History of Radiologic Sciences Involvement in Interprofessional Education

Prior to 2020 IPE Experience

- Radiologic Sciences Grand Rounds/ Marilyn Buck Professional Poster Presentation (Radiologic Sciences Program Tradition)
- As a degree program we are interprofessional with:
  - Radiography
  - Sonography
  - Nuclear Medicine
  - Cardiovascular Interventional Sciences
  - Radiation Therapy

2020 Experience

- Some of the Radiologic Sciences program faculty wanted truly interprofessional experience with other departments.
- We submitted a case to Interprofessional Grand Rounds and made it mandatory for sonography junior and senior students to participate in discussions with all of the involved majors.
- Faculty voted on the best presentation to take to Grand Rounds that we thought would be most interesting for the participants.
- All of our sonography students had to review the case and become familiar with the pathology discussed and the role of the sonographer.

WATERS COLLEGE of HEALTH PROFESSIONS
GEORGIA SOUTHERN UNIVERSITY

DDTS · RESPIRATORY THERAPY · MEDICAL LABORATORY SCIENCE · RADIOLOGIC SCIENCES · Georgia Southern University

The Advancements of Ultrasound Technology to Aid in the Diagnosis of Amniotic Band Syndrome

Kaitlyn Jeong, Ayla Pitts, Brenda Rodriguez, Nirali Surati
Faculty Advisors: Mrs. Myka Bussey-Campbell and Mrs. Yvonne Dillon

Amniotic Band Syndrome (ABS)

- ABS is a rare set of congenital malformations.
- It is characterized by fibrous bands that may attach to and constrict parts of developing fetuses.
- While idiopathic, it is theorized to occur when the amnion ruptures and tissue bands from the chorionic space enter the amnion and entangle the fetus.
- Severity of ABS depends where the bands attach to the fetus.

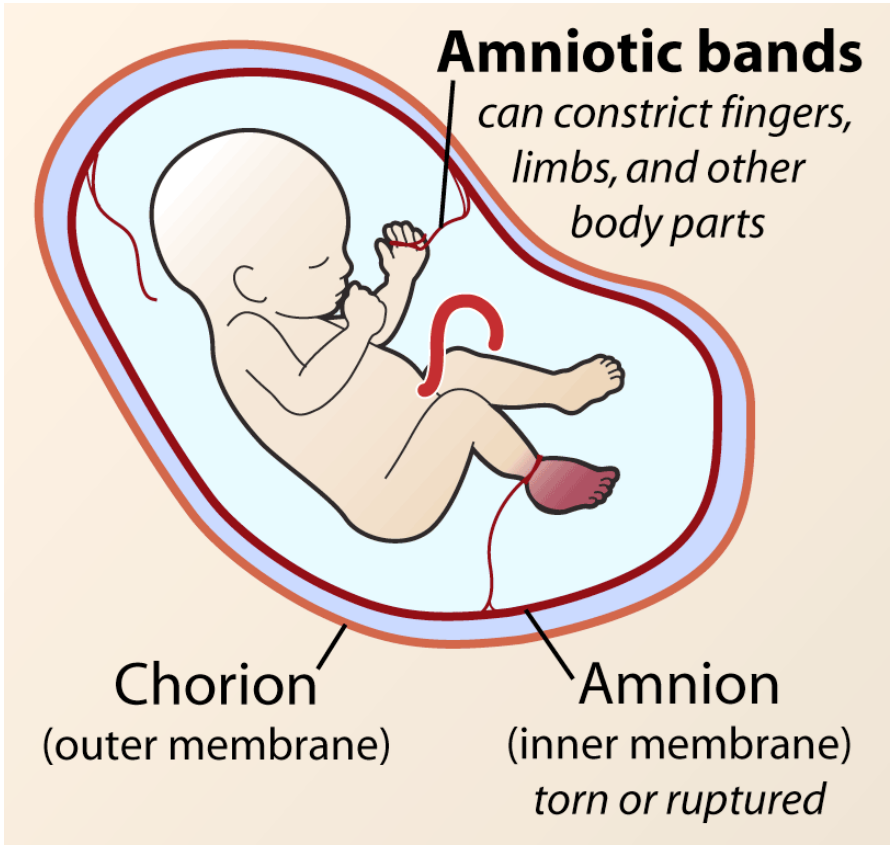

Figure 1. Animated image shows the layers of the amniotic sac and amniotic band constriction.

Related Diagnostic Ultrasound Findings

- Constriction Rings
- Decreased blood flow
- Edema
- Lymphedema
- Syndactyly (fusion of fingers)
- Oligodactyly (missing fingers or toes)
- Club foot
- Cleft lip and palate
- Acrania

3D/4D Ultrasound

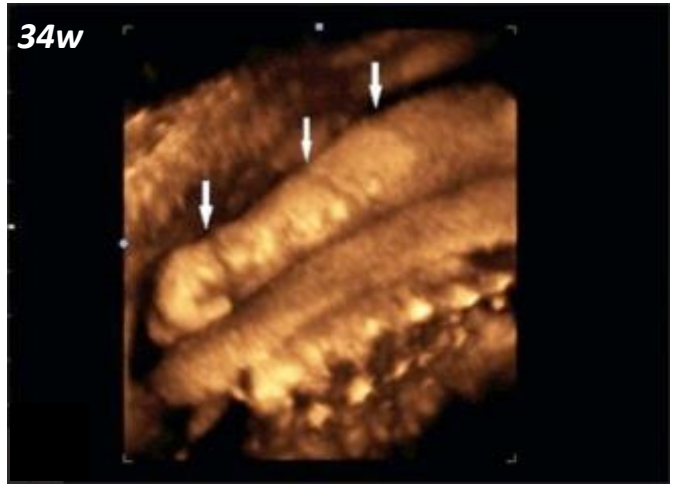

Figure 2. 3D ultrasound image. The three white arrows point to amniotic band constrictions around the fetal arm.

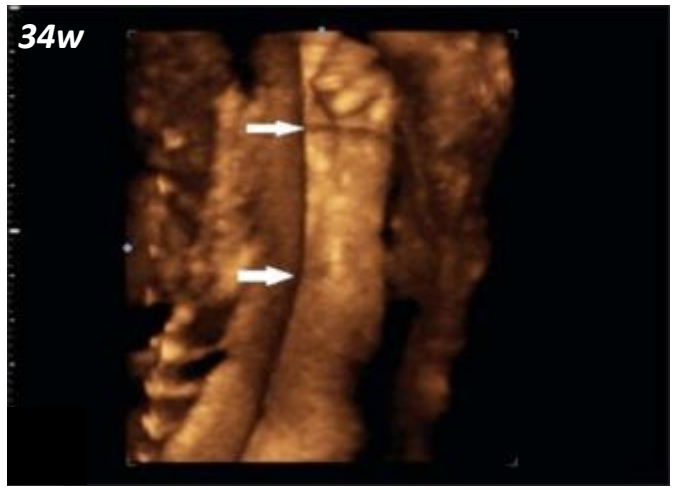

Figure 3. 3D ultrasound image. The two white arrows point to amniotic band constrictions around the fetal arm.

Figure 4. 4D ultrasound image. Amniotic bands are seen by the fetus' upper and lower extremities.

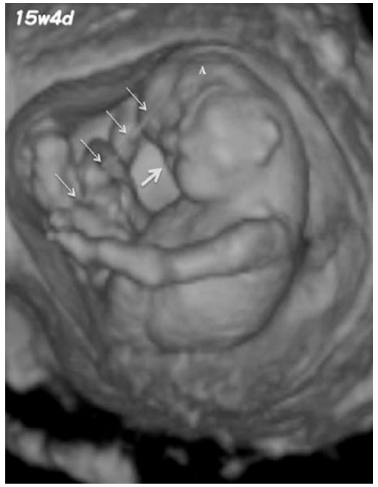

Figure 5. 4D ultrasound image. The white arrows point to amniotic bands around the fetal cephalic region.

Sonographic Findings

Figure 6. 2D ultrasound image showing amniotic bands protruding in the near field and attaching to the fetus' arms.

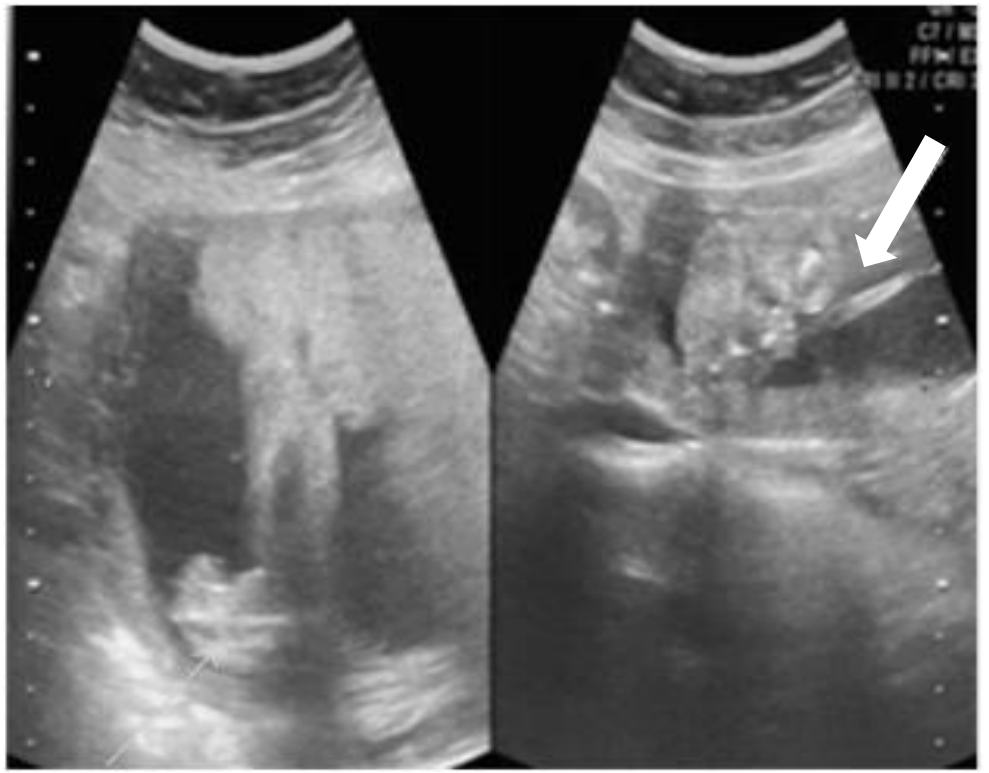

Figure 7. Constrictions of amniotic bands causing clubfoot (right) and short lower limb (left).

