in a relaxed position.

The arms should be placed along the body or on the abdomen, to allow for easier manipulation of the probe.

- Head Turned to the Side

The patient's head should be slightly turned to the side (opposite the side being scanned).
This position provides better access to the carotid arteries, particularly the internal and external carotid arteries, which are located laterally in the neck.

- Neck Support (if necessary)

A support is used to provide additional comfort for the patient and to ease access to the blood vessels.

Analysis of Blood Vessels

After identifying the anatomical structures of the blood vessels, their analysis is carried out in B-mode and using Color Doppler, with a special focus on:

1. **Measuring the thickness of the intima-media complex.**
2. **Identifying plaques and describing their characteristics.**
3. **Measuring flow velocity and determining the resistance index.**
4. **Determining the degree of stenosis.**

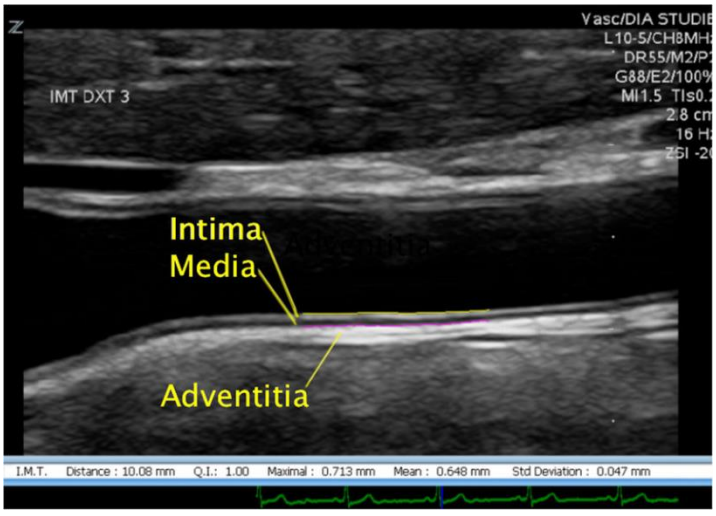
INTIMA-MEDIA COMPLEX (IMC)

The intima-media complex (IMC) is the layer of the arterial wall that consists of two main layers: the intima (the inner layer of the artery) and the media (the muscular layer). This complex is an important indicator of vascular health and plays a key role in assessing the risk of atherosclerosis and other cardiovascular diseases.

- **The intima** is the innermost layer of the artery, located adjacent to the lumen (the inner cavity of the artery). It consists of endothelial cells that line the interior of blood vessels and the subendothelial layer.
- **The media** is the muscular layer of the artery, responsible for regulating blood pressure through the contraction and relaxation of muscle fibers.

Together, these layers make up the intima-media complex. In healthy arteries, the IMT is thin and smooth, while in cases of atherosclerotic changes in the arteries (e.g., due to hypertension, elevated cholesterol levels, or smoking), both layers may become thickened, which can indicate the onset or progression of atherosclerosis.

MEASURING THE INTIMA-MEDIA THICKNESS



B-mode ultrasound allows for the visualization of the layers of the arterial wall in 2D format, where the intima and media are clearly visible as two white lines. The optimal view is in the horizontal plane.
The intima is the part where the interior of the blood vessel comes into contact with the blood.

- The adventitia is the second white line below the media.
- A common beginner's mistake is confusing the media with the adventitia, which should definitely be avoided.

When measuring, three rules should be followed:

- The measurement should be performed at a right angle;
- It should be done in a place where there are no plaques;
- It should be at least 2 centimeters below the bulb.

Interpretation of results

• **Normal IMT:** The thickness of the IMT in healthy individuals is usually less than 0.9 mm. With age, a slight increase can occur, but values above 1.0 mm may indicate the onset of atherosclerosis.

• **Increased IMT:** Values greater than 1.0 mm typically indicate the onset of atherosclerotic changes. Higher values, especially above 1.5 mm, may be associated with more significant atherosclerotic processes and an increased risk of cardiovascular events.
Measurement of the intima-media thickness (IMT) has become a key tool in assessing vascular health and evaluating the risk of cardiovascular diseases. Ultrasound, as a non-invasive technique, allows for precise measurement of IMT and helps in the early recognition of vascular changes, enabling timely intervention and prevention of serious cardiovascular issues.

The American College of Cardiology (ACC) and the American Heart Association (AHA) included the measurement of the intima-media thickness (IMT) as mandatory in the assessment of cardiovascular disease risk in the context of hypertension in 2017.
This recommendation was part of the updated guidelines for assessing the risk and prevention of cardiovascular diseases, which emphasized the importance of early recognition of atherosclerotic changes. IMT measurement has become an important tool in identifying individuals at increased cardiovascular risk, including those with hypertension, as increased intima-media thickness can indicate early stages of atherosclerosis and increased risk of cardiovascular events.
IMT is measured with ultrasound and used as a biomarker for assessing vascular function and health. Increased thickness of the intima-media complex is one of the first signs of atherosclerosis, meaning that the arteries have started to thicken and become more rigid. A thicker IMT indicates an increased risk of:

• Cardiovascular diseases, including myocardial infarction and stroke.
• Cerebrovascular diseases, such as transient ischemic attacks (TIA) and stroke.
• Hypertension and other conditions affecting the health of blood vessels.

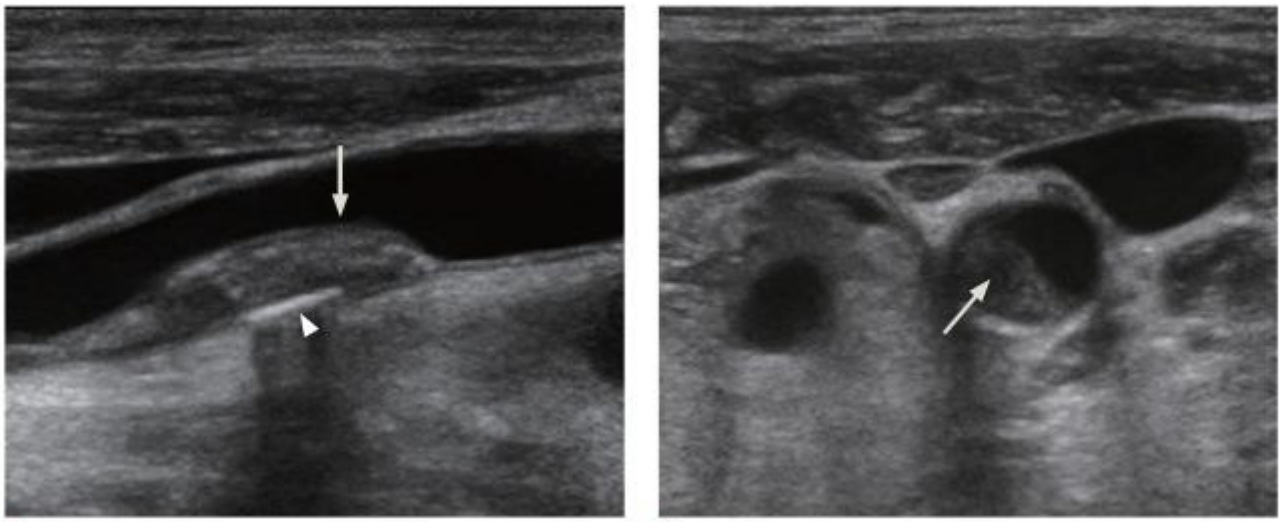
The measurement of IMT has become an important diagnostic tool in the early detection of cardiovascular risks, before more serious vascular issues arise.

PLAQUES - TYPES AND DESCRIPTION

Plaques are most often immediately noticed during scanning. The best visualization is achieved in a longitudinal scan, where the plaque can be better seen and fully described.

When describing plaques, the following should be noted:

1. The location where the plaque is found;
2. The echogenicity of the plaque;
3. The thickness and length of the plaque;
4. The appearance of the plaque's surface.
5. The most common location for plaques is the bulb of the common carotid artery (CCA), and it usually extends into the internal carotid artery (ICA).

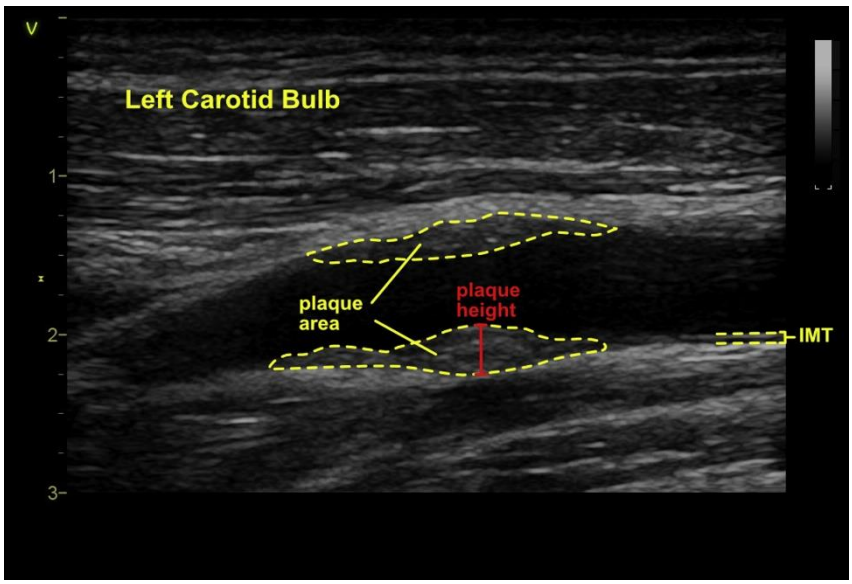


When describing the location, it is usually stated as "in the lower part; in the bulb; in the internal carotid artery (ICA) or external carotid artery (ECA)."

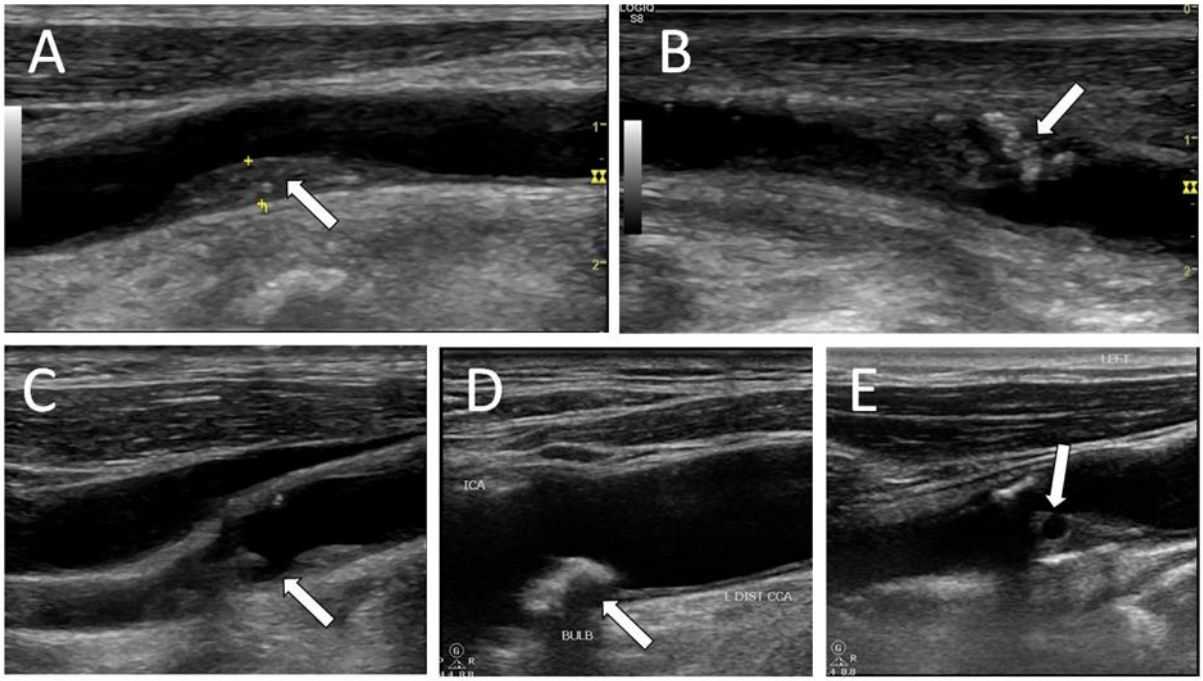
The next characteristic to describe is echogenicity, which can be either hyper- or hypoechogenic. The tone or echogenicity is compared to that of the adventitia. If the tone of the plaque is the same as the adventitia, it is said to be hyperechoic, and conversely, if the plaque is darker than the adventitia, it is said to be hypoechoic. A mixed structure is also common.

Some authors use different terms such as fibrous and calcified plaques. Describing echogenicity is important because it provides information about the stability of the plaque. If the tone matches that of the adventitia, meaning the plaque is calcified, it is stable because it is firmly attached to the vessel wall. In contrast, a hypoechoic plaque is usually unstable. In practice, the most common plaques are of mixed structure.

After echogenicity, the plaque's thickness and length are measured.



The surface appearance of the plaque can be smooth, irregular, or ulcerated. The ulcerated surface is the most risky, as it indicates plaque rupture and the release of thrombotic material distal to the rupture. Ulceration is difficult to detect, but it is best seen in a longitudinal scan, where a depression greater than 2 mm is considered a rupture.



B-mode ultrasound appearance of various types of carotid plaques.

A) a largely homogeneous plaque with a thin fibrous cap.
B) a heterogeneous plaque with patchy areas of calcification.
C) a large soft plaque with surface ulceration and ulcer crater, obtained from a patient with recurrent transient ischemic attacks.
D) a calcified plaque with shadowing. Such plaques are considered to be stable and have a good prognosis.
E) a large homogeneous plaque with an area of intraplaque haemorrhage, often associated with high risk of cerebral ischemic events.

MEASURING CAROTID ARTERY STENOSIS

The most important part of the carotid artery examination is measuring the stenosis. To visualize each stenosis as clearly as possible, each carotid artery should be examined in B-mode and with Doppler by scanning from the base to the jaw, covering the entire accessible segment. Most stenoses are located in the area of the bulb and extend into the internal carotid artery (ICA).

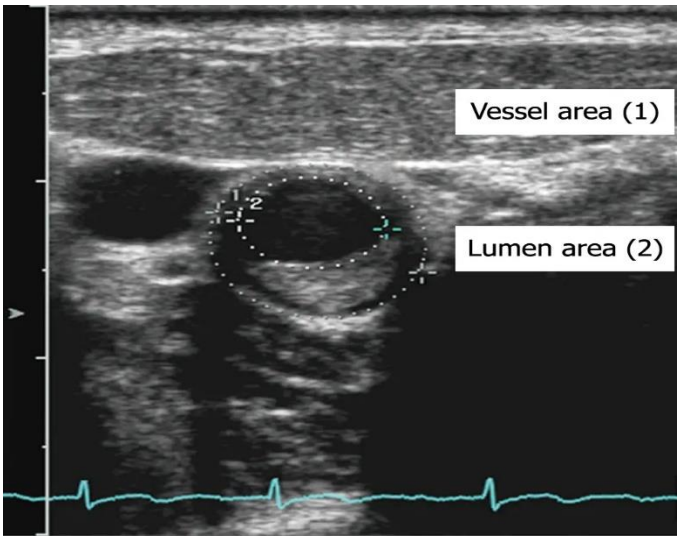
There are three methods for measuring stenosis:

1. Using the area measurement tool (areatool), where the surface area of the blood vessel is measured, followed by the approximate area of the remaining blood vessel lumen. These two values are then divided: the smaller value by the larger one, multiplied by 100, yielding the percentage of stenosis.

