

Correlation of Indirect Duplex Ultrasound Findings and Venography with IVUS for May-Thurner Syndrome

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Disclosures

Nothing to disclose

May Thurner Syndrome (MTS)

- Arterial compression of the pelvic venous structures against the sacral prominence roughly at the level of the common iliac vessels.
- More common on the left and in women.
- Can lead to unexplained leg edema and or thrombosis (DVT).
- Often underdiagnosed or missed as a cause of leg edema and DVT.

May Thurner Syndrome Clinical Presentation

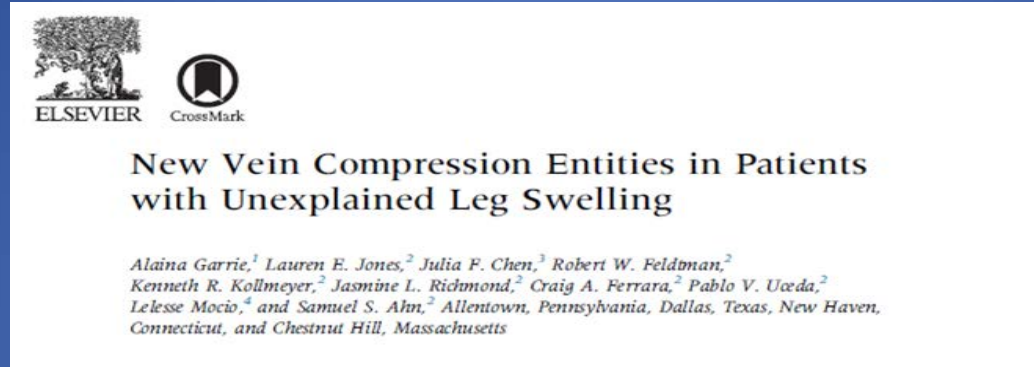
- Lower extremity swelling and pain
- Venous stasis ulcers
- Skin discoloration
- Venous claudication
- Chronic venous insufficiency

MTS Underdiagnosed

- In most instances, as long as there is not a deep vein thrombosis or venous reflux, the exam will be ruled as “negative”.
- Patients will then have no explanation for their chronic pain and swelling. Sometimes waiting years for an accurate diagnosis and treatment.

What Makes MTS So Difficult to
Image With Ultrasound?