Postnatal Findings

Figure 8. Cleft lip deformity from amniotic band syndrome on a terminated fetus.

Figure 9. Oligodactyly from amniotic band constructions.

Outcomes

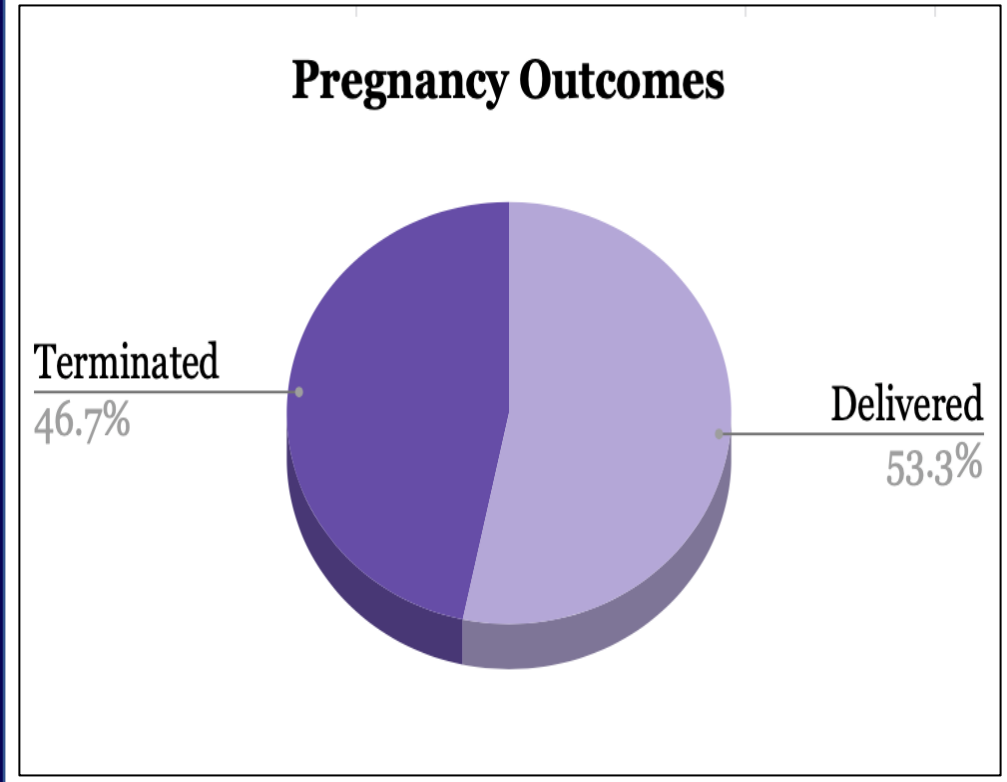

Figure 10. Pregnancy outcomes taken from 15 case studies that our group reviewed.

Conclusion

- Ultrasound is noninvasive and low risk
- 2D ultrasound can be used to discover amniotic bands and resulting malformations, but the development of 3D and 4D ultrasound allows precise spatial analysis of band attachments and constrictions.
- 3D/4D ultrasound allows a more accurate visualization of ABS and its severity, offering better understanding and more personalized treatment and counseling to parents.
- A new 3D/4D HD live mode includes adjustable shadowing and lighting effects, realistic and skin-like effects, and near photographic prenatal images.
- Increasing the usage of 3D/4D ultrasound early in gestation can result in earlier detection and treatment of amniotic band syndrome.

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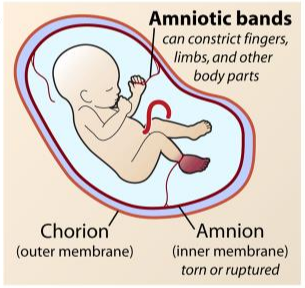

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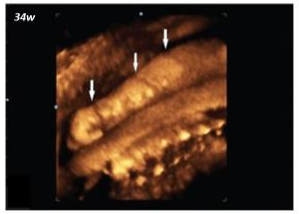

Figure 2. 3D image of amniotic band constrictions around the arm.

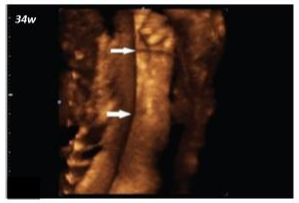

Figure 3. Second 3D image of constrictions around the arm.

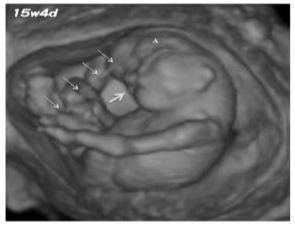

Figure 4. 4D image of bands around the cephalic area.

Figure 5. 4D image of bands around the upper and lower limbs.

Sonographic Findings

Figure 6. 2D image of bands attached to fetal arms.

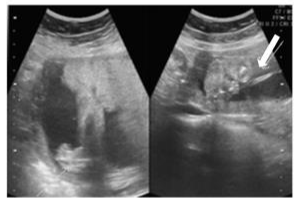

Figure 7. Band causing clubfoot (right) and short lower limb (left).

Postnatal Findings

Figure 8. Terminated fetus with cleft lip from amniotic bands.

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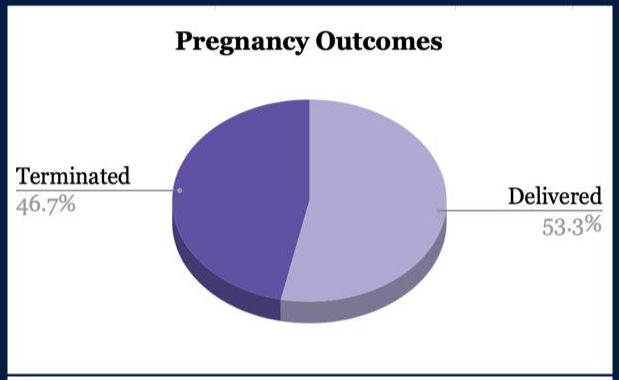

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- Increasing the usage of 3D/4D ultrasound early in gestation can result in earlier detection and treatment of amniotic band syndrome.

2021 Experience

- Faculty and students voted on the Sonography presentation that we felt would be interesting to all of the professions involved.
- We selected the presentation a vascular issue and a treatment to show that we do more than scan babies.

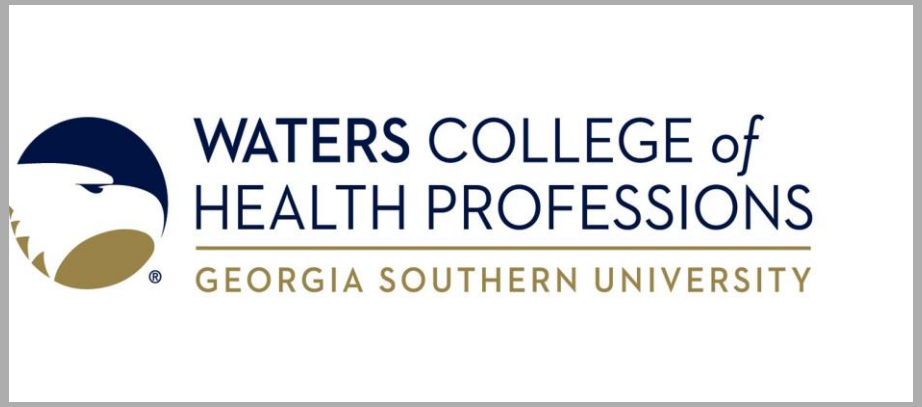
The use of Sclerotherapy to Minimize the Appearance of Varicose Veins with Ultrasound Guidance