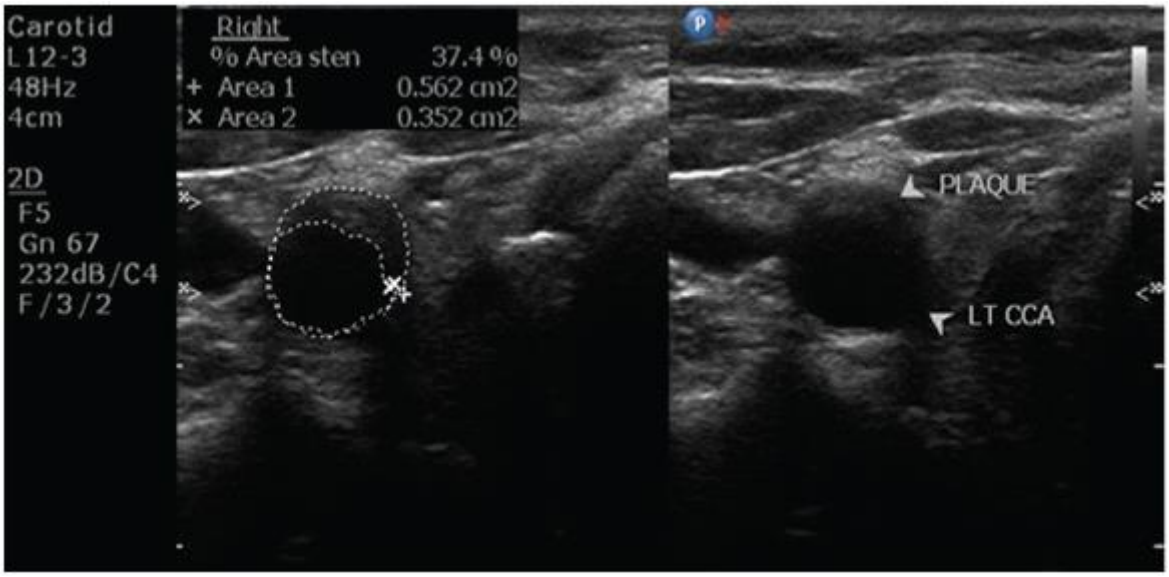
2. Using calipers and manually outlining the surface area of the plaque and the total surface area of the blood vessel.

3. Based on maximum flow velocities within the blood vessel.

The use of the "areatool" is an orientation method where the outer surface of the blood vessel is measured, followed by the approximate surface area of the remaining lumen. These two values are then divided: the smaller value by the larger one, multiplied by 100, and the percentage of stenosis is obtained.



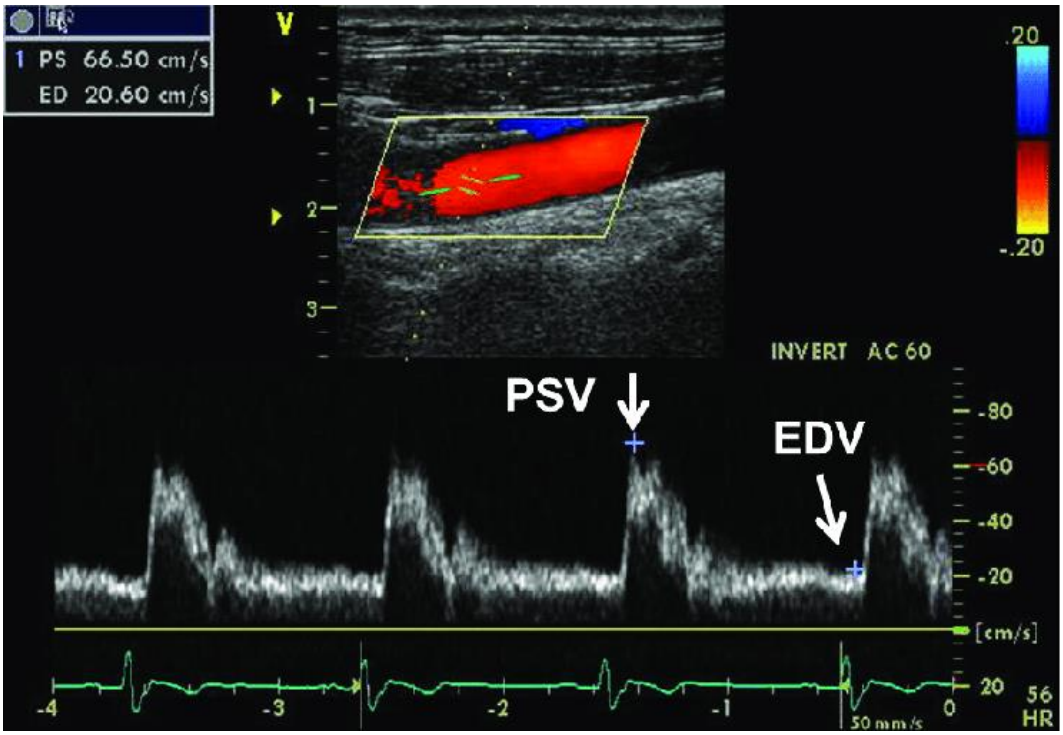
The use of a caliper is similar to the first method of measurement, with the difference that the surfaces of the blood vessel are manually traced.



The most accurate way to grade stenosis is based on measuring flow velocity. For the measurement to be accurate, three conditions must be met:

1. Scanning must be done in a longitudinal scan, and the flow should be directed towards the probe (which appears as red on the screen).
2. The angle of measurement should be set to 60 degrees.
3. The measurement should be taken at the site of the most significant stenosis.

PSV (peak systolic velocity) and **EDV** (end-diastolic velocity) measurements in the carotid arteries are usually performed using Doppler ultrasound, which allows for the assessment of blood flow through these arteries. These parameters are essential for evaluating the condition of the carotid arteries, particularly in detecting narrowing (stenosis) or other abnormalities.



PSV (peak systolic velocity) represents the highest blood flow velocity that occurs during systole, when the heart contracts and pumps blood into the circulatory system. Increased PSV may indicate narrowing of the artery (stenosis), as blood needs to flow faster through the constricted part of the artery.

EDV (end-diastolic velocity) represents the blood flow velocity measured during diastole, when the heart is at rest and filling with blood. Increased EDV may indicate more severe narrowing or even complete blockage of the carotid artery, while lower EDV can suggest normal blood flow.

An elevated PSV (usually above 125 cm/s) may indicate stenosis of 50-69%, while even higher PSV levels (over 230 cm/s) suggest more severe stenosis (70% or more).

Degree of Stenosis	PSV (cm/s)	EDV (cm/s)
Normal	Less than 125 cm/s	Less than 40 cm/s
Mild Stenosis (0-49%)	125-230 cm/s	Less than 40 cm/s
Moderate Stenosis (50-69%)	230-300 cm/s	Less than 100 cm/s
Severe Stenosis (70-99%)	Greater than 300 cm/s	Greater than 100 cm/s
Complete Occlusion (100%)	No flow (0 cm/s)	No flow (0 cm/s)

Explanation of the table:

Normal: The blood flow through the artery is normal, with no signs of narrowing.
Mild Stenosis (0-49%): A slight narrowing of the artery, where blood flow is not significantly accelerated. PSV is moderate, and EDV is usually normal.
Moderate Stenosis (50-69%): A more significant narrowing, but blood flow is not drastically reduced. PSV is elevated, but EDV remains within the normal range.
Severe Stenosis (70-99%): A significant narrowing of the artery with very high PSV and EDV, indicating a serious reduction in blood flow.

Most modern devices have the option to automatically measure PSV, EDV, and the resistance index (RI). The Resistance Index (RI) is a parameter used to assess the resistance in blood vessels and is typically applied in Doppler ultrasound. This index provides information about how blood moves through the vascular system and can help identify issues such as artery narrowing, arterial tone, and other abnormalities in blood flow.

The Resistance Index can be calculated using the formula:

$$RI = (PSV - EDV) / PSV.$$

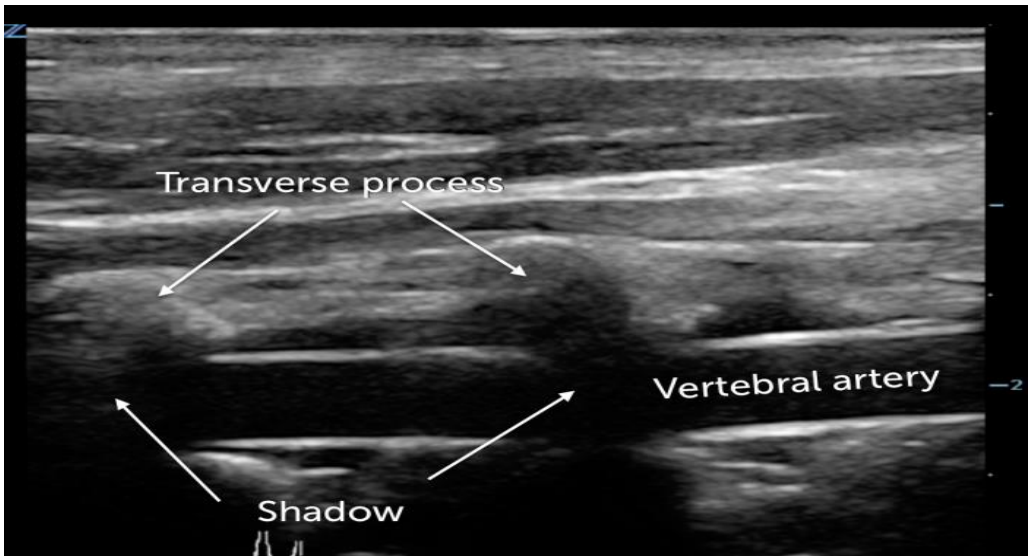
Normal RI (around 0.5–0.7) is characteristic of healthy blood flow.

High RI (between 0.7 and 1.0) indicates high resistance in the artery, which may be a sign of artery narrowing or high vascular resistance.

If stenosis of 70% or greater is suspected, it should be confirmed with CT angiography, which will definitively determine the degree of stenosis. Such severe stenosis represents an indication for surgical revascularization, such as endarterectomy.
It is important to note that in rare cases, the common carotid artery (ACC) and its branches may have atypical branching, a tortuous (twisted) course, or congenital malformations of arteries and veins. If such an anomaly is observed, it should be documented in the final report**.**

SCANNING OF THE VERTEBRAL ARTERIES

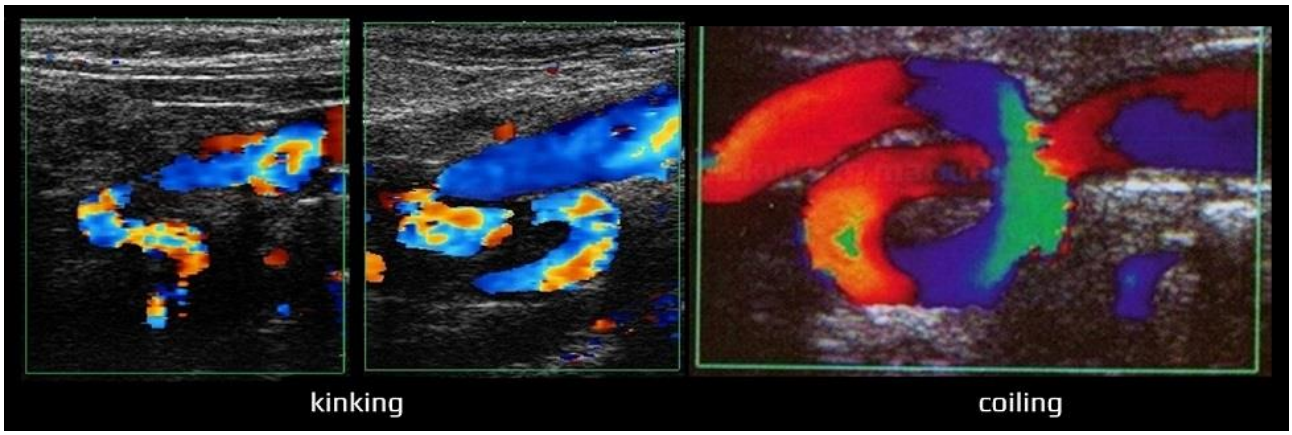
Scanning of the vertebral arteries can sometimes be difficult, especially in individuals with a more voluminous neck. The easiest way to scan them is to move the probe laterally from a longitudinal scan of the common carotid artery (CCA) while keeping the Doppler activated. This should allow the vertebral arteries to appear. They often appear interrupted due to their passage through the spinal column.



The course of the vertebral arteries is divided into four segments. Typically, only two segments, V1 and V2, are visible. The V1 segment originates from the subclavian artery and extends to the entry point of the intervertebral space at the C6 level, transitioning into the V2 segment, which continues up to the C2 area.

When scanning, attention should be paid to:

- **Kinking:** Refers to a sharp bend or twist in the blood vessel, which may appear as a sharp angle or sudden break.
- **Coiling**: Refers to the twisting or spiraling of the artery.
- **Tortuosity**: Refers to the curving or winding of the vessel path.
- **Blood flow**: Observing the direction and characteristics of blood flow is crucial for assessing vascular health.



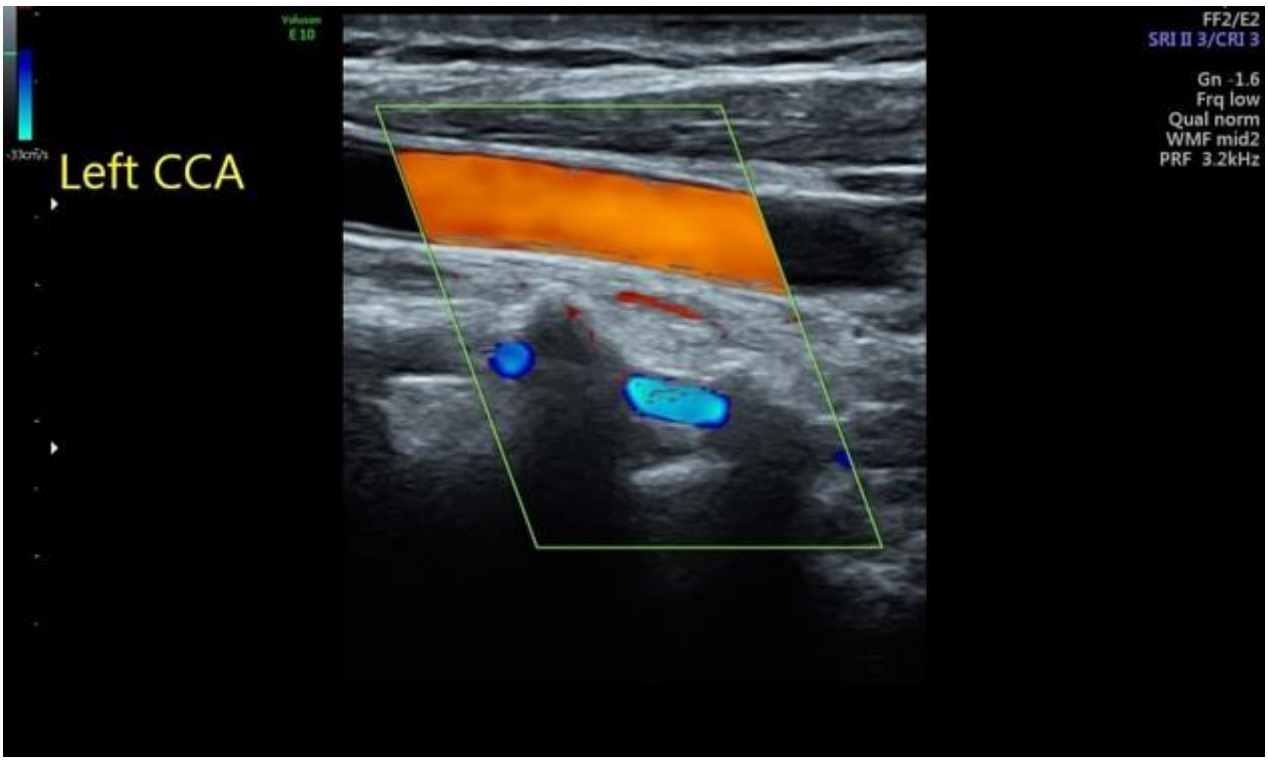
Coiling refers to a situation where the blood vessel forms a circular path. It is characterized by the artery twisting or spiraling, creating a coiled appearance.

Tortuosity refers to a condition where the blood vessel becomes twisted or winding. Tortuous vessels have longer, curved, and winding paths, but without the sharp, abrupt bends seen in kinking or coiling.

Blood flow in the vertebral arteries provides crucial information about vascular health, particularly regarding the brain's blood supply. Normal flow is steady and directed towards the brain, while abnormalities such as increased speeds, turbulence, or reversed flow can indicate stenosis, occlusion, or other vascular disorders.

A retrograde flow is observed in the subclavian steal phenomenon. The subclavian steal phenomenon occurs when there is a stenosis or occlusion in the subclavian artery, which affects blood flow in the vertebral artery, a branch that supplies the posterior part of the brain. This condition can reduce or completely block blood flow through the vertebral artery. As a compensatory mechanism, the body may "redirect" blood through the vertebral artery, resulting in a situation where blood flows from the vertebral artery back into the subclavian artery, "stealing" blood that would normally flow toward the brain to ensure blood supply to the arm. This is known as subclavian steal.

Blood flow is best assessed when both the common carotid artery (CCA) and the vertebral arteries are visualized in the same field of view. Both vessels should show the same direction of flow (indicated by the same color on Doppler).