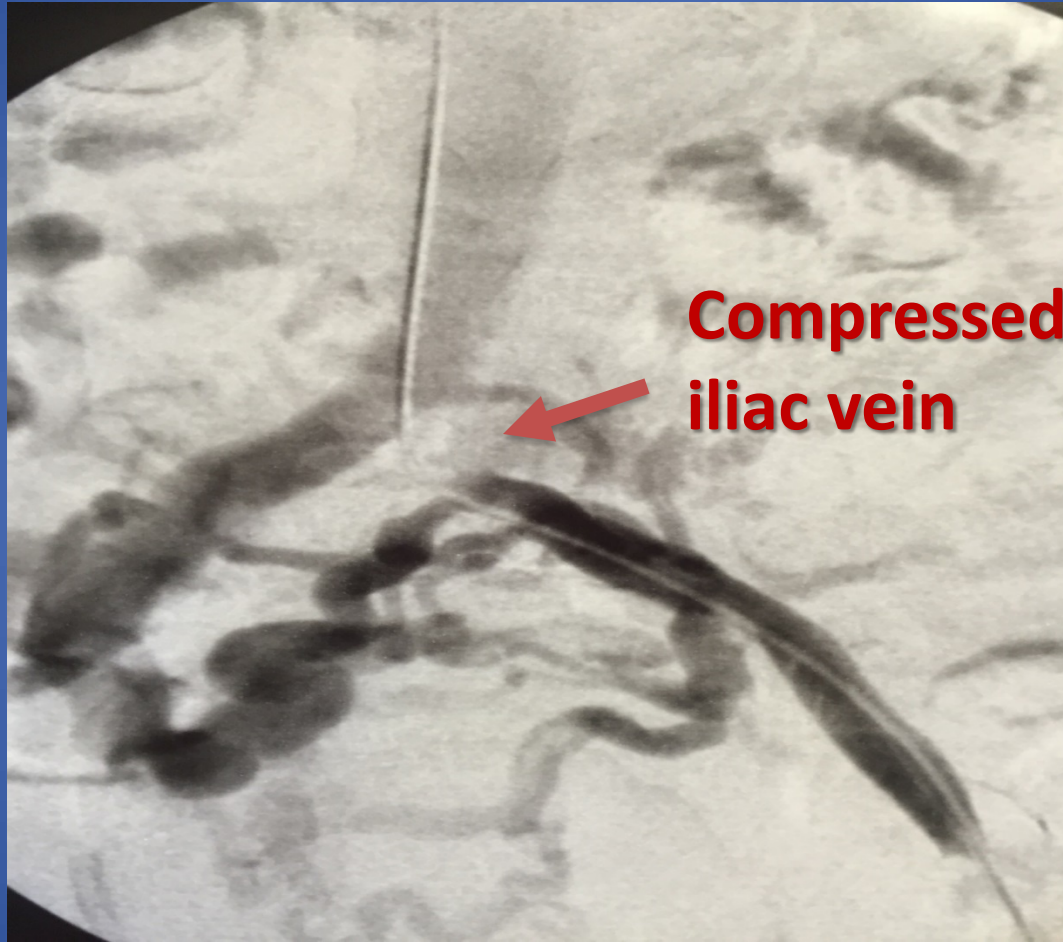
Previous Research

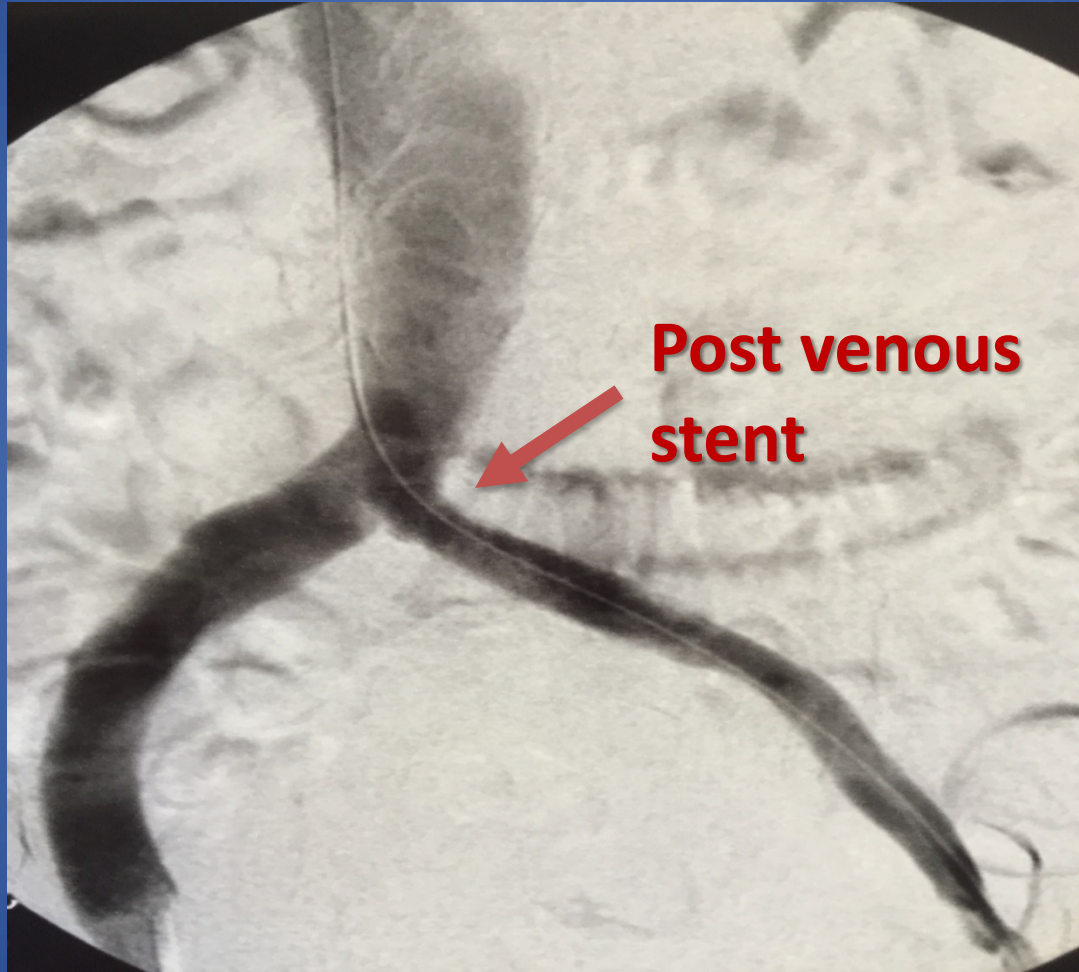


- In 2017, Garrie et al. suggested that this is due, in part, to a limitation in imaging techniques
 - Other contributing factors:
 - Poor understanding of incidence and anatomical variations
 - Lack of optimal diagnostic imaging strategies

Previous research (cont)

- 26 out of 36 patients based on the “standard” way to perform duplex scans had negative findings (no DVT and no reflux), however had abnormal venograms and IVUS.
- This resulted in patients living with persistent LE pain and edema without appropriate treatment and we wanted a better way to identify these patients with MTS.