Jaci Rogers, Kaitlyn Joines, Malia Seagraves, Treasure Torres-Harp

Georgia Southern University

Diagnostic Medical Sonography

Faculty Advisors: Mrs. Myka Bussey-Campbell and Mrs. Yvonne Dillon



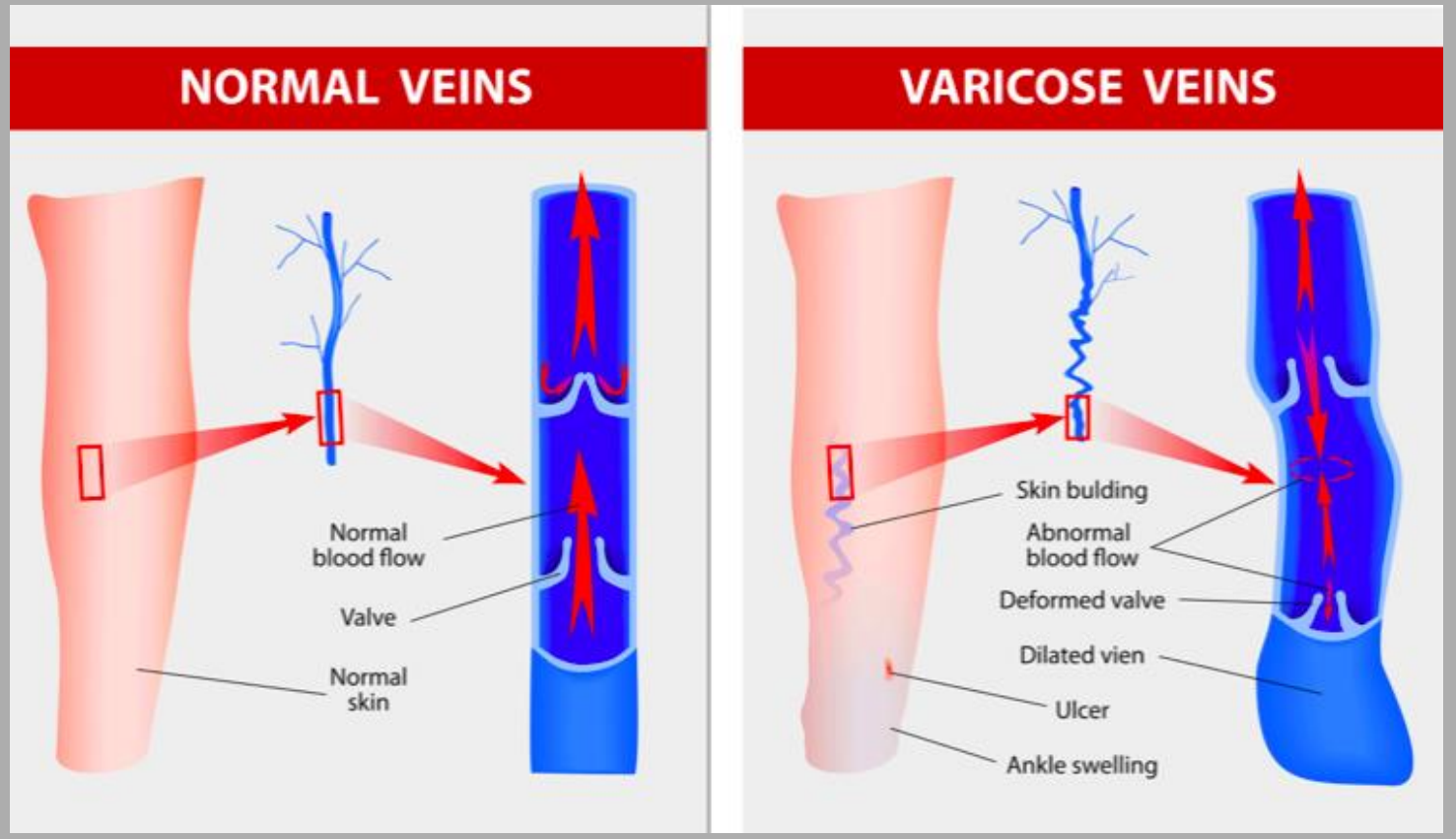
Introduction

- Ultrasound guided sclerotherapy (USGS) is a treatment option for the appearance of varicose veins in the lower extremities.

- Varicose veins may also be asymptomatic, but the patient can choose to cosmetically diminish the appearance of the varicose veins on their legs.

What are Varicose Veins?

- Dilated veins due to increased intravascular pressure and the weakening and loss of elasticity of the venous walls are most commonly found in the lower extremities.



What are Varicose Veins?

Risk Factors

- Family history of venous disease
- Female sex
- Older age
- Obesity
- Pregnancy
- Prolonged standing

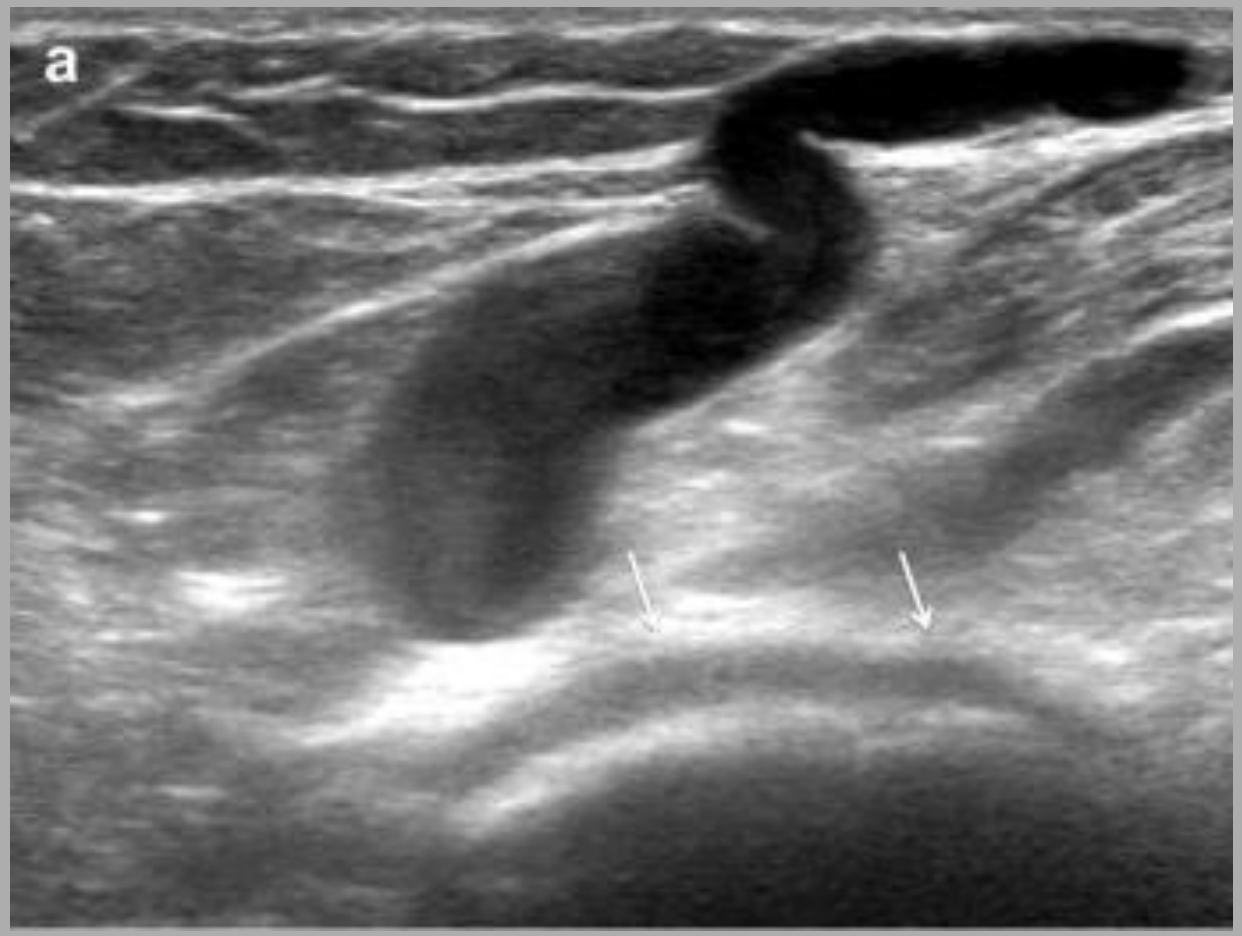
Symptoms

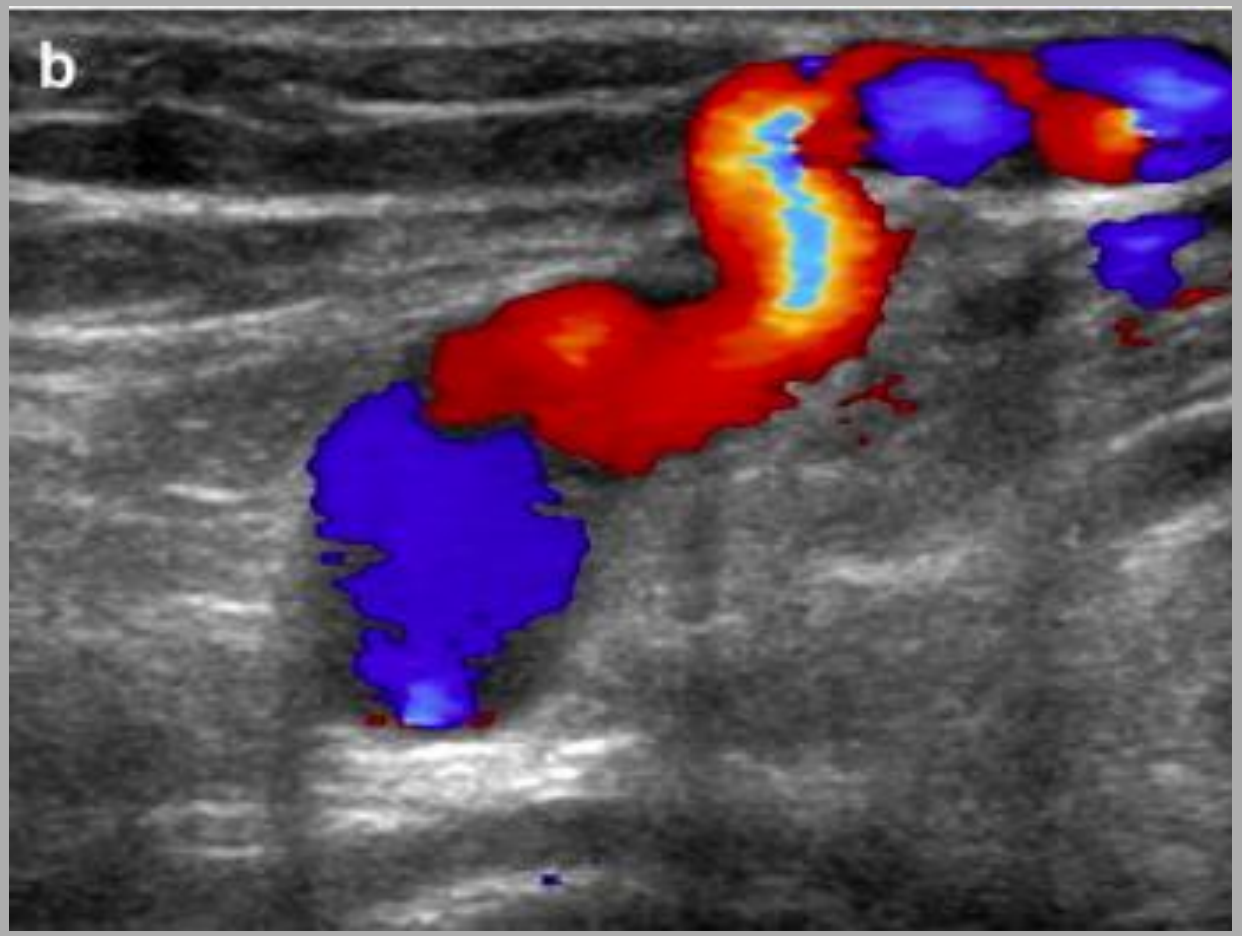
- Pain
- Burning, itching, tingling
- Aching, cramping
- Heaviness
- Swelling in the legs
- Restlessness

Varicose Veins Before and After Treatment

- After 10 months post-treatment of ultrasound-guided sclerotherapy, there are no residual varicose veins documented by ultrasound.