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POCUS Academy of Serbia

Newly promoted POCUS sonographers in second half of 2024

In the second half of 2024, we saw an increasing demand for POCUS education for personnel working on cruises. It was an interesting challenge because we had both doctors and medical technicians, who were required by their agencies to obtain POCUS certification. We created a condensed course covering the PEARLS protocol, which included the standard eFAST protocol, FATE protocol, RUSH protocol, and BLUE protocol. This combination proved to be more than sufficient for our colleagues working on cruise ships, and likely more than enough for those in intensive care units, ERs, primary healthcare, etc.

Of course, here in Serbia, we still believe that our **PROBE protocol** (POCUS Rapid Overall Body Exam) is the best curriculum for general practitioners, ER, ICU, and internal medicine practitioners. However, it is a bit more time-consuming to learn everything covered by the PROBE protocol. Therefore, we used PEARLS as a guide (which we wrote about as an elegant mnemonic protocol) and enhanced it with the BLUE/LUS, eFAST, FATE, and RUSH procedures.

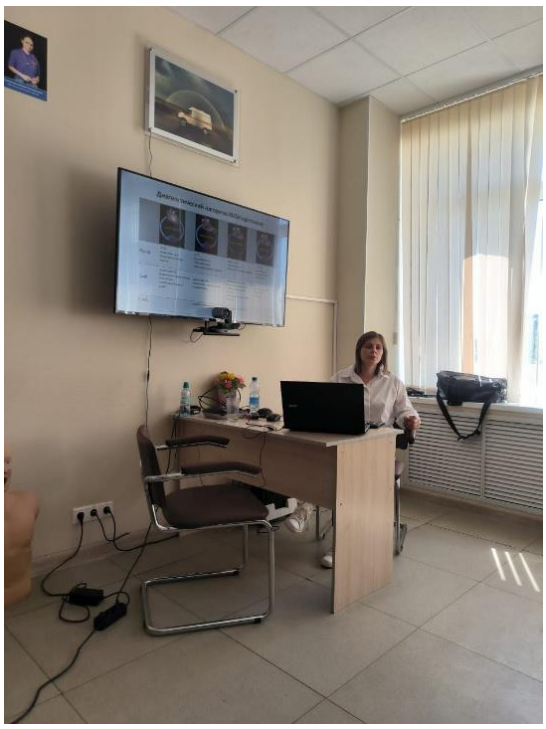

SERTIFIKAT
Dr BRANKA POPOVIĆ


SERTIFIKAT
Dr SNEŽANA KRUNIĆ
CERTIFICATE
Dr. OLIVERA SAVIC


SERTIFIKAT
Dr SVETLANA NARIĆ

POCUS MOSCOW NEWS IN LAST MONTHS OF 2024

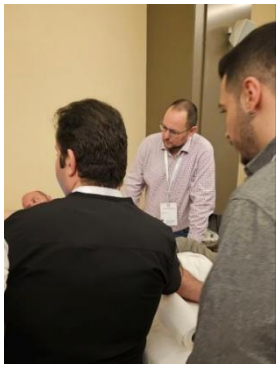
In Q3 2024, POCUS MOSCOW Group participated in several key events. On July 12-13, our group held a Prehospital POCUS course at the Tver Ambulance Service. The course included the necessary protocols for the prehospital phase of eFAST, BLUE, especially important for the vast territory of the Tver region, in terms of choosing the correct routing of patients depending on the severity and mechanism of injury.



On October 19-20, under the auspices of SONOSCAPE, a conference was held in Yerevan, Armenia: RAPID RESPONSE: THE ROLE OF POCUS IN EMERGENCY CARE. The main topics of the conference included protocols for urgent evaluation, as well as ultrasound navigation of interventions (from vascular access to regional anesthesia under ultrasound control).

POCUS MOSCOW team participated in the ANATOLIAN PAIN SOCIETY INTERNATIONAL CONGRESS on October 24-27, one of the largest global events uniting pain management specialists from around the world. Key stations on musculoskeletal ultrasound (MSK ankle, MSK wrist, MSK knee) were successfully conducted by our team.





Also, for the first time, we conducted a master class on facial ultrasound for cosmetologists and plastic surgeons. This pioneering workshop was enthusiastically received by aesthetic medicine specialists.


Our team was invited to this congress thanks to our strong collaboration with Turkish colleagues. Previously, Dr. Tolga Ergonek participated in our cadaver courses on ultrasound-guided regional anesthesia in St. Petersburg. We plan to strengthen and expand this international cooperation in the future.

We continue our advanced cadaver course program in St. Petersburg, focusing on expert-level ultrasound-guided regional anesthesia. This comprehensive training provides a clear educational roadmap for specialists interested in acute and chronic pain management. On November 2-3, we conducted another successful cadaver course, which brought together physicians from various regions of Russia and CIS countries.



One of the key events of 2024 was the International Practical Course in Astana: "Point-of-Care Ultrasound: Ultrasound-Guided Vascular Access and Regional Anesthesia."

This event was particularly significant as it was held at the Astana Hospital of the Medical Center of the Presidential Administration of the Republic of Kazakhstan, the country's premier medical institution.
The course successfully brought together healthcare professionals from various regions of Kazakhstan.

In December, we successfully conducted another cadaver course at a new facility in Moscow. We continue to maintain the highest quality standards for cadaver-based training while ensuring our team of instructors remains at the forefront of educational expertise.



Looking ahead to 2025, the POCUS MOSCOW team is preparing for numerous educational initiatives. We continue expanding the POCUS methodology across different countries and medical specialties. Currently, we are developing programs for medical universities and designing a comprehensive 500-hour curriculum integrating POCUS and pain management. We look forward to seeing you in 2025!

Contributed by:

The World on POCUS (And Where Are We?)

Ivica Zdravkovic, MD, Director of POCUS Academy of Serbia

POCUS (Point-of-Care Ultrasound) is a diagnostic technique that allows the use of ultrasound directly at the point of care - whether in the clinic, during the first contact with a patient, or in emergency and critical situations. This method is gaining increasing importance in clinical practice and has been recognized by numerous medical organizations worldwide.

- **World Health Organization (WHO):** Recognizes the significance of POCUS in healthcare systems with limited resources, considering it a key tool for rapid diagnostics in rural and remote areas where advanced diagnostic tools are not readily available. POCUS has been included in WHO guidelines as a tool to improve healthcare, reduce mortality, and optimize resource allocation.
- **American Institute of Ultrasound in Medicine (AIUM):** Supports the integration of POCUS into everyday clinical practice to enable faster and more accurate diagnostics, leading to better patient outcomes.
- **European Society of Intensive Care Medicine (ESICM):** Deems POCUS indispensable in intensive care for quick decision-making in critical situations such as shock, trauma, or acute respiratory failure.
- **Royal College of Emergency Medicine (RCEM):** Recommends POCUS as a key tool for emergency medicine, facilitating faster patient assessments and timely interventions.

POCUS is increasingly recognized as a valuable diagnostic tool in primary healthcare.

- **American Academy of Family Physicians (AAFP):** Acknowledges its value in family medicine, organizes training programs, and emphasizes the importance of adequate education for safe use.
- **College of Family Physicians of Canada (CFPC):** Has integrated POCUS into family medicine training, particularly for assessing conditions such as abdominal pain, pregnancy, and cardiovascular issues.
- **WONCA Europe:** Highlights the significance of POCUS for general practitioners/family doctors in remote areas with limited access to specialist diagnostics.

Where Does Serbia Stand?

In Serbia, POCUS is not yet widely accepted or integrated into primary healthcare.

- **Official Guidelines:** The Ministry of Health has not adopted specific guidelines for using POCUS in primary care.
- **Education:** Medical faculties in Serbia are gradually introducing POCUS into specialization programs, but its application in general medicine remains limited.
- **Medical Associations:** The Serbian Medical Society (SLD) recognizes the importance of POCUS, but detailed strategies for its integration are yet to be developed and implemented.
- **Practice:** At professional gatherings, POCUS is often mentioned as a tool with great potential, but its widespread application is not yet a reality.

Conclusion

Serbia is at the beginning of its journey toward integrating POCUS into primary healthcare. There is no official position, and plans for implementation remain undefined.

When will this change? Time will tell. For now, there's a lot of potential, but little action.

The Future of Education in Ultrasound Diagnostics

Authors: Siniša Ristić, Željka Popović, Sunčica Starović Bajčetić, Jelena Marić

Ultrasound diagnostics today is one of the essential tools in modern medicine. It enables rapid, non-invasive, and relatively affordable assessment of various anatomical and pathological conditions. It is applied across almost all medical fields, from gynecology and cardiology to radiology and orthopedics.

Education in this field plays a critical role in ensuring precise interpretation of findings and proper equipment handling. However, rapid technological advancements and increasing complexity of ultrasound devices demand innovative approaches to the training of medical professionals.

The aim of this paper is to explore potential directions for the development of education in ultrasound diagnostics, taking into account modern technologies, healthcare system needs, and challenges in implementing new methods.

Technological Development and Its Impact on Education

Technological advancements are transforming education in ultrasound diagnostics, providing new tools and methods for enhancing knowledge and skills. Key trends in this area include:

1. Advances in Ultrasound Devices

Modern devices are becoming more sophisticated and easier to use. Portable devices allow the use of ultrasound in remote settings or emergencies, while artificial intelligence (AI) facilitates image analysis. These devices offer:

- Higher image resolution and better organ visualization.
- Automated data processing and error reduction.
- Interactive connectivity with systems for data analysis and archiving.

2. Virtual Reality (VR) and Simulations

Using VR technology allows medical professionals to learn in a controlled environment. Simulations provide realistic scenarios, which include:

- Reducing stress for beginners.
- Safe repetition of exercises without patient risk.
- Training availability without expensive equipment.

3. Telemedicine and Online Education

Telemedicine enables remote mentorship, while online courses provide access to modern educational materials. Benefits include:

- Global accessibility.
- Reduced training costs.
- Interactive lessons with video demonstrations and quizzes.
- Modern Education Methods

Education in ultrasound diagnostics today combines traditional methods with innovative approaches. The most significant methods include:

1. Practical Training ("Hands-on")

- Practical training remains crucial for gaining experience. This method includes:
- Working with patients under mentor supervision.
- Using models and phantoms to simulate various conditions.
- Workshops and small group courses.

2. E-learning Platforms

Digital platforms provide personalized training accessible at any time. They include:

- Multimedia content (videos, 3D models).
- Online tests and certification.
- Discussion forums with instructors.

3. Interdisciplinary Approach

Collaboration among various specialties ensures comprehensive understanding of ultrasound roles. This includes:

- Training in basic medical studies.
- Joint training sessions for doctors, technicians, and nurses.
- Knowledge exchange between specialists

Challenges and Opportunities

Challenges

- Financial Aspects: High equipment costs and the need for continuous investment.
- Standardization: Lack of unified training protocols.
- Technical Complexity: Additional training required for using new technologies.

Opportunities

- Artificial Intelligence (AI): Automation of analysis and personalized training.
- Global Accessibility: Online platforms enable access to training in remote areas.
- Innovations in Training: Virtual simulations and interactive modules.
- Interdisciplinary Research: Development of advanced tools through collaboration between engineers and doctors.

Conclusion

Ultrasound diagnostics holds an indispensable role in modern medicine. The future of education in this field lies in the combination of traditional and innovative methods, adaptation to technological advancements, and improvement of global accessibility.

Advances in technology, such as AI and VR, provide broad opportunities for enhancing training quality. At the same time, challenges like high costs and the need for standardization require strategic approaches. Dynamic and adaptable education will equip medical professionals with the skills needed for daily practice, contributing to better patient health and a higher-quality healthcare system.

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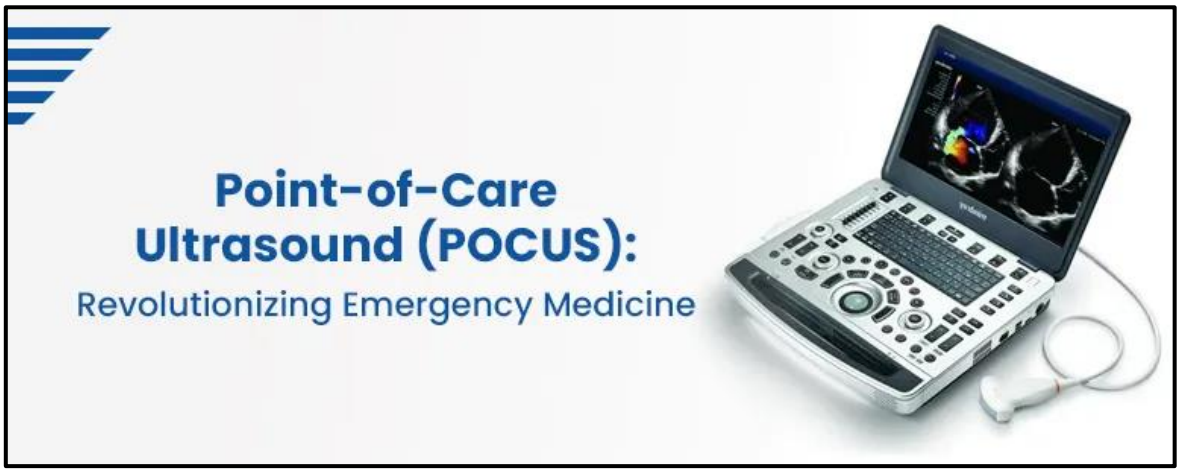
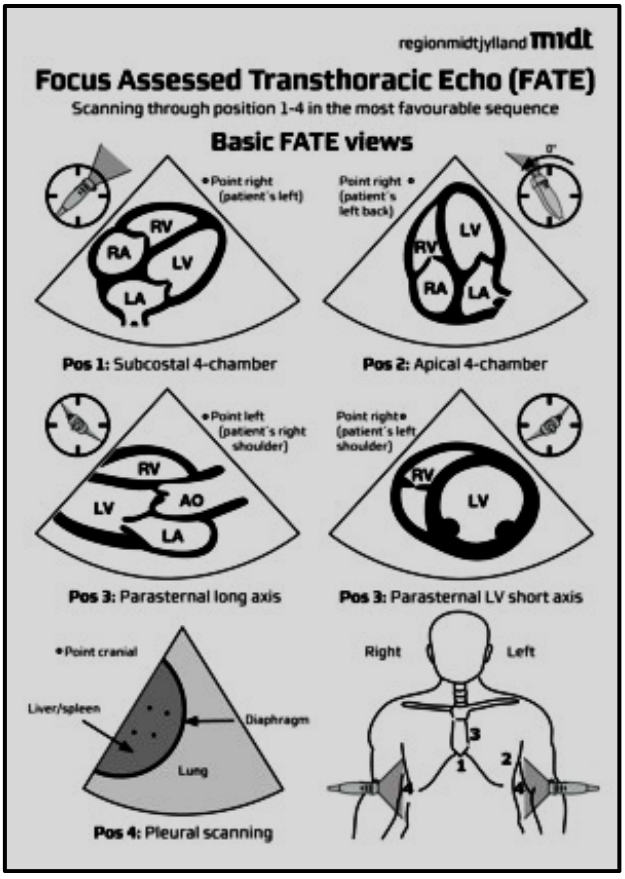




POV: IS IT TIME TO APPLY THE OCCAM'S RAZOR IN ECHOCARDIOGRAPHY (AND ULTRASOUND IN GENERAL)?

Ivica Zdravkovic, MD, Serbia

Just when I thought I had learned something and that I knew something (now that I have only 10 years left until retirement, after nearly 4 decades of learning in medicine), this morning I stumbled upon an old ASE webinar (ASE: American Society of Echocardiography), where I "learn" that ASE no longer "recommends" (considers incorrect?) measuring the heart in M-mode in the PLAX position. Therefore, calculating ejection fraction (EF) based on measurements obtained in M-mode is also incorrect...