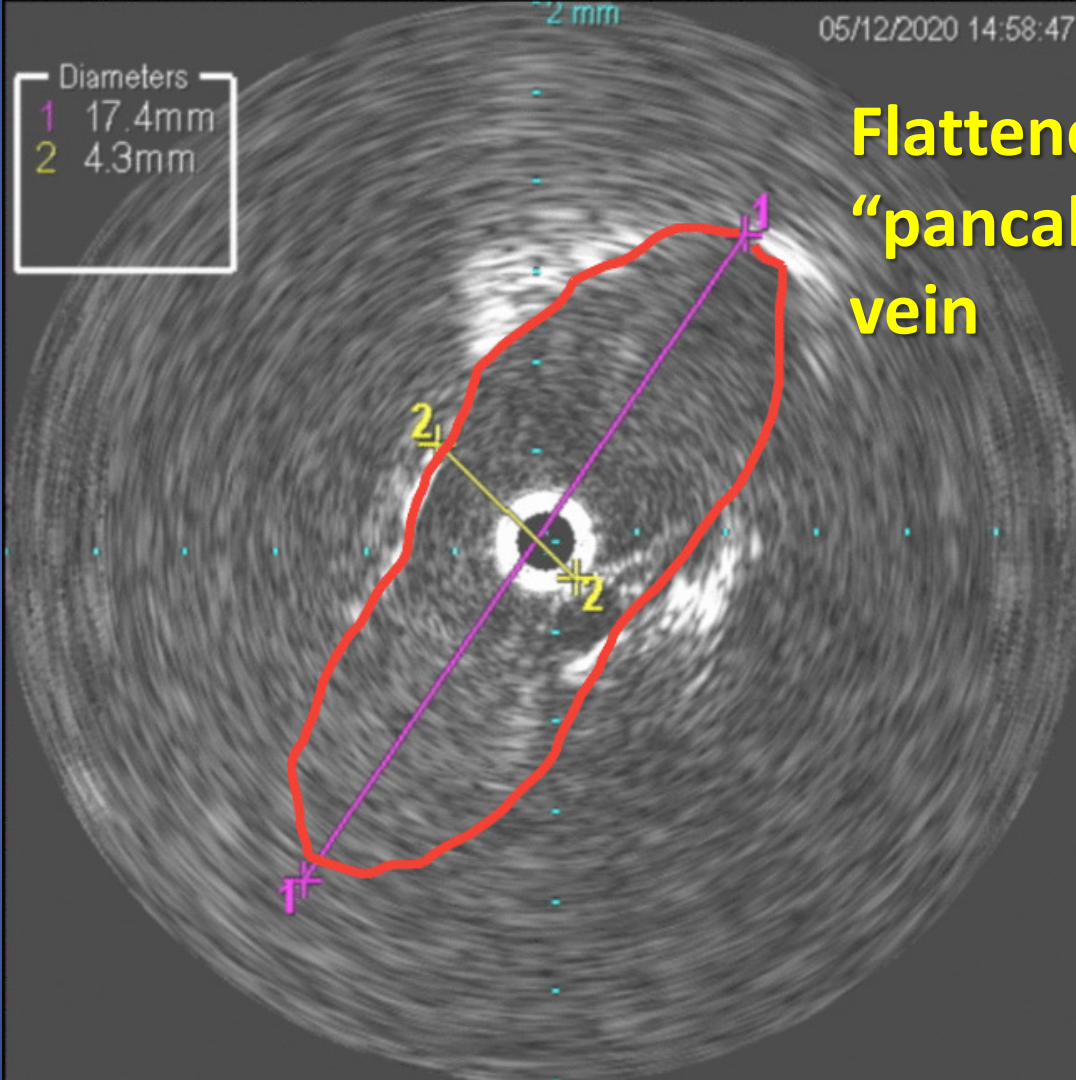




**Post venous
stent**

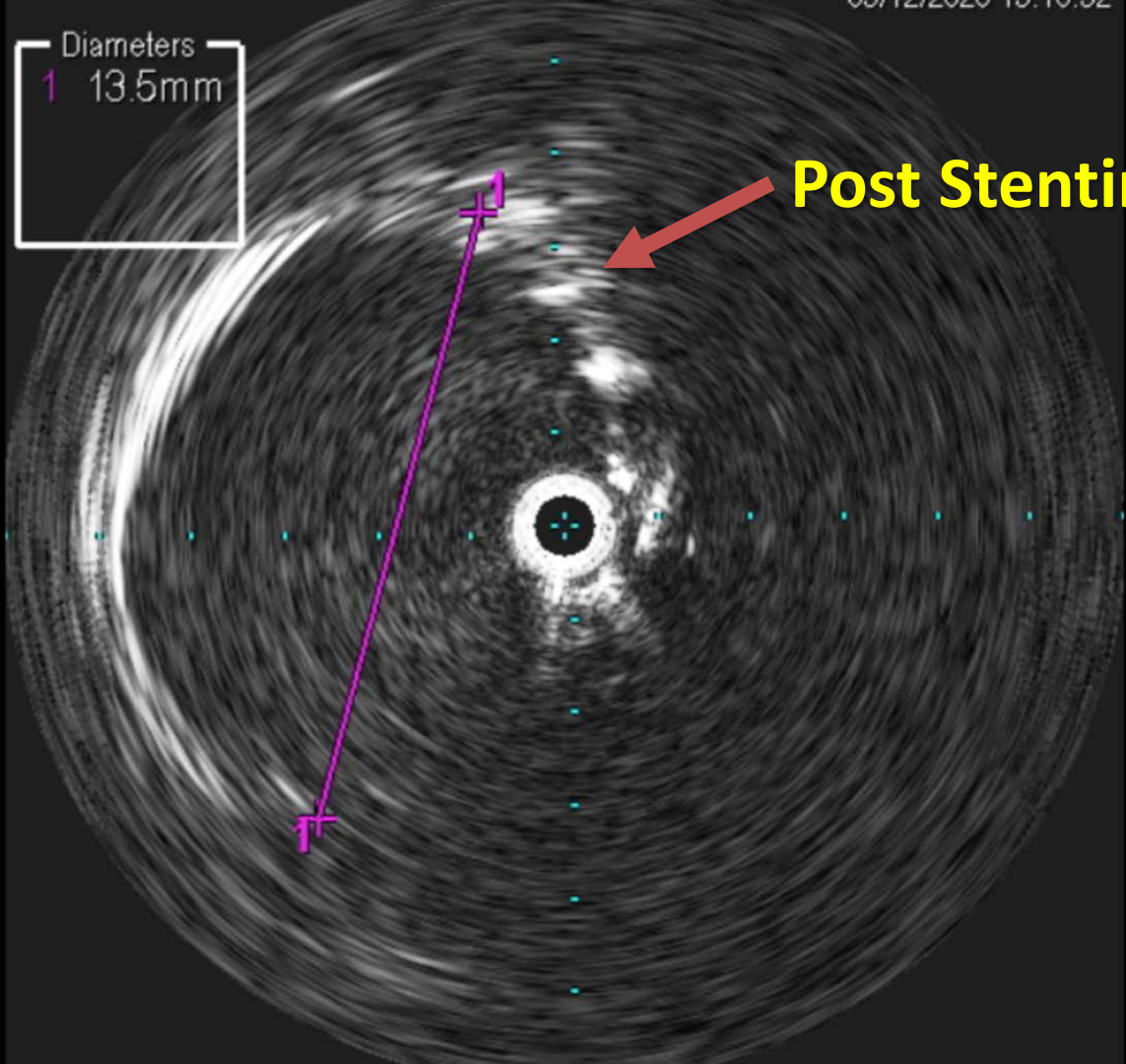
Diameters
1 17.4mm
2 4.3mm

Flattened
“pancake” iliac
vein



Diameters
1 13.5mm

Post Stenting



Measurements

03/12/2020

Our Goals

- Therefore, we wanted to analyze the more advanced methods to test their effectiveness of identifying MTS.
- Over the next four years we documented several indirect testing methods to better identify these patients.

How did we achieve this?

Indirect Ultrasound Testing

The Role of Sonography

- As sonography is dependent of the skill and knowledge of the technologist, under reporting of abnormal venous flow is common