The Use of Color Doppler

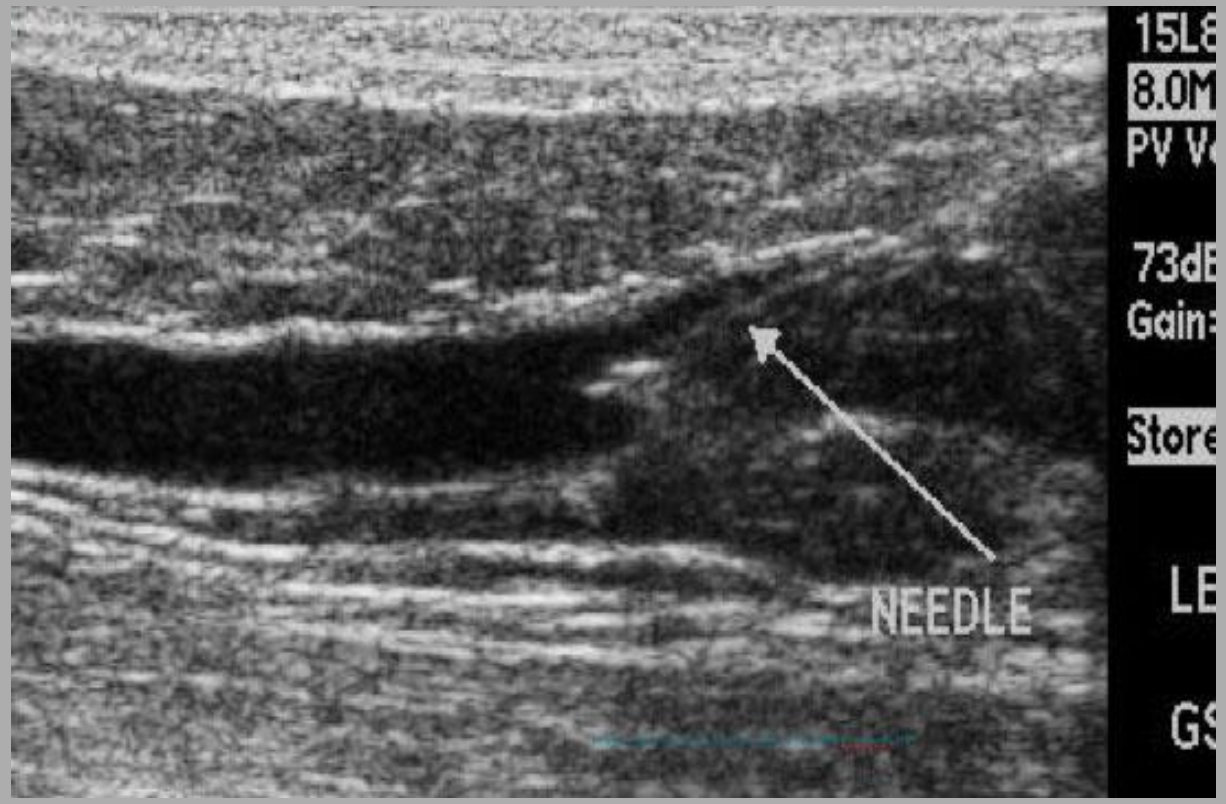




Ultrasound-Guided Sclerotherapy

- USGS is a minimally invasive procedure where the medication is injected into the desired vein.
- Ultrasound guidance is highly beneficial in this procedure to aid in locating the vein of concern.
- The injection of the sclerosant into varicose veins cause them to shrink in size or disappear altogether.
  Ultrasound is used to diagnose the varicose vein before treatment, and then to monitor the vein after treatment.

Ultrasound-Guided Sclerotherapy

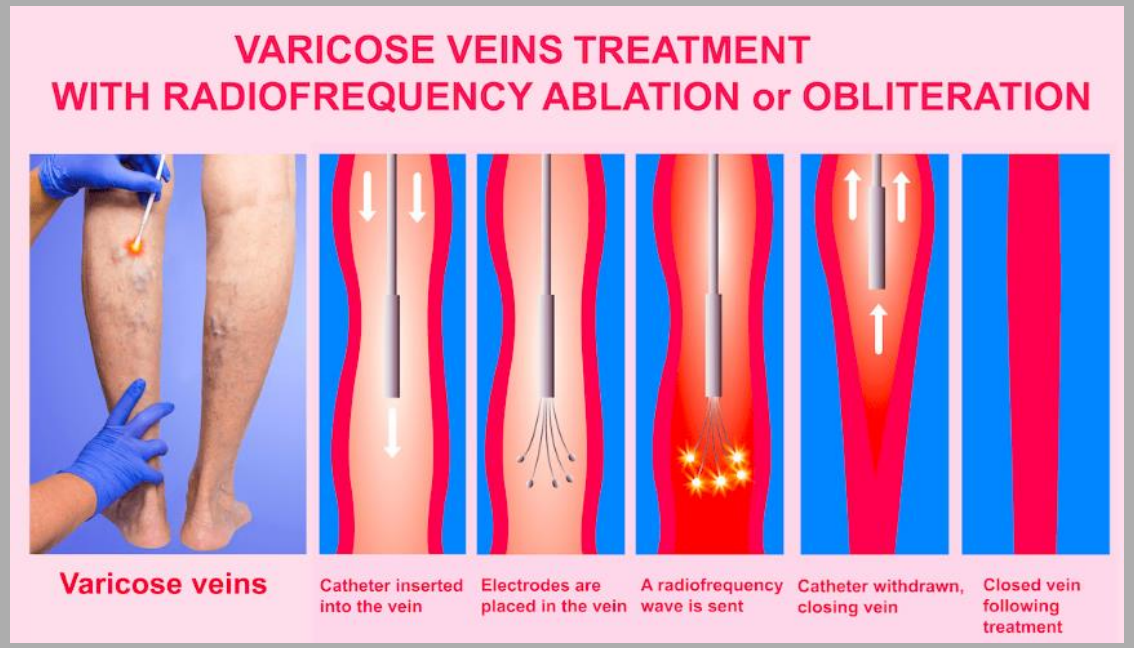


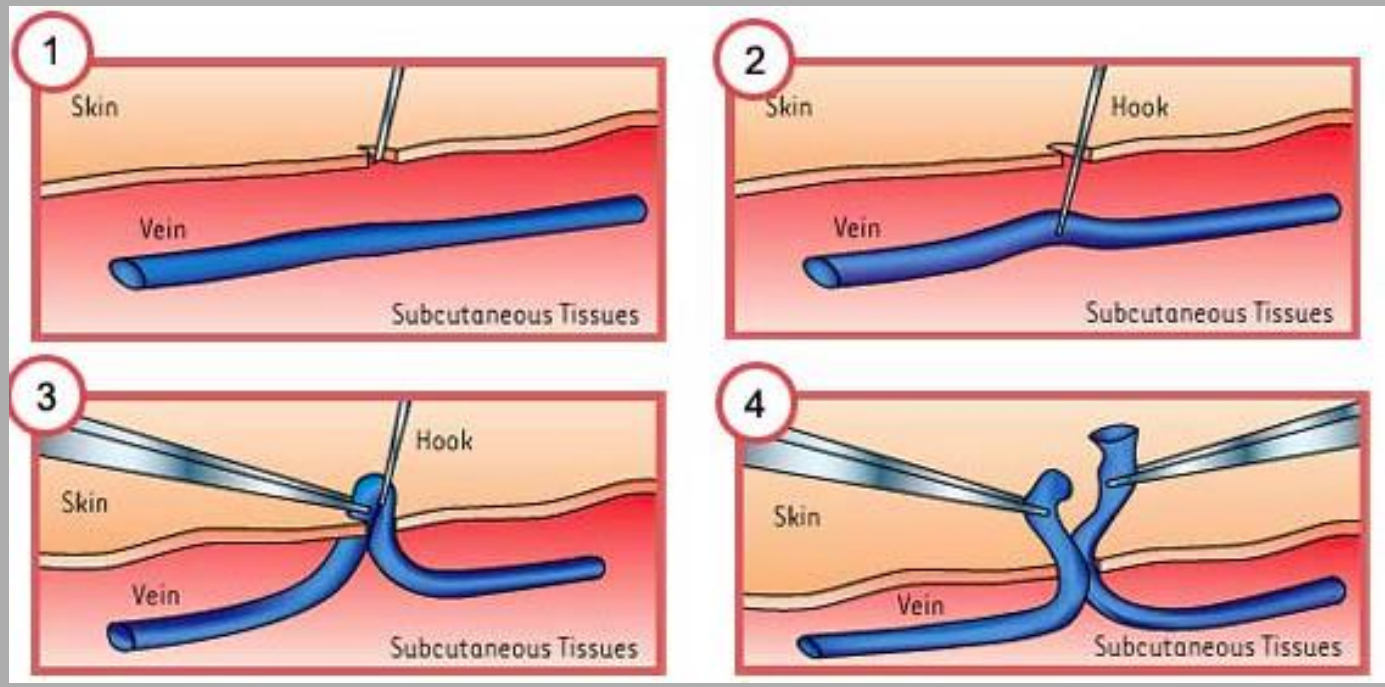
Risk of Complications

- Swelling
- Aching
- Skin pigmentation
- DVT/SVT
- Visual impairment
- Migraines
- TIA or Stroke
- Allergic reaction
- Lipodermatosclerosis

USGS vs. Other Treatments

- When USGS is compared to surgery, endovenous laser ablation, radiofrequency ablation, and other treatments, sclerotherapy surpasses the next due to many factors.