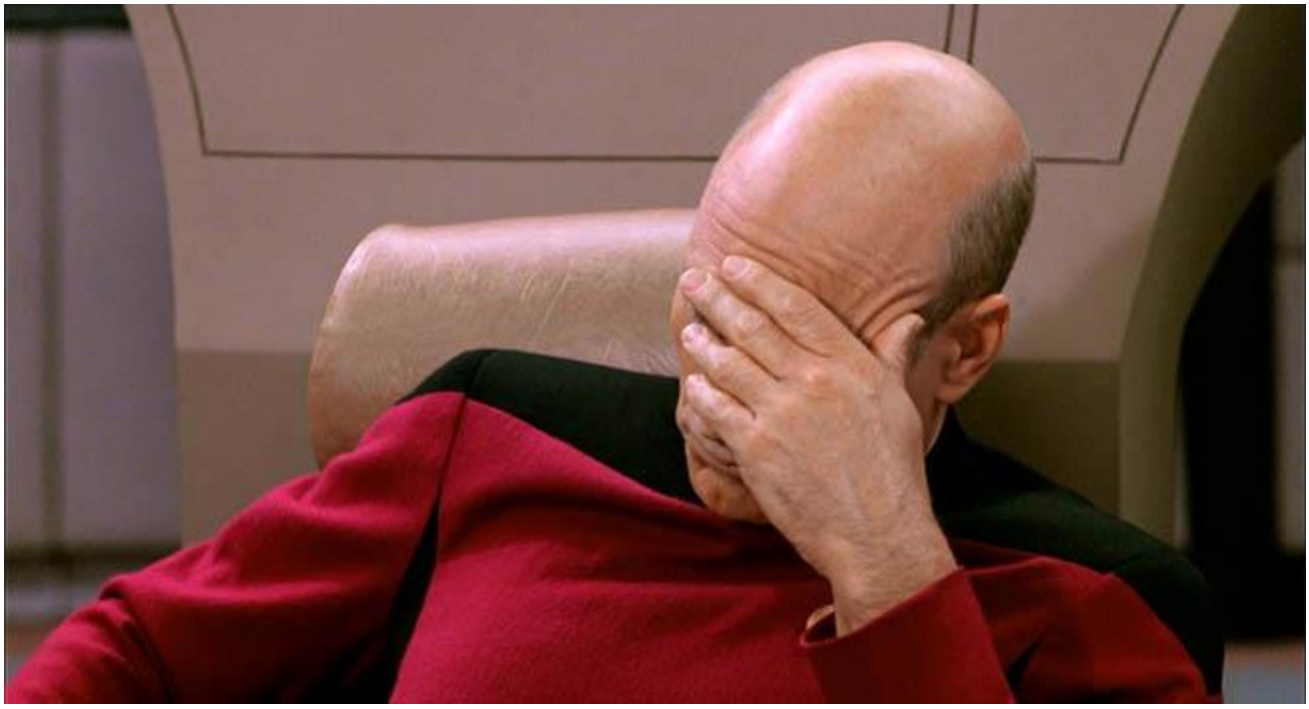
In other words: Goodbye, Mr. Teichholz and Mr. Simpson!? (Enter the heart MRI?...)

Some nations are perhaps wealthy enough to favor volume measurements over linear ones. However, measuring volumes requires either expensive software and machines, or using the same machines while spending much more time with each patient, resulting in higher charges. This trend is very dangerous.

If cardiologists worldwide abandon what we use in POCUS and start labeling our methods as "outdated", "imprecise", or simply "bad", we will face significant conflict once again. I have observed this for the past 35 years. We recently reached a compromise where cardiologists no longer felt they had a monopoly over echocardiography, but now the issue resurfaces.

We should not reject proven and reliable methods for the sake of academic exaggeration. The world already has many problems that can be solved with existing knowledge and technology. Sometimes, so-called "advancements" must be recognized as needless, arrogant snobbery.

In other words: please remember the Occam's razor...



POSSIBILITIES OF REGIONAL AND COMBINED ANAESTHESIA IN SURGICAL TREATMENT OF THYROID CANCER

Authors: K.S. Krasnov[1], N.V. Krasnova[1], V.S. Solovyev[2,3], V.N. Lykhin[3], R.B. Gudantov[4], O.I. Perov[2], D.E. Agafonov[4].

[1] G.E. Ostroverkhov Kursk Oncology Research and Clinical Center, Kursk, Russia
[2] Hospital for War Veterans No. 2, Moscow, Russia;
[3] S.P. Botkin City Clinical Hospital, Department of Health, Moscow, Russia;
[4] P.V. Mandryka Central Clinical Hospital, Moscow, Russia;

Annotation

Objective. To compare the quality of intra- and postoperative analgesia in general and combined anesthesia in patients with thyroid cancer.

Materials and Methods. Anesthesiologic support of 60 operations for thyroid cancer was compared. The patients were divided into two random groups (30 in each). Patients of group I - general anesthesia as inhalation anesthesia with sevoflurane (MAC 1.0-1.5), analgesia with fentanyl (2 μg/kg/h), myorelaxation with rocuronium in doses regulated by the instructions for the drug, considering the age and weight of the patient.
Group II patients - general anesthesia was performed according to the model of Group I (sevoflurane + fentanyl + rocuronium) in combination with regional anesthesia: superficial cervical plexus block + pretracheal block with local anesthetic solutions of amide type (ropivacaine 0.5%, bupivacaine 0.5%).

Results. In group II, the average MAC level of sevoflurane decreased to 0.6-0.8 (53% relative to group I); fentanyl requirement intraoperatively decreased to 0.5-0.7 μg/kg/h (3.8 times); the need for postoperative analgesia decreased by 67%, excluding the need for opioid administration; the frequency of postoperative nausea and vomiting (PONV) decreased 4.1 times. The stress response of the organism was less pronounced in group II: the delta of cortisol level was 24%, compared to 61% in group I.

Conclusion: the combination of general and regional anesthesia significantly increases the effectiveness of anesthesia and improves the quality of postoperative comfort of oncology inpatients.

Keywords: anesthesiology, regional anesthesia, neck surgery, thyroid cancer surgery.

Introduction.

Oncological pathology of the thyroid gland is one of the most common in the structure of morbidity of malignant neoplasms. Over the period from 2014 to 2024, an increase in the number of actively detected cases of thyroid cancer from 16.7% to 29.3% was noted in Russia. The mortality rate from this disease accounted for 0.5% of the total mortality rate from malignant tumours.

Among all patients who received radical treatment with differentiated forms of thyroid cancer, the five-year survival rate is 94% and ten-year survival rate is 92%. In male patients and older patients, the prognosis is worse.

In recent years, the leading place in the treatment of this pathology is occupied by combined methods - a combination of surgery with radiation and chemotherapy. Research in the field of targeted therapies and immunotherapy in advanced forms of thyroid cancer is topical. However, it is surgical radical treatment that is the first step to cure patients with thyroid cancer pathology. Of course, surgical intervention imposes certain requirements to the quality of anesthetic support of operations.

General anesthesia is the classical option of anesthesia for thyroid surgery. The use of modern inhalation anesthetics in combination with opioid analgesics provides controlled and high-quality anesthesia. However, there are a few problems associated with the peculiarities of the drugs used. First, a short half-life, which does not allow to provide high-quality postoperative analgesia. Secondly, the side effects of opioids, which can not only reduce the comfort of the postoperative period, but also lead to fatal complications in cancer patients.

Regional anesthesia addresses these issues: prolonged anesthesia will improve the quality of the postoperative period for the patient, and the ability to reduce opioid requirement during surgery will massively reduce the probability of adverse effects of opioid analgesics. A significant contribution to patient safety is the use of ultrasound navigation to provide regional anesthesia to the neck region.

Objective.

To analyze the quality and safety of different variants of anesthesia in surgical treatment of thyroid cancer.

Materials and Methods. An analysis of anesthesiologic support of 60 operations for thyroid cancer was carried out.

Inclusion Criteria:

- Verified thyroid cancer;
- Age 50 - 79;
- The Eastern Cooperative Oncology Group (ECOG) general condition scale score of 0 to 2;
- Assessment of physical status according to ASA I-III;
- Signed informed consent to participate in the study.

Exclusion Criteria:

- Patient's non-consent to participate in the study;
- Age less than 50 and more than 79 years old;
- Eastern Cooperative Oncology Group (ECOG) general condition scale score of 3 to 4;
- Assessment of physical status according to ASA IV-V;
- Presence of allergic reactions to local anesthetics of the amide type;
- Previous surgical treatment for thyroid cancer (recurrence, progression);
- Refusal of treatment at any stage of the study.

Preoperative examination by an anesthesiologist necessarily included explanations on the peculiarities of different anesthesia options, the technique of performing neck blocks, as well as the principles of using visual analogue scale (VAS) to assess pain in the postoperative period.

Patients were randomly divided into two groups:

- Group I patients underwent general anesthesia as inhalation anesthesia with sevoflurane (MAC 1.0-1.5), analgesia with fentanyl (2 mcg/kg/h), myorelaxation with rocuronium in doses regulated by the instructions for the drug, considering the age and weight of the patient.
- Group II patients - general anesthesia was performed according to the model of Group I (sevoflurane + fentanyl + rocuronium) in combination with regional anesthesia: superficial cervical plexus block + pretracheal block with local anesthetic solutions of amide type (ropivacaine 0.5%, bupivacaine 0.5%).

Regional anesthesia of the neck region was provided using two types of blocks: superficial cervical plexus block allows anesthesia of the anterolateral surface of the neck and supraclavicular region; pretracheal block allows "immersing" the thyroid gland in the anesthetic solution, thus disabling its innervation and reducing

the possibility of reactions from the autonomic nervous system. All cases of regional anesthesia were performed using ultrasound navigation.

Intraoperative monitoring included electrocardiogram control (monitoring, ST segment dynamics), non-invasive blood pressure measurement every 5 min, arterial blood saturation monitoring and exhaled air capnography.

Parameters evaluated:

- The quality of intraoperative anesthesia was assessed by the stress response of the patient's parameters:
  - Changes in haemodynamic parameters,
  - Blood glucose levels (preoperatively, 15 and 30 min from the start of the intervention),
  - Blood cortisol levels (preoperatively, 15 and 30 min from the start of the intervention).
- Pain scores (VAS) at 2 and 12 hours after surgery.
- The quality of anesthesia and comfort of the postoperative period were assessed using the Russian version of the QoR-15 questionnaire for assessing the quality of patient recovery after anesthesia.

Results.

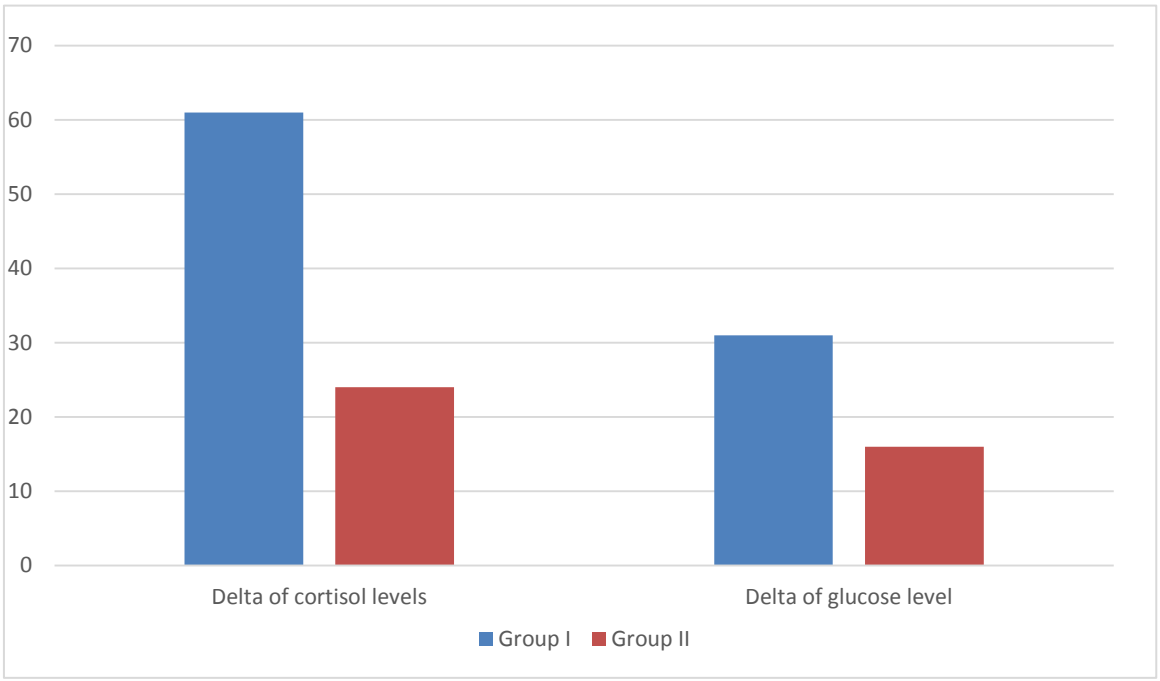
An analysis of intraoperative anesthesia:

- In the analysis of 60 anesthesia cases, the following data were obtained. The required level of anesthesia and analgesia in combined anesthesia (general and regional) was achieved with lower drug concentrations, which had a positive effect on reducing the possibility of side effects.
- In group II of the study subjects, there was a decrease in the average MAC of sevoflurane to 0.6-0.8 (53% relative to group I); a decrease in the need for fentanyl administered intraoperatively to 0.5-0.7 μg/kg/h (3.8 times).

Option	**Group I (general anesthesia)**	**Group II (combined anesthesia)**
Average MAC of sevoflurane	1,13	0,71
Fentanyl requirement, μg/kg/h	2,4	0,62
Rocuronium requirement, mg/kg/h	0,37	0,31

- The study of fluctuations in plasma glucose and cortisol levels and changes in hemodynamic parameters revealed a clear advantage of combining general anesthesia with regional anesthesia. The stress response was less pronounced in group II: delta of cortisol level was 24%, relative to 61% in group I; delta of glucose level was 16%, relative to 31% of group I patients. Significant shifts in haemodynamic parameters were not expressed in both studied groups, which confirms the safety of general anesthesia in thyroid surgeries. However, a less pronounced stress response to surgical trauma is a guarantee of a more comfortable course of the early postoperative period.

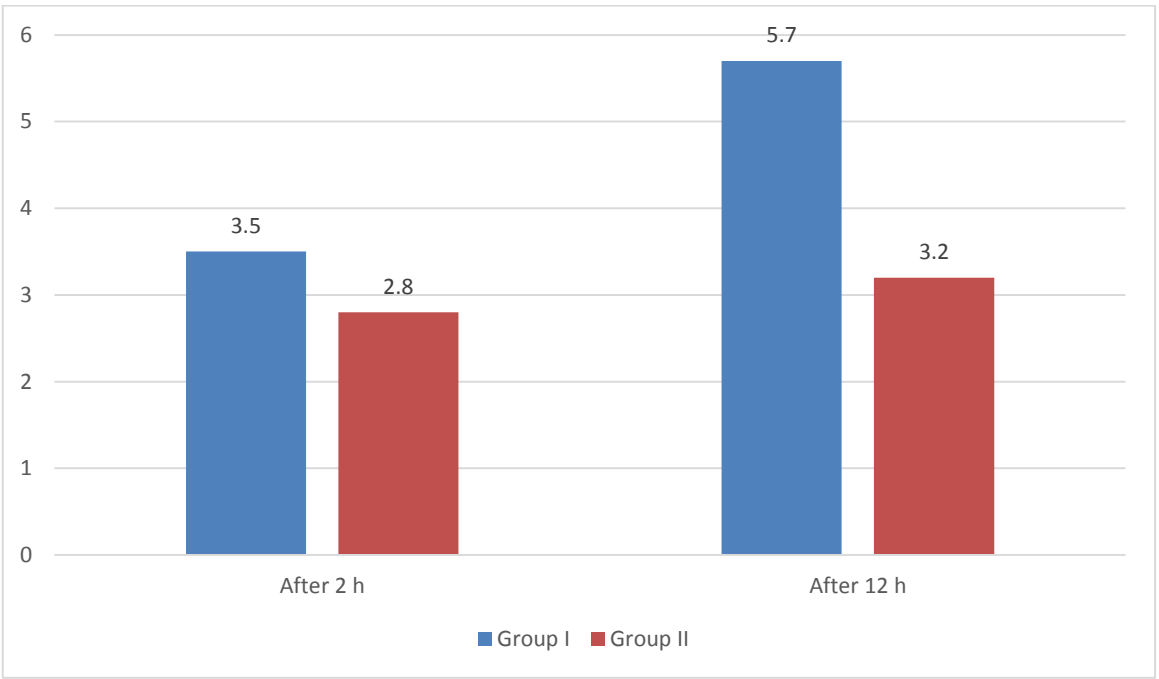
Schedule 1. Variations in cortisol and glucose blood levels during surgery.