- As long as there is absence of a deep vein thrombosis (DVT), there is little information given regarding the variance of the venous flow.
- More emphasis on venous flow documentation by the sonographer could greatly help with getting the patient the treatment needed.

Basic Venous Report From Radiology

Narrative

EXAM: Right lower extremity venous ultrasound

HISTORY: Swelling.

TECHNIQUE: Realtime grayscale and color/spectral doppler was performed and pertinent images recorded.

COMPARISON: None

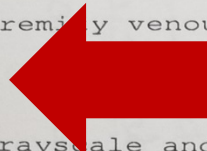
FINDINGS: The common femoral, femoral, popliteal, and greater saphenous veins above the knee demonstrate normal color flow and compressibility. Spectral phasic flow and augmentation are demonstrated. Color flow and augmentation are demonstrated in the posterior tibial and peroneal veins in the calf. There is moderate subcutaneous edema at the calf.

Impression

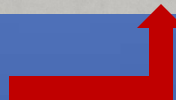
IMPRESSION:

No evidence of right lower extremity deep venous thrombosis.

Vein compression can be present as lower extremity edema



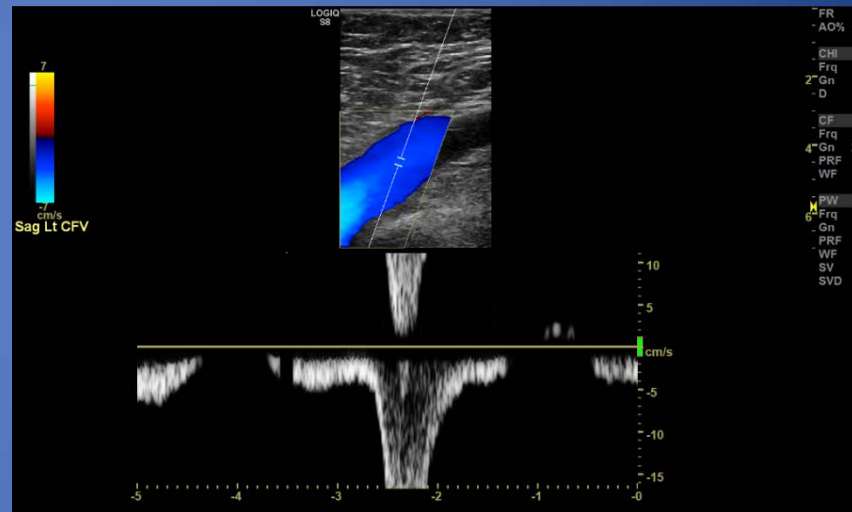
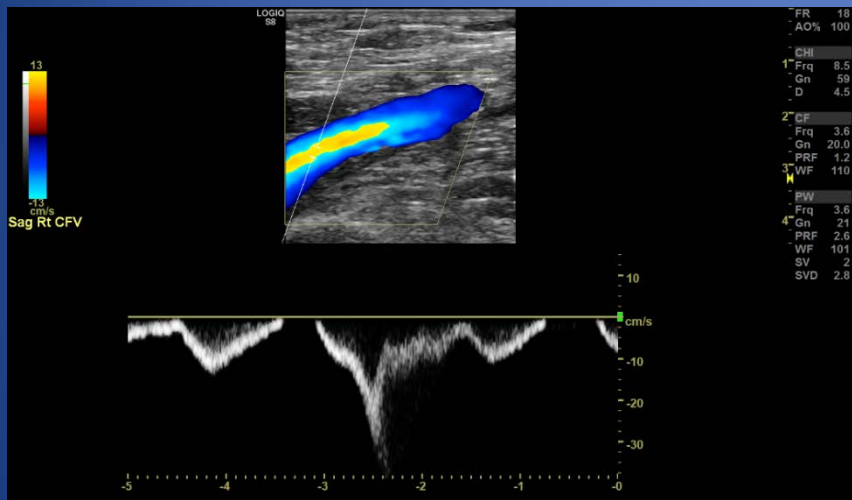
Then why are they symptomatic???