Success Rate

- USGS is becoming highly popular and is becoming the main treatment option for the treatment of varicose veins.
- Documented patient follow up and research has proven that USGS results in partial or complete occlusion of the varicose vein after the first treatment.
- This procedure has less complications, least traumatic, and easy to repeat compared to the conventional surgery options.
- USGS also greatly fulfils patient satisfaction by diminishing the appearance of varicose veins as soon as after the first treatment.

Conclusion

- Varicose veins are the result of increased intravascular pressure and weakened elasticity of venous walls.
- Ultrasound helps to determine many details before venous procedures like :
  - which saphenous junctions are incompetent
  - what the diameter of the junctions are
  - what the extent of reflux is
  - what the location and size of other incompetent perforating veins are
  - which vein should be injected with sclerosant during an USGS procedure.
- USGS is a minimally invasive, cost effective, and highly successful venous procedure that can be repeated when or if needed to.
- Continuing research could eliminate or help decrease the instance of both common and rare complications of USGS procedures.

The use of Sclerotherapy to Minimize the Appearance of Varicose Veins with Ultrasound Guidance

Jaci Rogers, Kaitlyn Joines, Malia Seagraves, and Treasure Torres-Harp
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Introduction

- Ultrasound guided sclerotherapy is a treatment option for the appearance of varicose veins in the lower extremities.
- Ultrasound is considered the gold standard for imaging and diagnosing varicose veins.
- Varicose veins may also be asymptomatic, but the patient can choose to cosmetically diminish the appearance of the varicose veins on their legs.

What are Varicose Veins?

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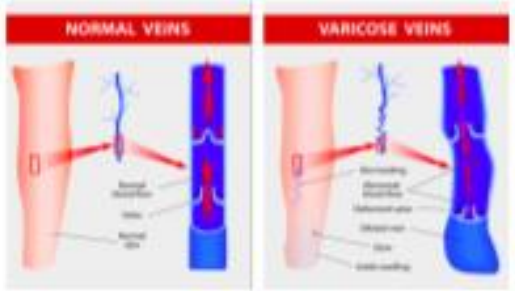

Figure 1 Shows normal vs disease veins

Ultrasound Guided Sclerotherapy

Figure 2. Real time ultrasound guidance of needle

Figure 3. Ultrasound image of the needle inserted

UGS vs. Other Treatments

- When USGS is compared to surgery, endovenous laser ablation, radiofrequency ablation, and other treatments, sclerotherapy surpasses the next due to many factors.

Figure 4. RFA

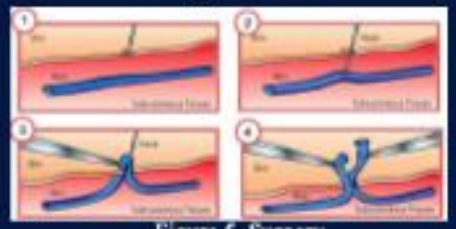

Figure 5. Surgery

Success Rates

- When performed by experienced specialists, USGS has a success rate of over 80%
- USGS can eliminate underlying venous insufficiency and halt the progression of disease in those veins
- The cosmetic appearance after the completion of this procedure greatly fulfils patient satisfaction

Figure 6 and 7. Before and After USGS

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- USGS is a minimally invasive, cost effective, and highly successful venous procedure that can be repeated when or if needed to.
- Continuing research could eliminate or help decrease the instance of both common and rare complications of USGS procedures.

2022 Involvement

- Sonography juniors only
- More faculty involvement – RDSC 3001 class, juniors in all tracks
- Common Case
- Radiologic Sciences faculty assisted students in creating presentations to share with the discussion groups regarding their involvement with the case.

Deep Vein Thrombosis (LLEV-Left Lower Extremity)

Interprofessional Case Study
Fall 2022

Patient Assessment

- 64-year-old
- Male
- Confirm patient name and DOB
- Symptoms: Difficulty breathing was initial symptom for admission, acute onset of pain in left lower extremity while hospitalized is the indication for the exam.
- History of COPD, seizure disorder
- Previous chest x-ray

Sonographic Application/Patient Prep

- The patient is inpatient in the hospital and experiencing acute left lower extremity pain.
- A lower extremity venous Doppler ultrasound was ordered on his left leg to rule out DVT.
- This exam is completed by a sonographer.
- The patient is transferred from tank oxygen to room wall oxygen when they arrive.
- The patient removed pants and socks for this exam and was laying in a supine position with their leg slightly bent at the knee and relaxed to the side.
- Equipment is sanitized prior to the exam.
- Hand hygiene is performed and gloves worn for the exam.
- Equipment is sanitized following the exam.

Ultrasound Equipment

- GE Logiq 10
- 8 MHz Linear Probe
- B-mode
- Color Doppler
- Pulsed wave Doppler

Normal Anatomy/Protocol

LLEV Doppler Protocol

*Probe is to be placed on the vessel with color
and spectral Doppler imaging performed while the sonographer
simultaneously compresses/squeezes the calf.

****Procedure Transverse grayscale images with and without compression**

- Common Femoral Vein
- Greater Saphenous Junction
- Greater Saphenous Vein
- Superficial Femoral Vein prox, mid, and distal
- Popliteal Vein prox, mid, and distal

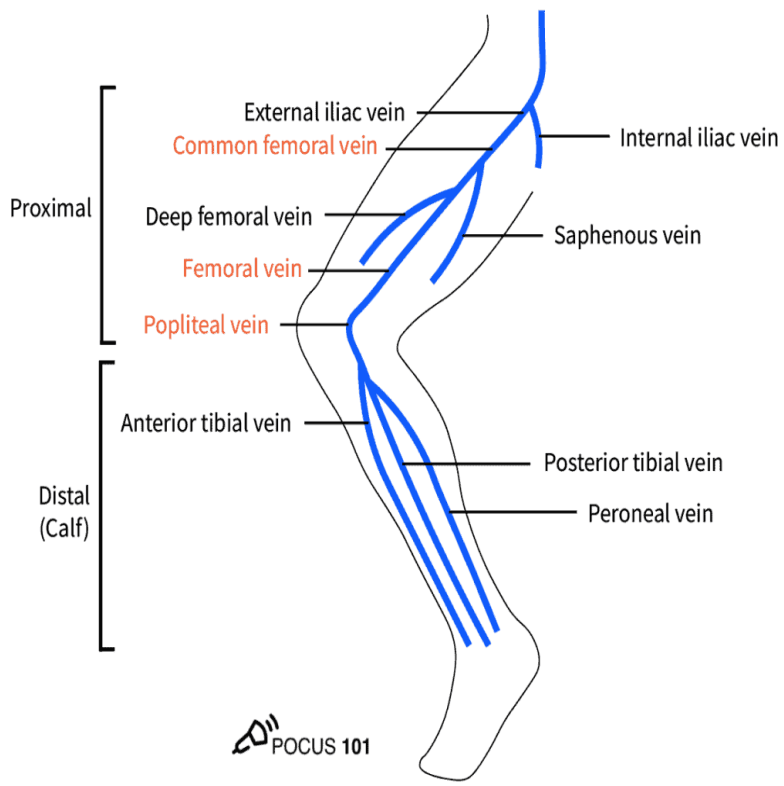
****Longitudinal Color and Spectral Doppler**

- Common Femoral Vein (with Valsalva)
- Greater Saphenous Junction (with Valsalva)
- Profunda (with augmentation) • Superficial Femoral Vein proximal, mid, and distal (with augmentation)
- Popliteal Vein proximal and distal (with augmentation)
- Calf Veins vary per site
- Additional Notes: • Document the location and extent of any thrombus with grayscale and color Doppler.