Analyses of the postoperative period:

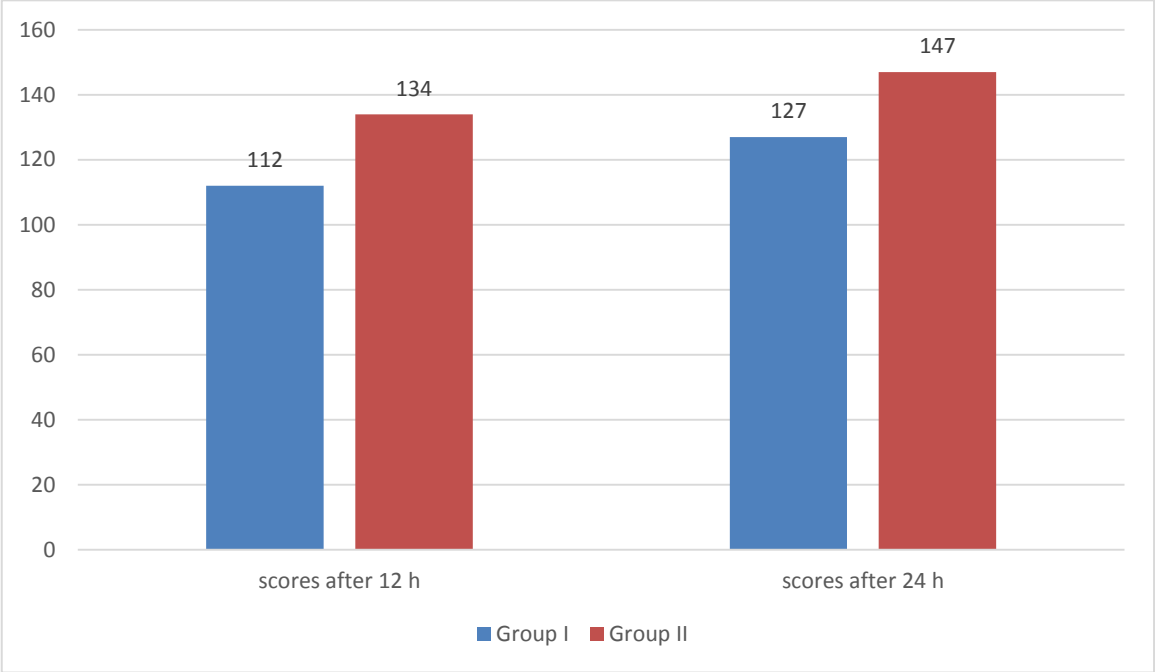
Pain assessment (VAS) at 2 and 12 hours after surgery revealed the advantage of combining general and regional anesthesia with prolongation of postoperative analgesia. Especially, this was evident when comparing the assessment 12 h after surgery.

Schedule 2. VAS pain score 2 hours and 12 hours after surgery.



- The lower intensity of pain syndrome in group II patients reduced the need for postoperative analgesia by 67%, eliminating the need for opioid administration.
- This explains the significant decrease in the incidence of postoperative nausea and vomiting (PONV) in the group of patients with combined anesthesia: lower by 4.1 times.
- According to the data of the patient survey using questionnaires (Russian version of the QoR-15 questionnaire for assessing the quality of patient recovery after anesthesia), the following data were obtained: the quality of patient recovery was higher in group II (by 16% on average).

Schedule 3. Mean QoR-15 scores, assessed 12 hours and 24 hours after surgery.



Conclusion.

Introduction into routine practice of the combination of general and regional anesthesia in surgical treatment of thyroid cancer significantly increases the efficiency of anesthesia and improves the quality of postoperative comfort, which creates favorable conditions for cure and rehabilitation of patients in oncological hospital.

The use of general anesthesia is safe for oncology patients but is associated with an increased risk of side effects. It also requires more frequent administration of drugs for postoperative anesthesia.
Special attention should be paid to patients with extremely high perioperative risk: patients with comorbid pathology, significant pathology of the cardiovascular system. This category of patients can be treated with isolated regional anesthesia, which we use in our oncology center.

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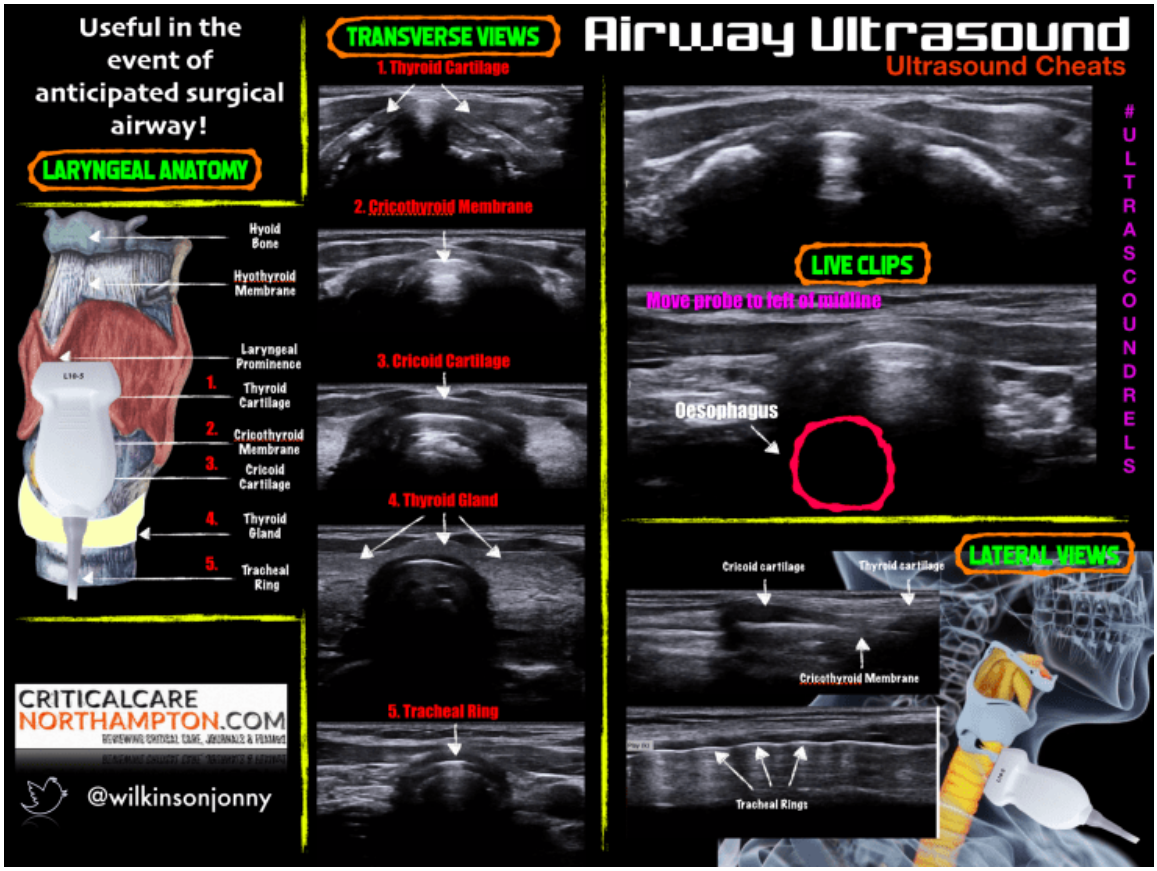


Assessment of Ejection Fraction Using FAC (Fractional Area Change)

Ivica Zdravkovic, MD, Serbia

Procedure:

Using the A4C (Apical Four-Chamber) view:

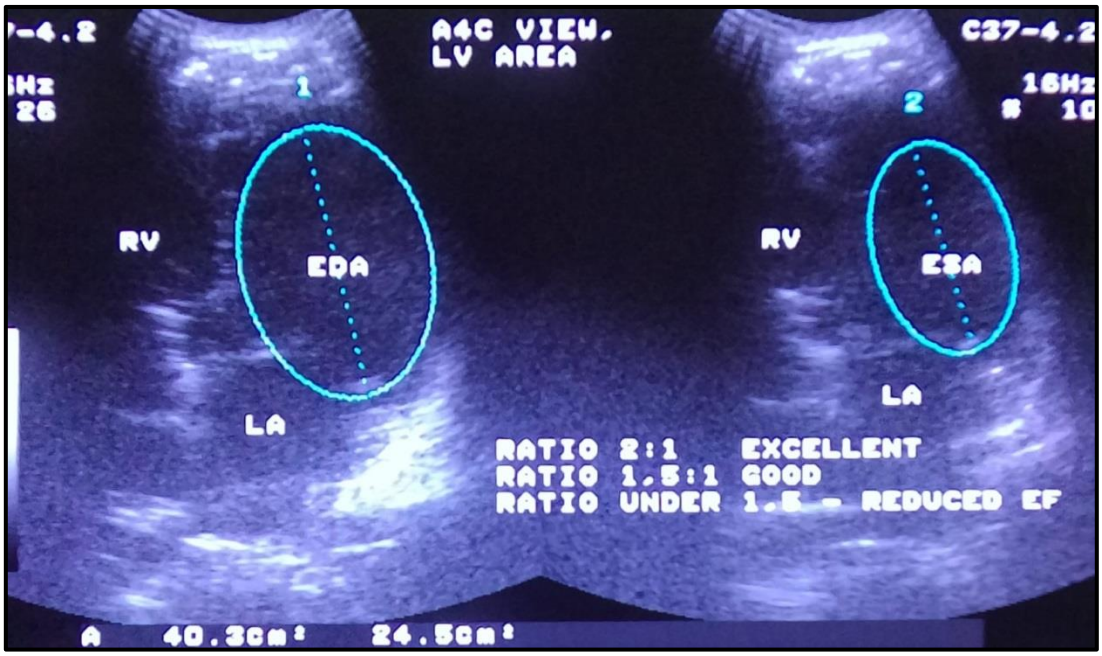
1. **Measure the end-diastolic area (EDA) of the left ventricle.**
2. **Measure the end-systolic area (ESA) of the left ventricle.**

Calculation Formula:
FAC=(EDA−ESA)/EDA

Key Interpretations:

- **Normal EF (~50%) corresponds to a FAC of approximately 35%.**
- **To achieve a FAC of 35%, the ratio of EDA to ESA must be at least 1,5:1.**
- **If the EDA-to-ESA ratio is around 2:1, the EF is typically over 70%.**

This method offers a straightforward way to approximate the ejection fraction based on fractional area changes, especially useful in situations where volumetric calculations are not feasible.



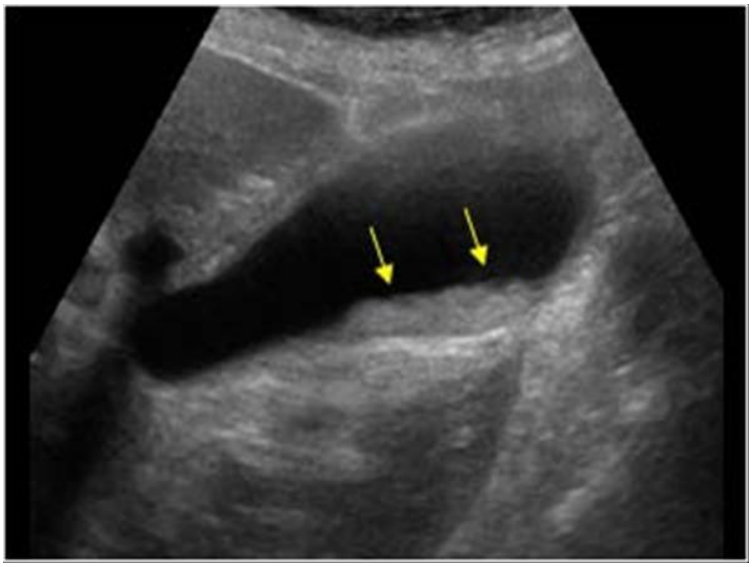
Ratio 40,3:24,5 (almost 2:1) = NORMAL EF

Sludge in the Gallbladder/Acute Acalculous Cholecystitis

Dr. Vekoslav Zajić, specialist of emergency medicine and
POCUS Academy of Serbia instructor & scientific assistant

Bile is produced in the liver and concentrated in the gallbladder between meals, from where it empties into the duodenum after meals. Insufficient emptying of the gallbladder leads to the accumulation of dense contents, resulting in more concentrated bile. Gallbladder sludge is a mixture of solid substances, consisting of cholesterol crystals, bilirubin, and other calcium salts.

Bile stasis increases intraluminal pressure and causes distension and edema of the gallbladder, often accompanied by infection, resulting in acute cholecystitis. In the absence of gallstones, this condition is referred to as acute acalculous cholecystitis (AAC).



Sludge

AAC accounts for 5–10% of all cases of acute cholecystitis. It carries a higher risk of necrosis, perforation, and mortality compared to calculous cholecystitis.

The clinical presentation of AAC includes the following symptoms: pain in the right upper quadrant of the abdomen, tenderness upon palpation (Murphy's sign), fever and chills, nausea and vomiting, and loss of appetite. Laboratory findings may also reveal leukocytosis, elevated CRP, increased erythrocyte sedimentation rate, fibrinogen levels, and potentially elevated liver enzyme values (ALT, AST, ALP, gamma-GT) and bilirubin.

Diagnosis of this condition is most commonly established via ultrasonography. The sensitivity of ultrasound for AAC ranges from 90–95%, and specificity from 78–86%.

The ultrasound diagnostic criteria for AAC are based on the following findings:

1) Distended gallbladder. The normal dimensions of the gallbladder are 10 cm x 4 cm.

2) Thickened gallbladder wall. The normal thickness of the gallbladder wall is less than 3 mm. The gallbladder wall appears as a single-layer structure when fasting. Postprandially, contraction alters the appearance of the wall into a three-layer structure (a hyperechoic inner layer, a hypoechoic middle layer, and a hyperechoic outer layer).

3) Pericholecystic fluid. This may be localized or circumferentially accumulated around the entire gallbladder, raising suspicion of perforation.

4) Intraluminal material. The gallbladder is often partially (Figure 1) or completely filled with sludge, appearing as hypoechoic material, also known as the "hepatized gallbladder."

In addition to acute cholecystitis, complications of gallbladder sludge include acute cholangitis and pancreatitis.

Asymptomatic patients with sludge or microlithiasis do not require treatment. When patients are symptomatic or complications arise, cholecystectomy is indicated.

Literature:

1. PROBE protocol, Point-of-Care-UltraSound, Rapid Overall Body Exam. Ivica Z 2023; 53-56
2. SUM P. Lee, Kerry Maher, and Jane F. Nicholls Veterans Administration Medical Center and Department of Medicine, University of Washington, Seattle, Washington; and Departments of Medicine and Radiology, University of Auckland, Auckland, New Zealand
3. ACUTE ACALCULOUS CHOLECYSTITIS: CASE REPORT Snežana Mitrović, Goran Živković, Biljana Radisavljević, Radica Krstić, Tatjana Mićić Zavod za hitnu medicinsku pomoć, Niš ISSN 2466-2992 (Online) (2018) br.1-2, p. 25-29

Yamaguchi Syndrome Case Report

Ivica Zdravkovic, MD, Serbia

Patient:

- **Age: 72 years**
- **Symptoms: None (asymptomatic)**
- **Referral Reason: Hypertension and suspected EKG findings under the diagnosis of acute myocardial infarction.**

Point-of-Care Ultrasound (POCUS) Findings:

1. **Left Ventricle (LV): End-Diastolic Diameter (EDD) and End-Systolic Diameter (ESD): Reduced due to a severely hypertrophic septum (up to 30 mm thickness). Subvalvular "aortic" stenosis caused by the hypertrophic septum. LV posterior wall thickness: 12 mm. LV function: Normal strength with an EF ~70% (assessed via FS, MAPSE, and FAC).**
2. **Septum: Extremely hypertrophic (up to 30 mm thickness), most prominent in the parasternal long axis (PLAX) view. Impaired relaxation (slow relaxation observed), consistent with HFpEF (Heart Failure with preserved EF).**
3. **Aorta (Ao): Diameter: 32 mm, Aortic valve leaflet separation: Normal, ~16 mm.**
4. **Mitral Valve (MV): Sclerotic valve leaflets. Moderate mitral regurgitation (MR2+) observed. Dilated left atrium (LA): 46 mm diameter.**
5. **Right Ventricle (RV): Right ventricular outflow tract (RVOT): 28 mm. TAPSE: Normal.**
6. **Diastolic Function: E/A inversion indicating impaired diastolic function.**
7. **Left Atrium (LA): Dilated, secondary to mitral regurgitation.**
8. **Right Atrium (RA) and Inferior Vena Cava (IVC): IVC: Normal diameter and respiratory variations.**
9. **Apical Hypokinesia: Noted in the parasternal short axis (PSAX) view.**
10. **Pericardium: No pericardial effusion.**