Advanced Venous Ultrasound Evaluation and Documentation

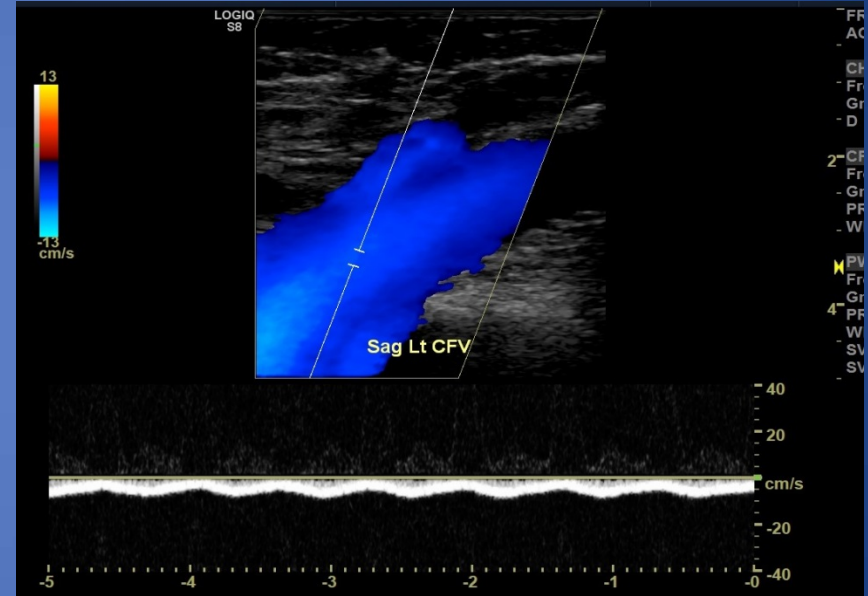
- If there is continuous venous flow demonstrated in the CFV, with or without pulsatility, then there should be multiple images taken, showing the venous flow with and without augmentation
- Noting reflux with patient inspiration at the CFV > 1 second
- If there is loss or respiratory variation in the femoral vein, either at the proximal portion or throughout