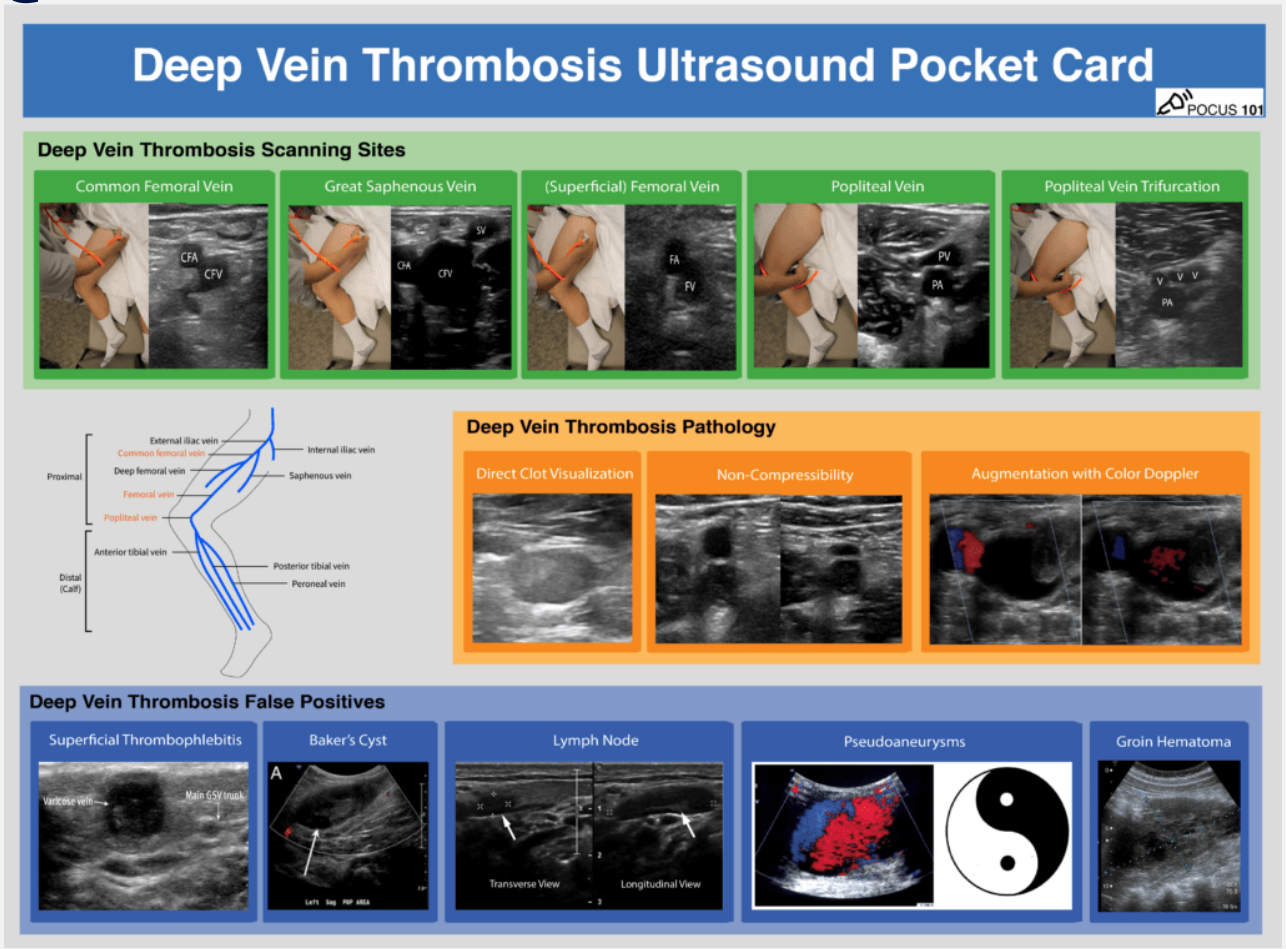
If thrombus is seen within the proximal GSV, document the distance from the SFJ.

- augmentation is to be performed on all lower extremity vessels

(no augmentation is to be performed if there is known/documented clot within the calf veins)



Quick Guide for DVT Study



Normal Anatomy Images

Figure A:

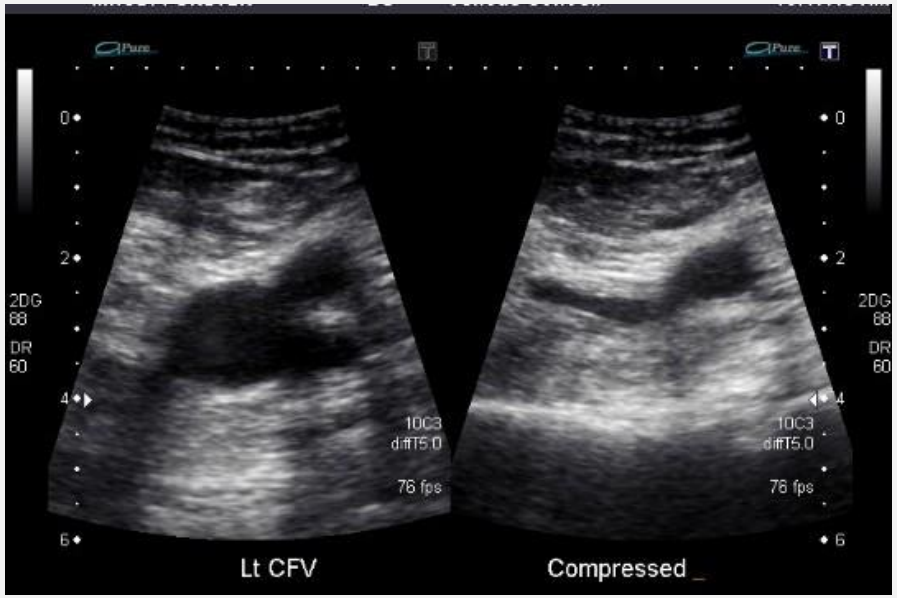


Figure A shows a transverse image of a normal LT CFV with and without compression

Figure B:

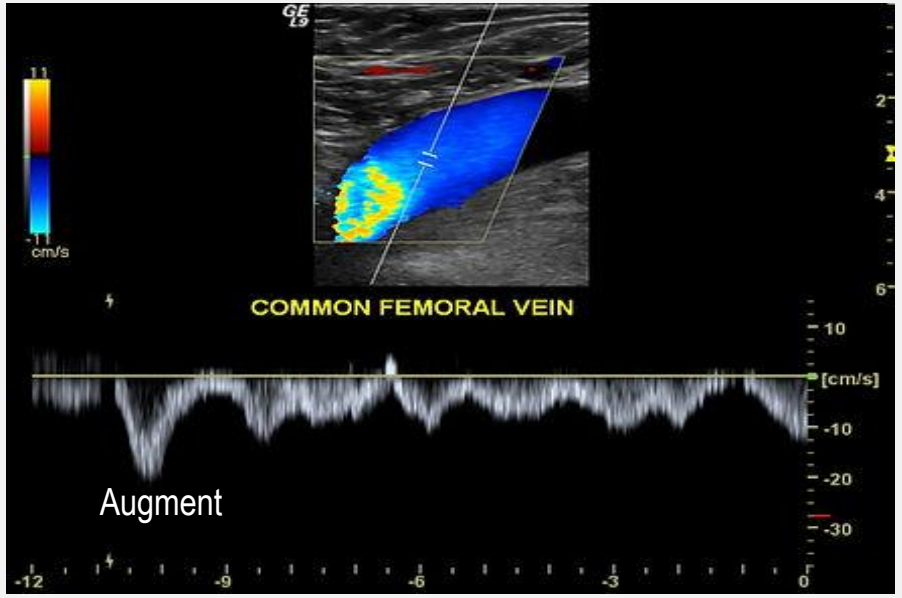
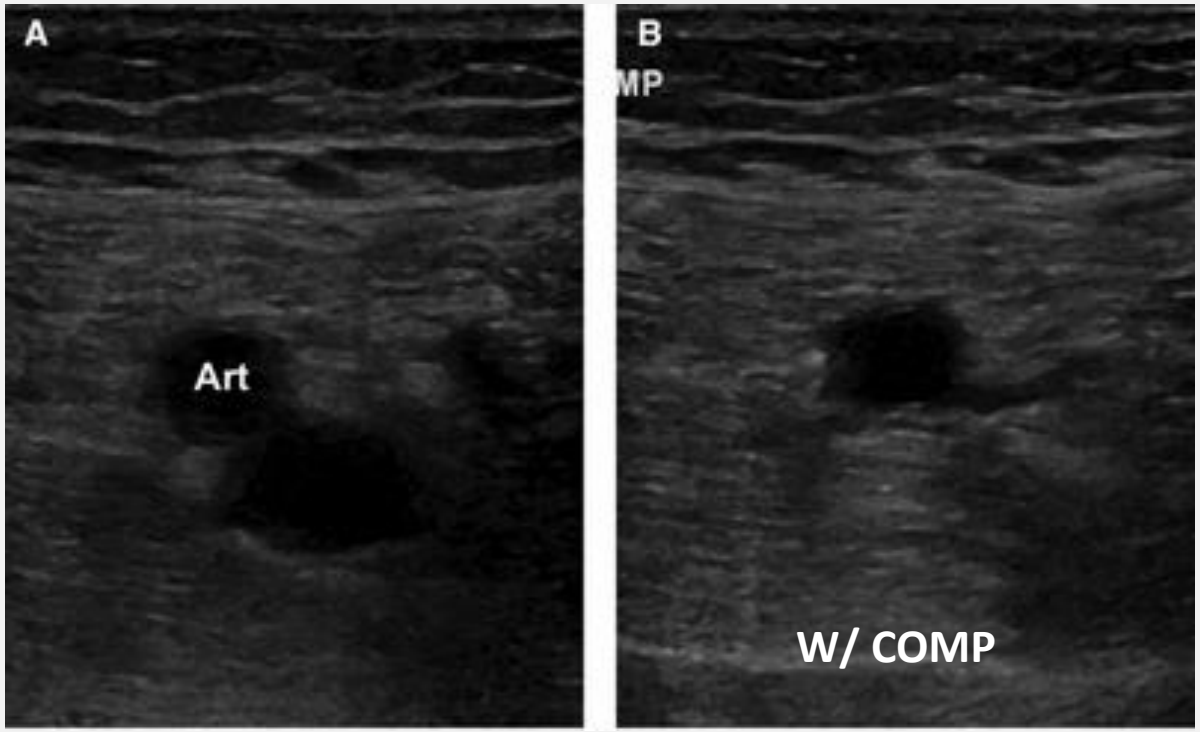
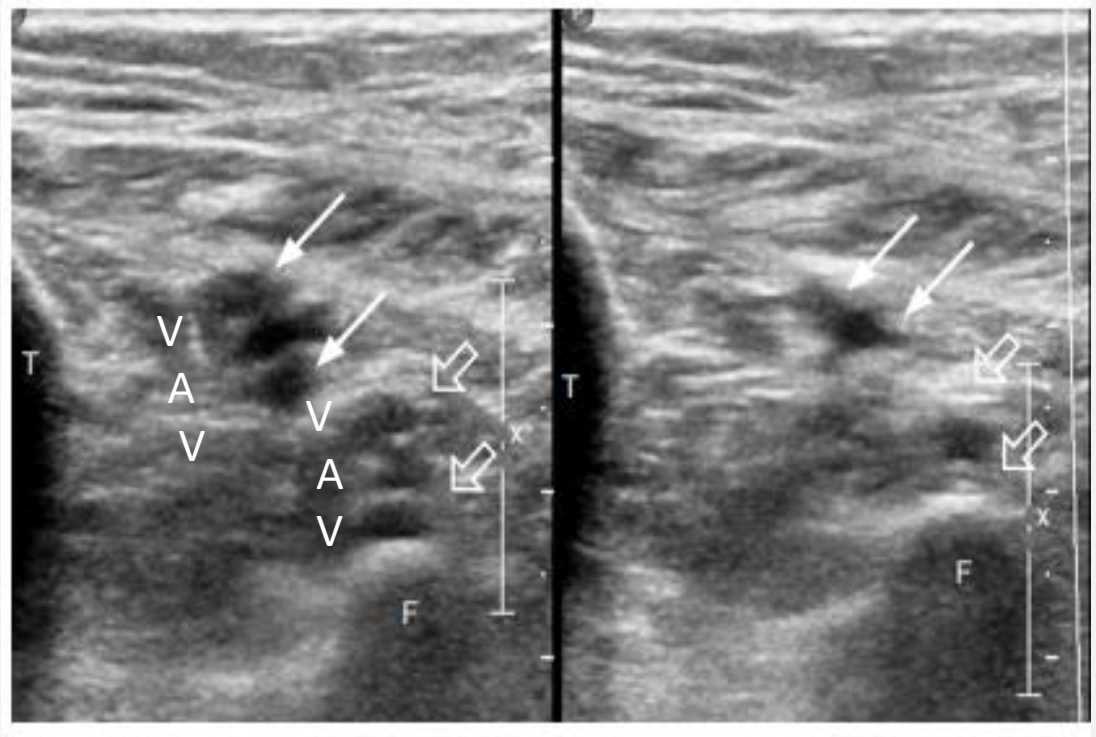