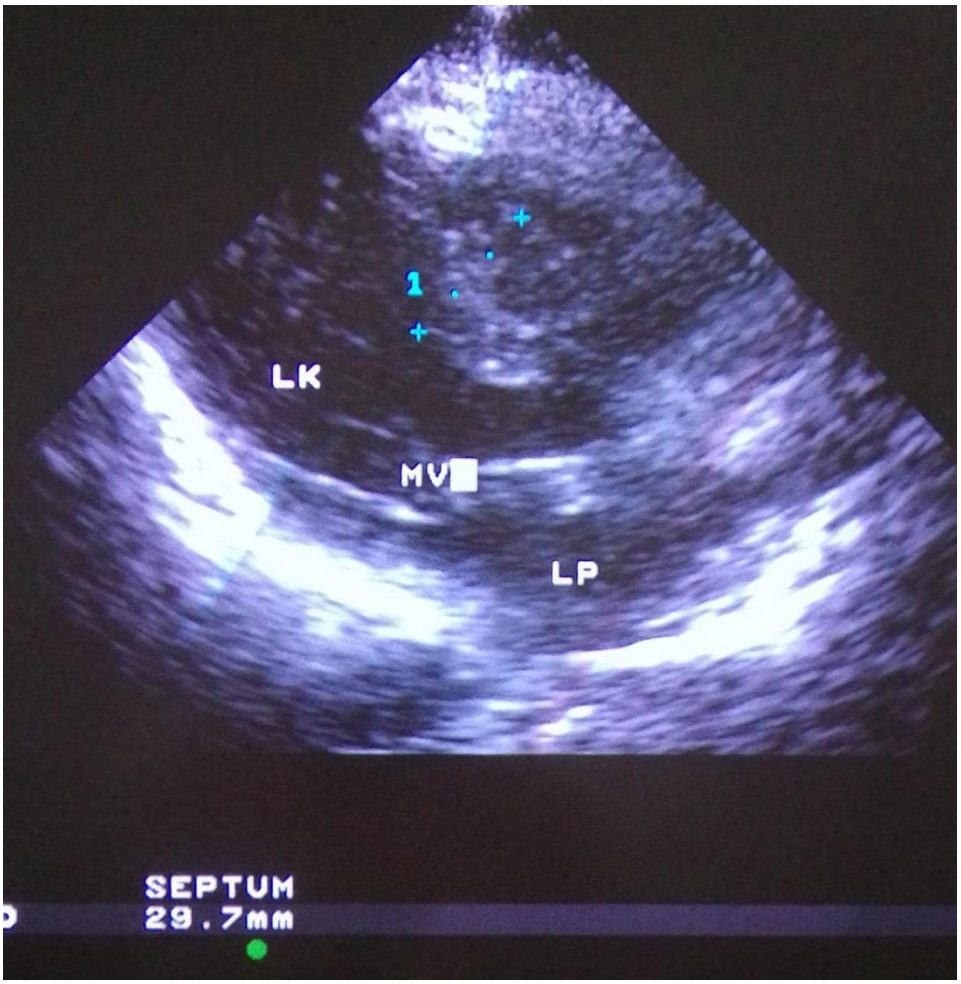
Summary and Interpretation:

- **The findings are consistent with Yamaguchi Syndrome, a form of apical hypertrophic cardiomyopathy (AHCM).**
- **The hallmark features include extreme septal hypertrophy, HFpEF, apical hypokinesia, and secondary atrial dilation.**
- **The hypertrophic septum and diastolic dysfunction contribute to clinical signs resembling subvalvular aortic stenosis.**
- **The absence of symptoms in the patient is notable given the extent of structural changes.**

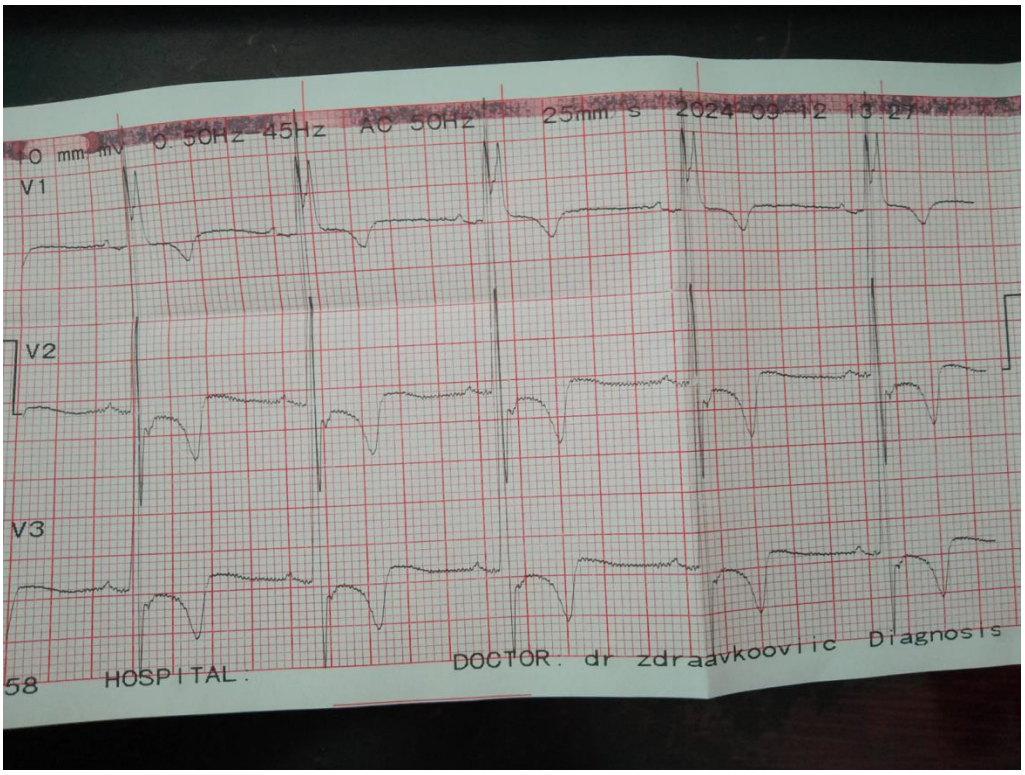
Management Considerations:

- **Close monitoring for potential progression of HFpEF.**
- **Control of hypertension to reduce afterload.**
- **Regular follow-ups with cardiology for echocardiographic evaluation.**
- **Evaluation for symptoms suggestive of heart failure or arrhythmias (e.g., atrial fibrillation due to LA dilation).**

This case emphasizes the diagnostic utility of POCUS in identifying rare conditions such as Yamaguchi Syndrome in routine evaluations.



Thick septal wall



Downward ST depression in precordial leads.

News from HAITI

Training of Doctors in General Ultrasound under Professor Gedeon Gelin

Under the leadership of Professor Gedeon Gelin, a cardiogeriatrician and Hospital Medicine Specialist with RDMS certification, our branch in Haiti continues to provide essential training in general ultrasound to doctors, despite the challenging circumstances posed by gang violence in the country. This initiative is crucial for improving healthcare delivery in Haiti, particularly in rural areas where access to advanced medical training and resources is limited.

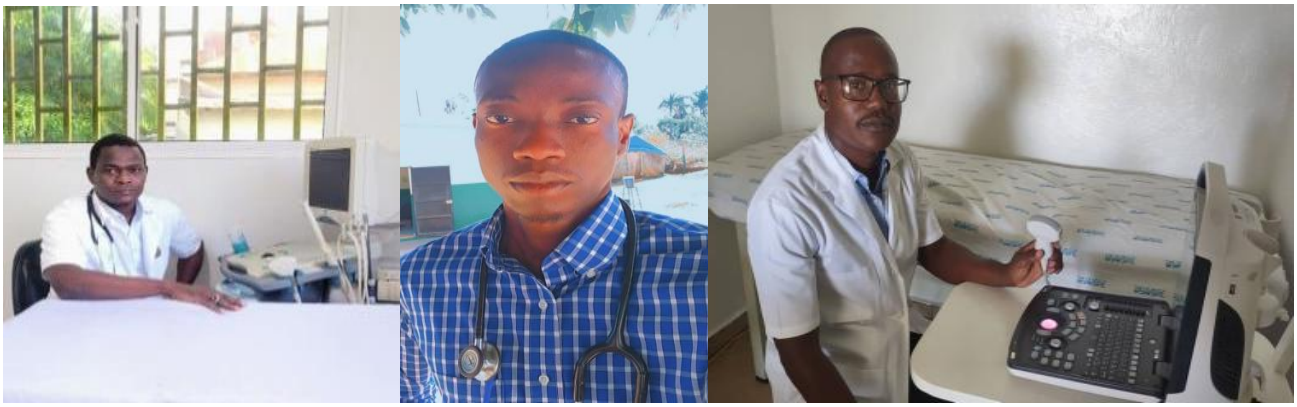
Currently, a cohort of 15 doctors is undergoing training in general ultrasound techniques. Among them, seven are expected to complete their training by March 2025. This ongoing education not only enhances their skills but also equips them with the necessary tools to provide better patient care within their communities.

The Haiti program has its roots dating back to December 2017 when it was initiated by Dr. Gelin himself. Initially, he was the sole trainer responsible for imparting knowledge and skills related to ultrasound technology. Over time, as the program matured and developed, graduate students who have completed their training have taken on roles as trainers for clinical practice. This transition reflects a significant advancement in local capacity-building efforts and demonstrates the sustainability of the program.

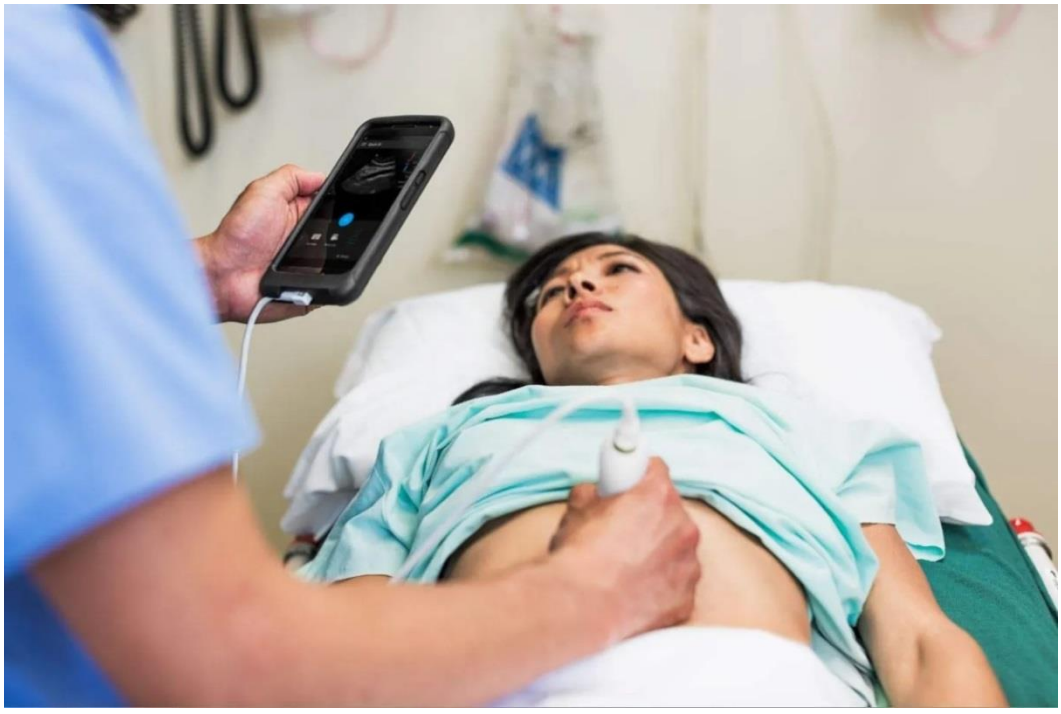
The involvement of trained graduates now practicing in rural Haiti is particularly noteworthy. These individuals are not only applying their knowledge but also mentoring new trainees, thereby creating a cycle of education that benefits the entire healthcare system. The ability to perform ultrasound examinations locally can drastically improve diagnostic capabilities and patient outcomes.

The Haiti program has gained considerable respect within the Haitian medical community. Its commitment to enhancing medical education and providing practical skills has made it a model for similar initiatives for other low-income countries. The recognition stems from both its longevity and its adaptability in responding to the needs of healthcare professionals working under difficult conditions.

In conclusion, despite facing significant challenges due to gang rule and instability, Professor Gedeon Gelin's leadership at Haiti Branch exemplifies resilience and dedication towards advancing medical education through ultrasound training. The program's historical significance, current impact on rural healthcare practitioners, and esteemed reputation within the Haitian medical community underscore its vital role in improving health outcomes in Haiti.



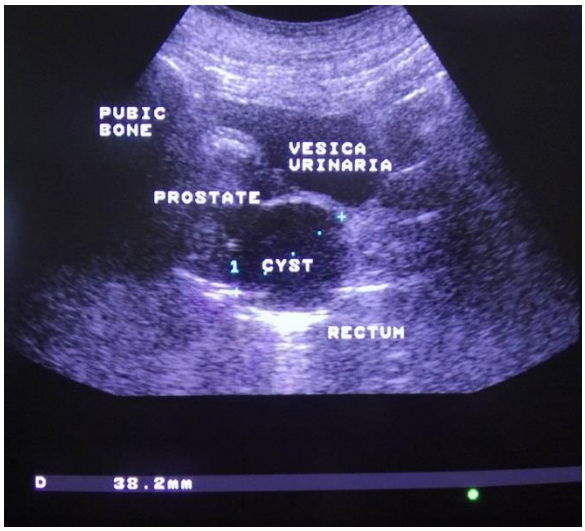
Pictures of Dr Gelin and 6 physicians of April2024-March2025 cohort.
From left to right (first row): Dr Etienne, Dr Gelin, Dr Davilmar, Dr Dorizan
From left to right (second row): Dr St-Fleur, Dr Saint-Phard, Dr Monace



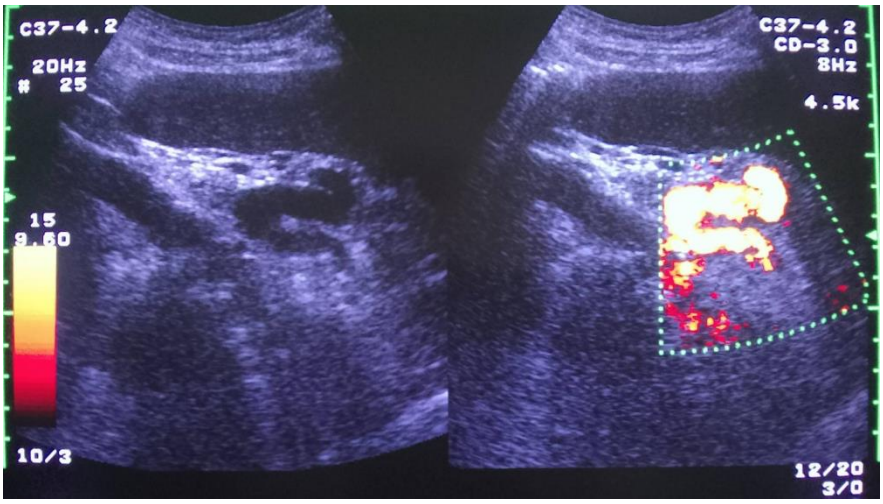
GALLERY OF CASE REPORTS

Ivica Zdravkovic, MD, Serbia

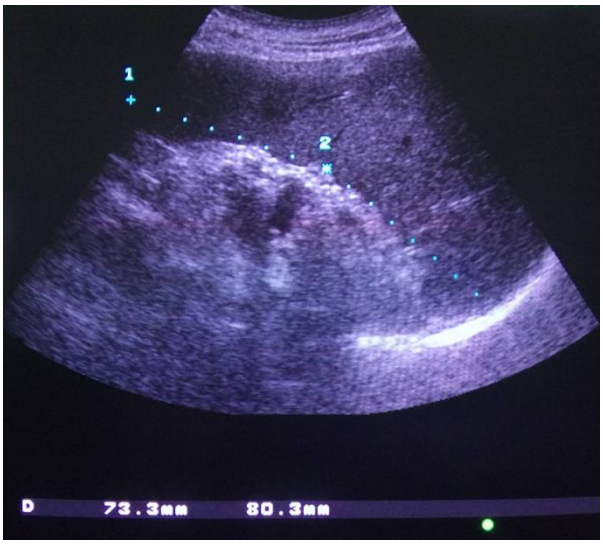
Cystis vesiculae seminalis



Arteria lienalis And Splenomegalia

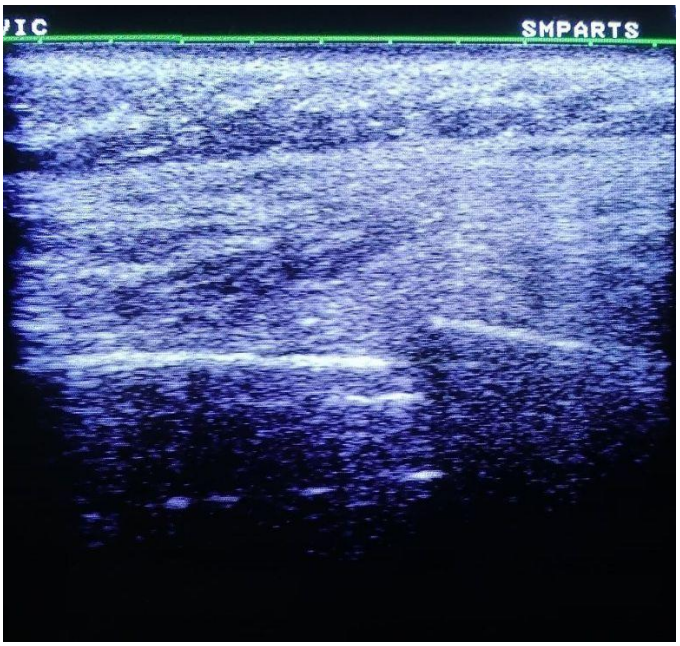


The most curved arteria in human body ("serpent shape")