Figure B shows a sagittal image of a normal CFV. Color and Pulse Wave Doppler are used to show blood flow and response to augmentation in clear vessel.

Normal Anatomy Images



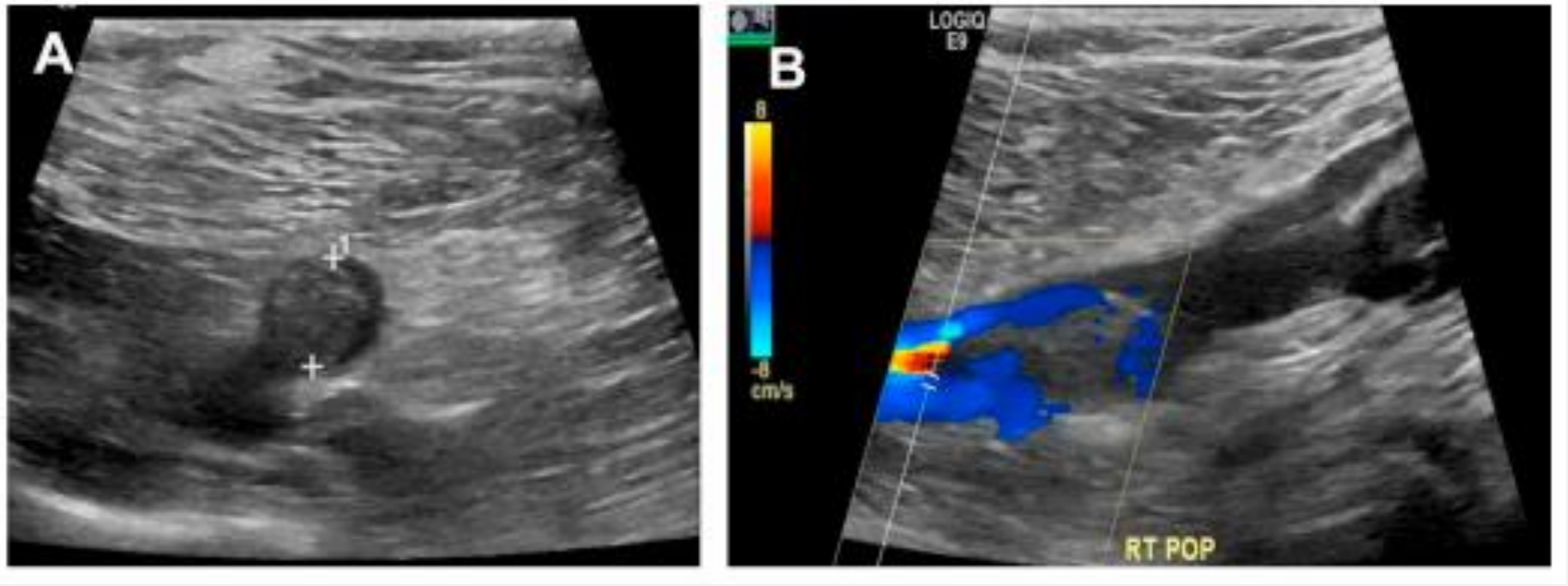
LEFT FV WITH AND WITHOUT COMP
Normal



CALF VEINS WITH AND WITHOUT COMPRESSION
Normal

Pathology Images

Transverse view of Left CFV that will not compress. Positive for DVT in Left CFV



Transverse and Longitudinal views of the Right Popliteal Vein with partially occlusive clot. Some blood flow is still seen in the long view, so it is not totally occluded yet.

Differential Diagnosis Images

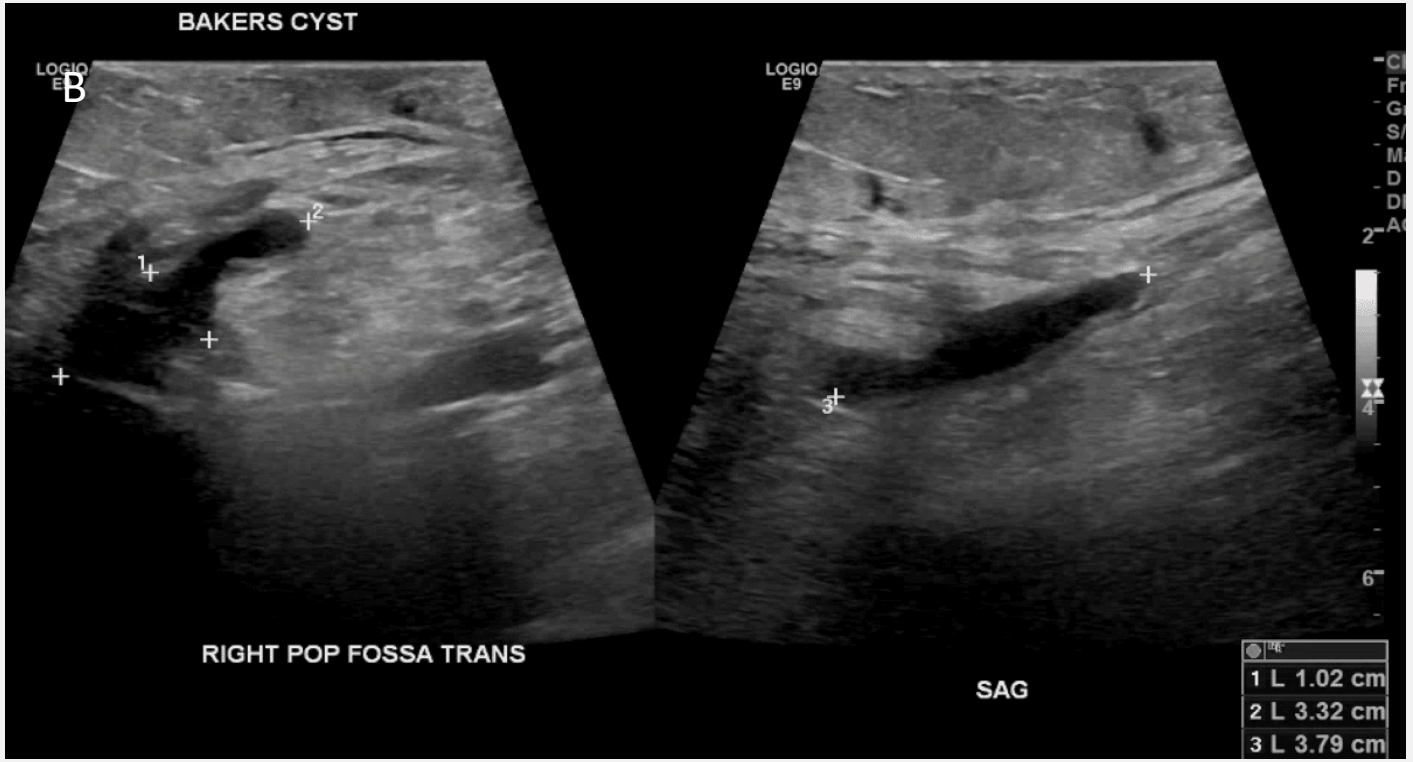


Figure A: Enlarged Inguinal Lymph node

Figure B:Right Popliteal Fossa, Baker's Cyst

Conclusion/Follow-up

- Outcomes for deep vein thrombosis are generally good when patients are diagnosed and treated at early stages.
- Follow up ultrasound is typically scheduled after the initial diagnosis to assess treatment.
- Left untreated a DVT can lead to Pulmonary Embolism.

Health and Wellness

- Some foods such as ginger, walnuts, garlic, cayenne pepper, and cinnamon have been shown to reduce the likelihood of blood clots (5 home remedies for deep vein thrombosis (DVT) and natural treatment, 2017).
- Additionally, regular exercise and adequate water intake have been shown to lower the risk of blood clots.
- Smoking has been shown to increase the risk of blood clots (Blood clots prevention tips, 2021).