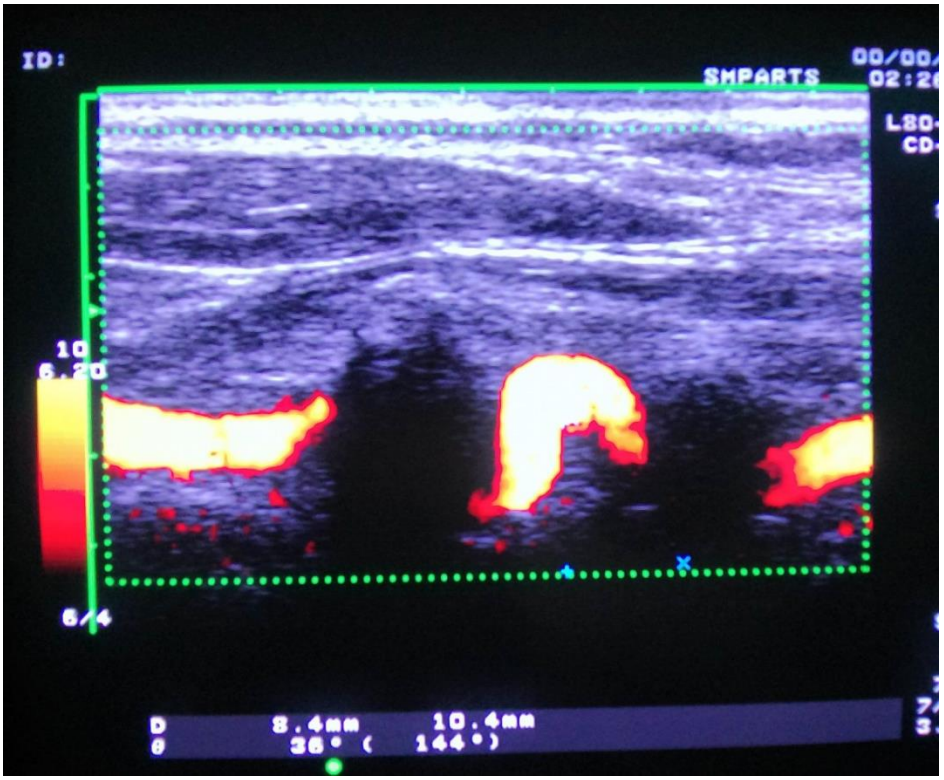


Craniocaudal lenght 153,6mm

Rib fracture



AV KINKING

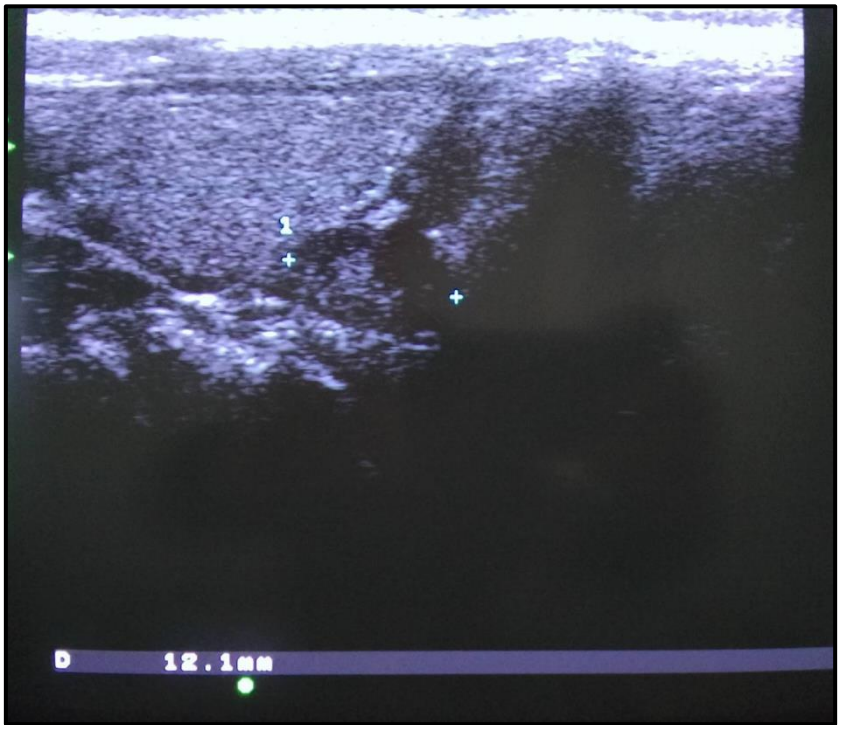


Kinking of the right vertebral artery. The "bend" angle is approximately 36°.
When the angle is 30° or smaller, the hemodynamics are similar to those in plaque stenosis of 70% or greater. Angulations of 90° or less are practically of no clinical significance.

PARATHYROID GLAND

A 57-year-old female patient complains of an episode of tetanic seizures during a half-marathon race. She collapsed and was transferred to the emergency department. At the local health center, an examination and laboratory tests were performed, revealing a calcium level of 1.1 mmol/L. She has frequent episodes of renal colic due to nephrolithiasis. She denies any other diseases or symptoms.

An ultrasound of the neck was performed.

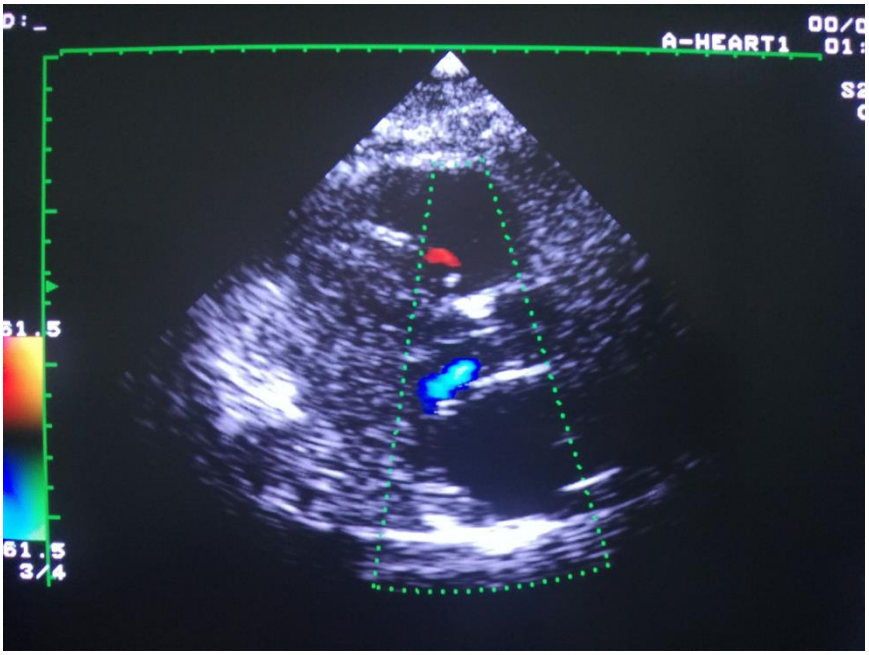


It was recommended to perform PTH, serum Ca++, 24-hour urinary calcium, as well as other laboratory tests. Elevated PTH confirmed parathyroid adenoma.

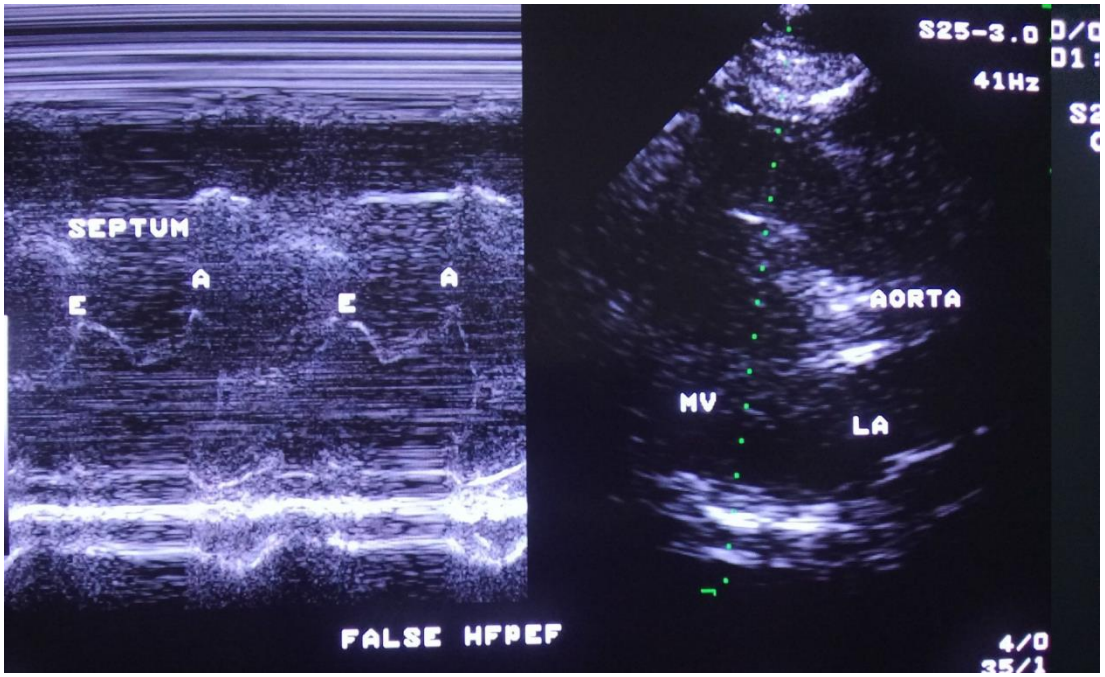
FALSE HFpEF

Echocardiogram: EDD/ESD=46/31mm, RVOT=41mm, LA=45mm, Ao=28mm. Septum/Posterior Wall Thickness=13/12mm. MAPSE and TAPSE are normal. LV has normal strength with EF around 62% (according to EPSS and FS).

The E/A ratio is inverted, partly due to LV wall hypertrophy, which relaxes more slowly ("stiff heart," moderate diastolic dysfunction), and partly due to eccentric aortic regurgitation over the anterior cusp of the MV (see image).



Above the AV, which has sclerotic leaflets and normal separation up to about 20mm, there is a trace of AR1+ directed over the anterior cusp of the MV. As a result, the anterior cusp moves less during the early filling phase of the LV, so the E-wave is lower compared to the A-wave, creating an image of slowed LV relaxation typical of HFpEF, but this is partly a result of the AR as well.

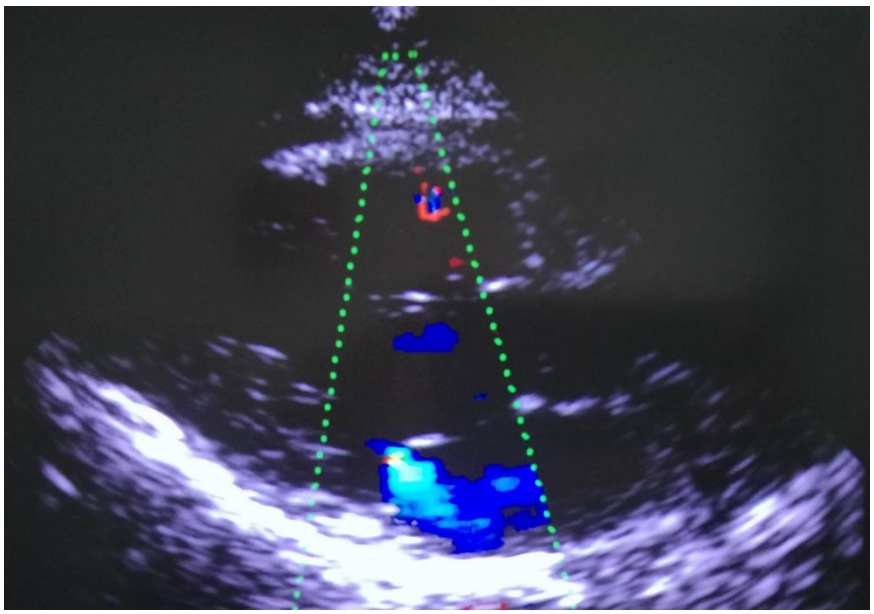


Asymptomatic Mild-to-Moderate Mitral Regurgitation With High Backjet Velocity

Female patient, 47 years, asymptomatic, with no history of cardiovascular disease. Mitral regurgitation was incidentally detected during a routine annual checkup. Normal blood pressure. Normal EKG. A very faint heart murmur graded 1/6 on the Levine scale.

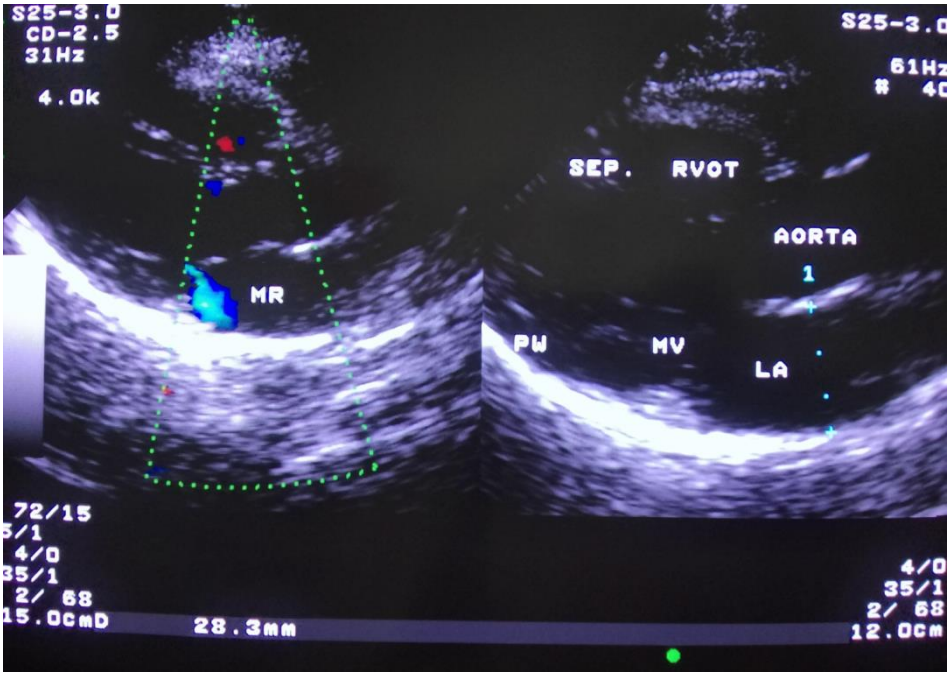
POCUS: Color Doppler revealed a mitral regurgitant jet. The jet occupied about 1/4 to 1/3 of the LA width, consistent with mild-to-moderate mitral regurgitation (MR1+ to MR2+) based on visual estimation. In the parasternal long-axis view (PLAX), the left atrium (LA) was not enlarged, with a diameter of 28 mm, which is within the normal range (27-38 mm) for females. The mitral valve leaflets showed no evidence of prolapse or significant structural abnormalities.

Continuous wave (CW) Doppler revealed a mitral regurgitant jet velocity of 4 m/s, corresponding to a pressure gradient (PG) of 60 mmHg. While these values might suggest a more severe regurgitation, the structural and hemodynamic findings imply a lesser degree of dysfunction. The regurgitant jet was eccentric, directed toward the posterior mitral leaflet and the posterior wall of the LA.