Interprofessional Case Study

The Radiographer's Role

RDSC 3001

Fall 2022

Patient Demographics

- 64-year-old
- Male
- Initial Symptoms: difficulty breathing
- Symptoms Arising: acute pain in the left leg, pain in left shoulder and elbow due to a fall during a seizure
- Long history of a seizures
- Hypertension
- Chronic Obstructive Pulmonary Disease (COPD)

Patient Assessment

Patient confirmed his full name and date of birth

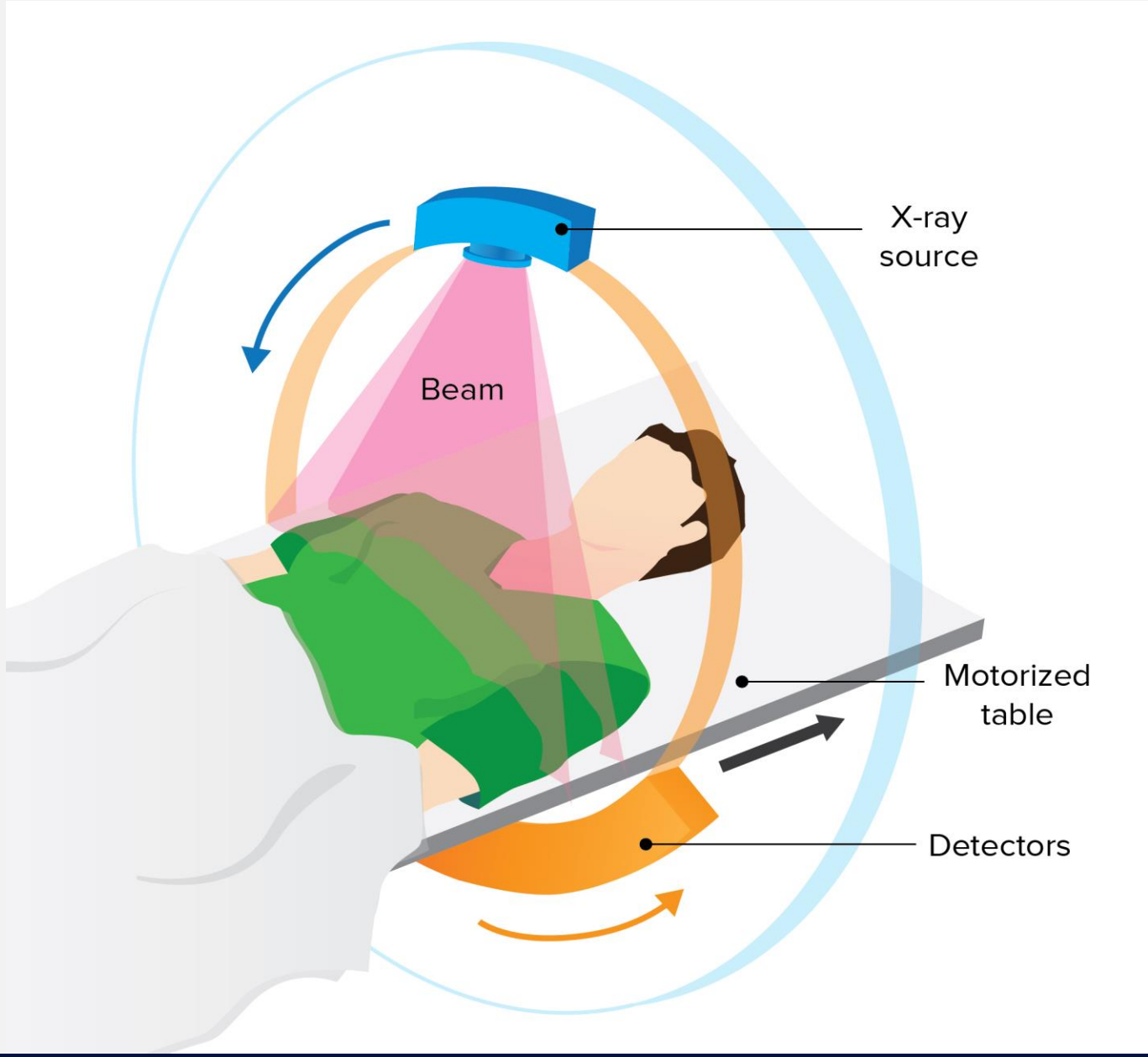
Patient was in Emergency Department (ED) a week prior for wheezing, difficulty breathing and DVTs

On the following medications

- *Three for acute COPD (unlisted)*
  - Albuterol (Short-acting bronchodilator)
  - Fluticasone (Corticosteriod)
  - Carbocysteine (Mucoactive drug)
- *Three for Seizures*
  - Levetiracetam
  - Lamotrigine
  - Valproate Sodium
- Hypertension (unlisted)
  - Chlorthalidone (diuretic)
  - Benazepril (Angiotensin-converting enzyme (ACE) inhibitor)
  - Amlodipine (Calcium channel blocker)

Computer Tomography Equipment

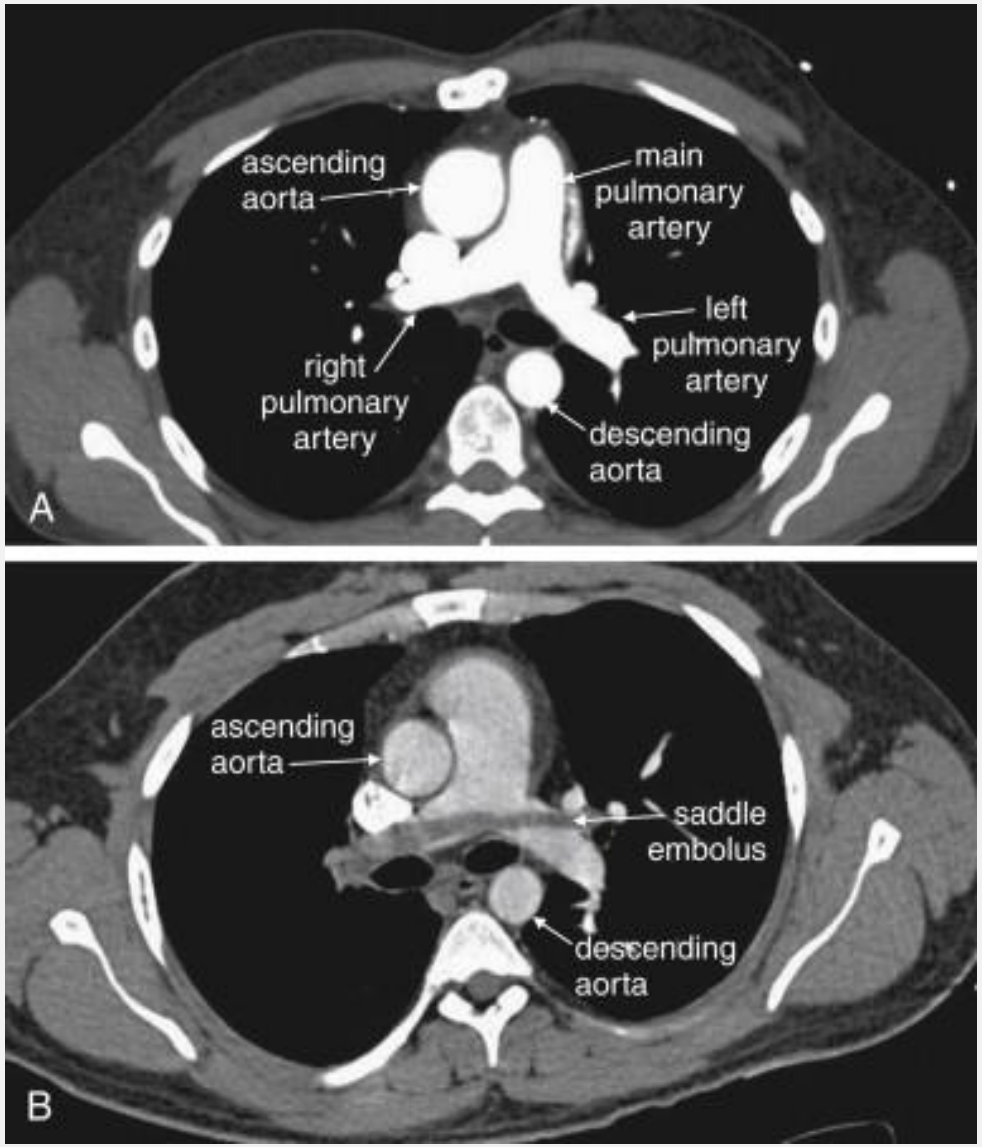
- The X-ray tube is a device that converts electrical input power (electrons) into x-rays (photons) that penetrate the human body.
- The image receptor (IR) is the device used to turn x-ray beams into visual images.



Radiographic Application

Patient came due irregular heartbeat, shortness of breath and dizziness	• Physical examination showed signs of a possible PE (pulmonary Embolism)
CT Pulmonary Angiography ordered by ED physician	• Determine whether a PE was visible
Procedure performed by a Radiographer/CT Technologist	
Patient admitted from ED to hospital after exam	• There was a positive PE visible on the CTPA chest

Exam Images: CTPA- “Normal” versus PE



Health and Wellness:

- Stay hydrated
- Avoid caffeine, alcohol, and smoking

- Wear loose-fitting clothing when traveling
- Compress legs below the knee to prevent the formation of blood clots

- Walk and stretch regularly, don’t cross your legs
  - If you can't walk, do lower leg exercises

- Manage weight by regulating exercise (at least 30 min a day)

- Check blood pressure yearly (or more via your doctor)

Why we do IPE

- Accreditation!
- Teach our students that their jobs are not all that matters in the scheme of patient care.
- Improve relationships among the healthcare workers that are all taking care of the same patient.
- Potentially reduce errors in patient care.