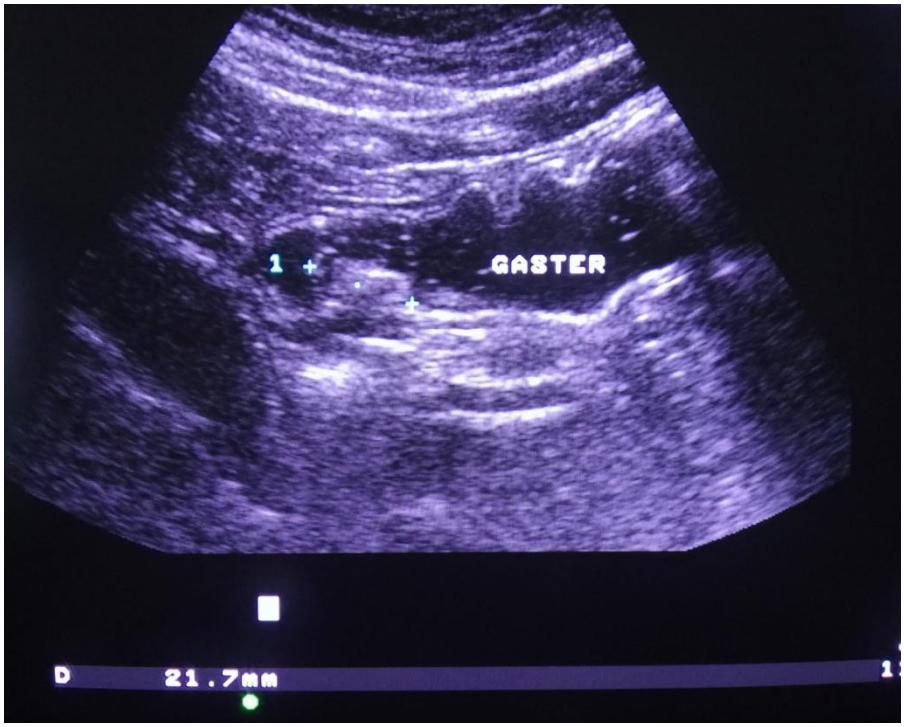
In this case, despite the elevated transvalvular velocity (4 m/s) and pressure gradient (60 mmHg), which might raise suspicion for more severe mitral regurgitation, the lack of left atrial enlargement and the eccentric nature of the regurgitant jet indicate a mild-to-moderate MR. Eccentric jets, particularly when directed along the atrial wall (as seen here with the jet directed towards the posterior wall), can cause artificially elevated velocities due to the Coanda effect.

The use of continuous wave Doppler is invaluable in the assessment of aortic valve disease, particularly aortic stenosis, where transvalvular pressure gradients and velocities are key parameters in determining severity. In contrast, for mitral valve disease, CW Doppler findings, while still important, must be interpreted with caution, as factors like jet direction, preload, afterload, and left atrial dimensions can influence velocities without necessarily indicating severe disease.



This case highlights the importance of integrating clinical data (such as LA size, patient symptoms, and the characteristics of the regurgitant jet) with Doppler measurements to avoid overestimation of mitral regurgitation severity.

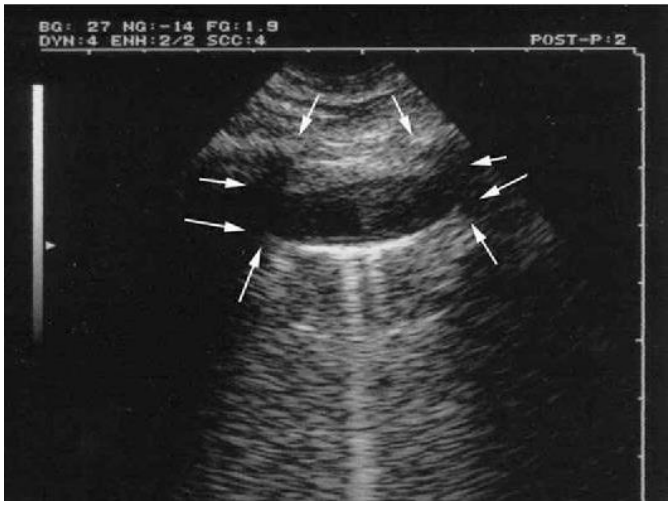
Hypertophic gastritis



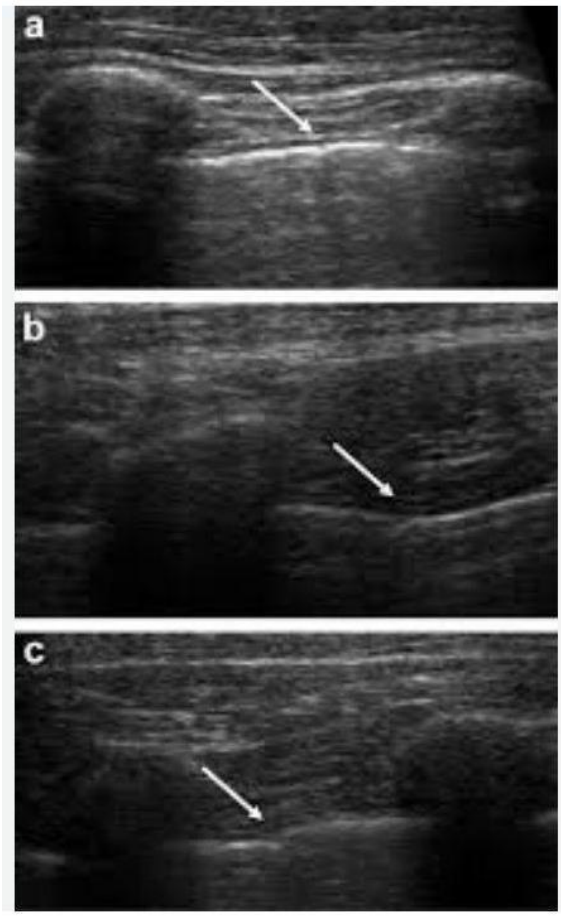
Stomach filled with water scaned in the upright position

FALSE QUAD SIGN

The "quad sign" is the separation of the visceral and parietal layers of the pleura in the case of effusion. It appears as shown in the first image, by scanning the pleura longitudinally.



A false "quad sign" can be seen in certain patients who have pronounced interlobar fissures. Over the interlobar fissures, the pleura duplicates, giving the appearance of a false effusion.

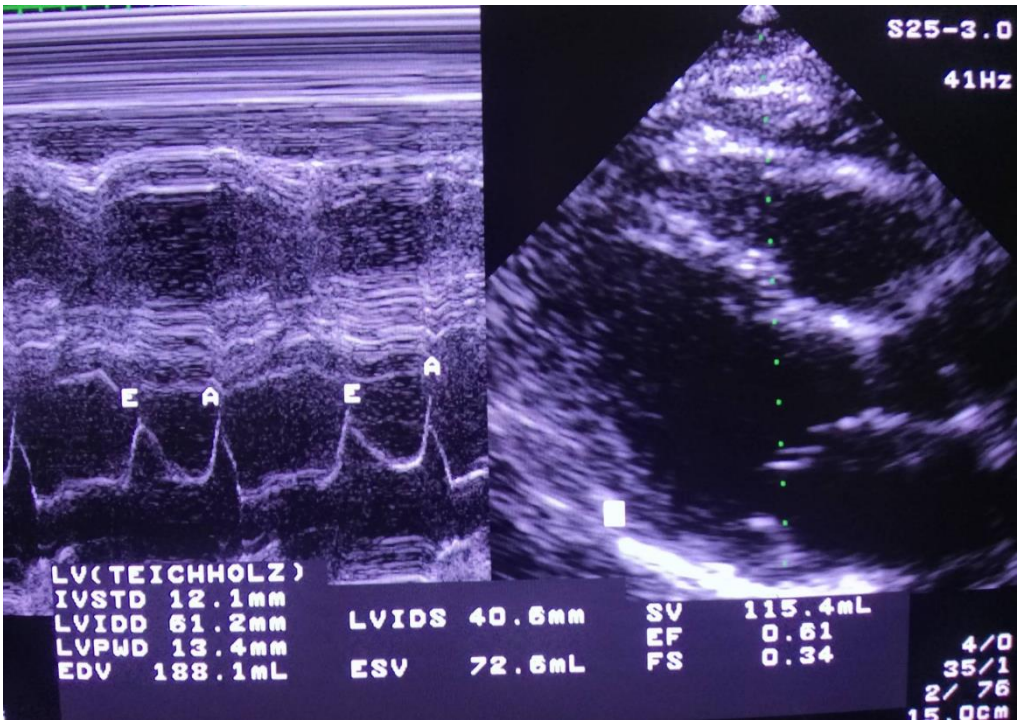


It is important to remember that the pleural space normally contains 15-20ml of free fluid.

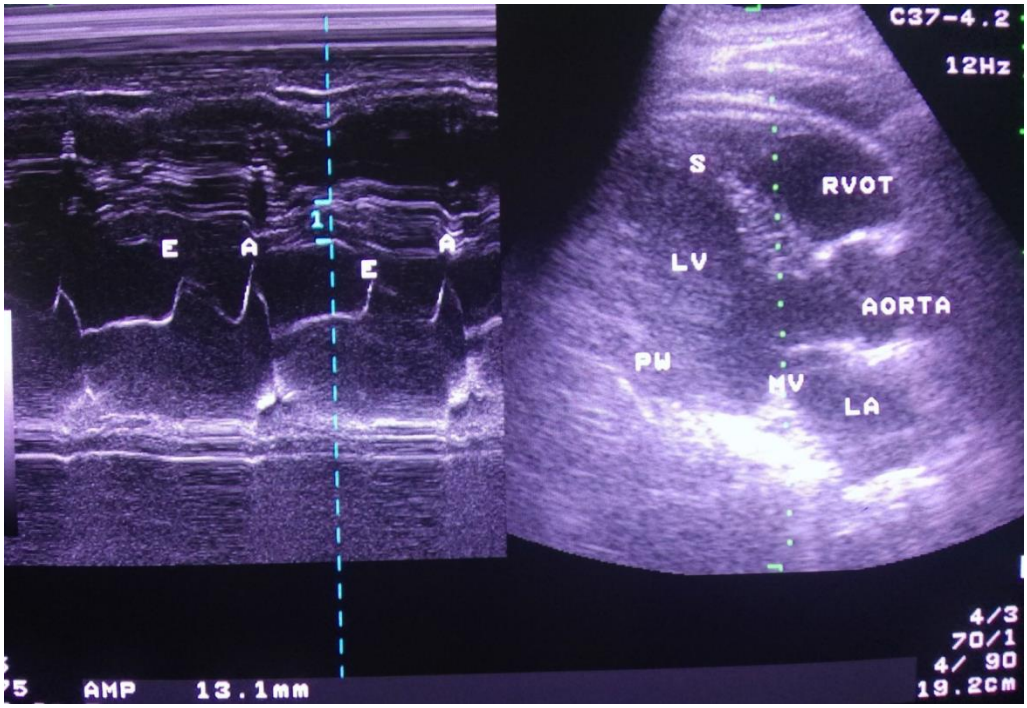
To avoid making the mistake of misinterpreting fissures as effusions: interlobar fissures are seen in <u>ONE</u> intercostal space. Effusion is visible in at least <u>TWO</u>...

Heart Failure With Preserved Ejection Fraction (HFpEF)

Asymptomatic initial phase of the "Stiff Heart Syndrome", hypertensive heart cardiomyopathy with preserved LV ejection fraction, thick left ventricle walls and inversion of E and A waves ratio (slow early filling of left ventricle, increased role of "atrial kick" with subsequent increase if intraatrial pressure - verifiable by BNP). Frequently neglected early stage of serious cardiac pathology.



PLAX: inverted E/A ratio, thick walls of left ventricle, dilated heart (LVIDD, aka EDD is 61mm)

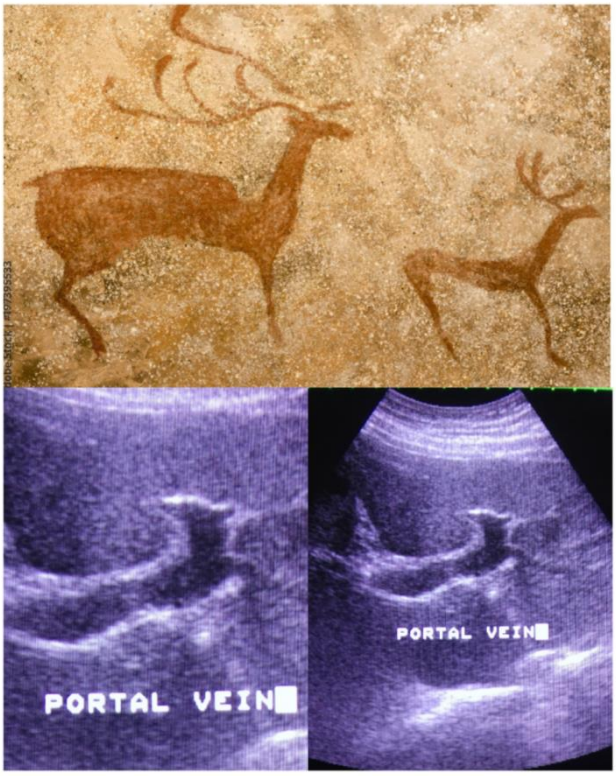


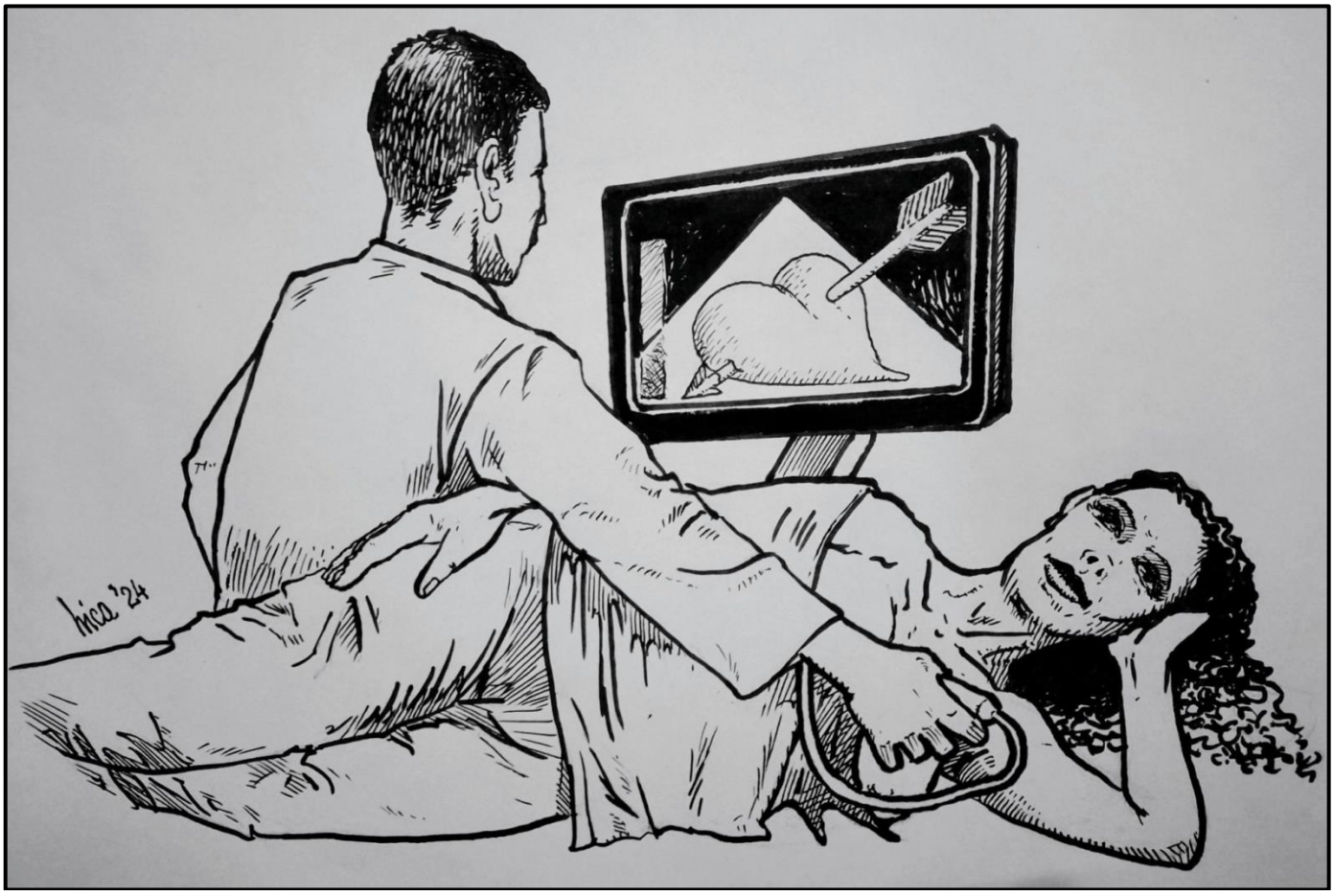
Same heart, convex probe: E/A ratio inverted, septum 13mm: asymptomatic initial stage of HFpEF

POCUS JOKES

by Ivica

We have a "Mickey Mouse" sign, a "Playboy Bunny" sign, "Mercedes" sign, a "Double barrel" sign...
Why not this: the "**DEER SIGN**" 😉





CONTENT:

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