Normal Venous Flow Pattern at the CFV



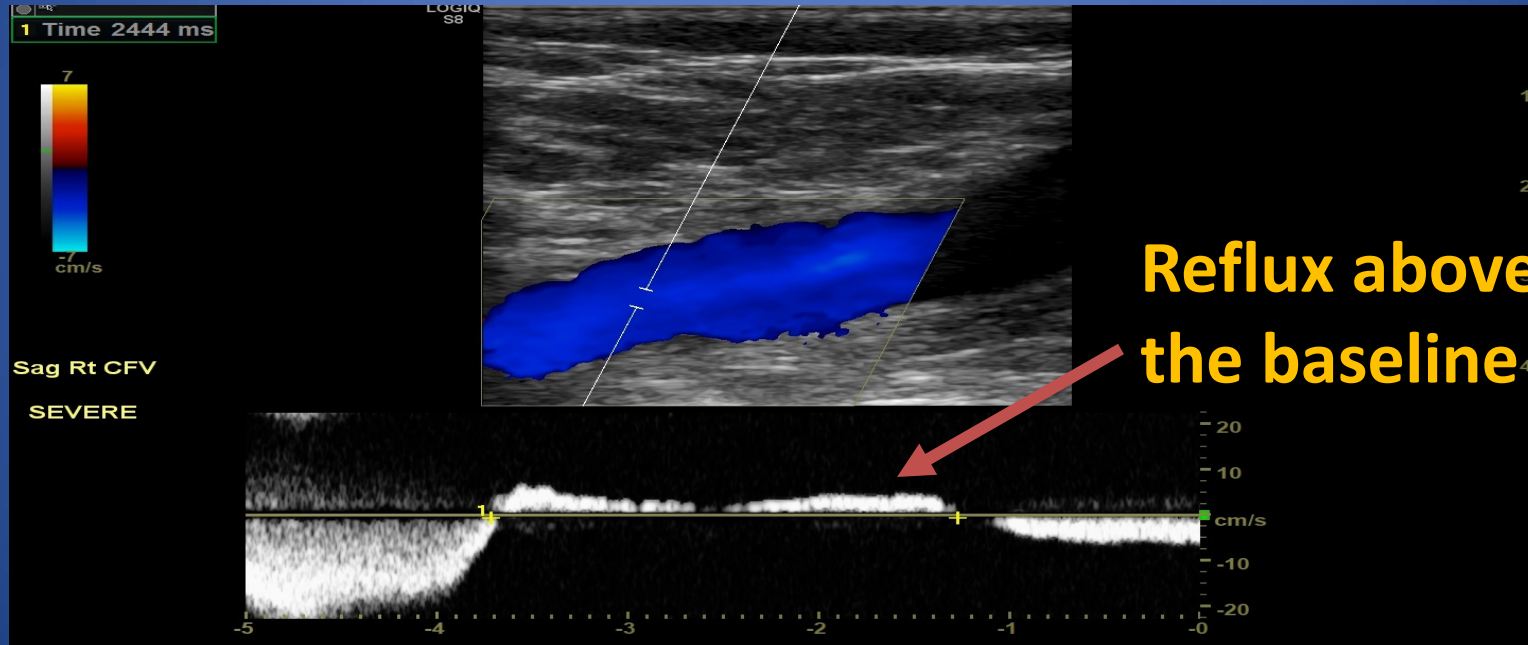
Ultrasound Indications of MT Syndrome

- Abnormal venous flow pattern in the CFV.
- Arterial pulsatility and/or continuous venous flow at the common femoral vein level



Ultrasound Indications of MT

Venous reflux with inspiration at the common femoral vein

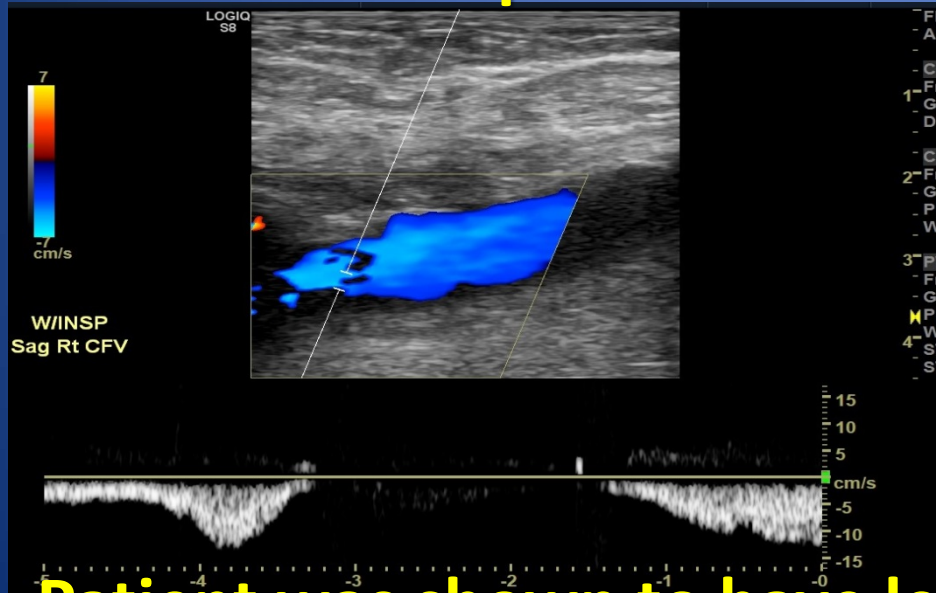


Comparison of Venous Flow in MT Patient

Patient

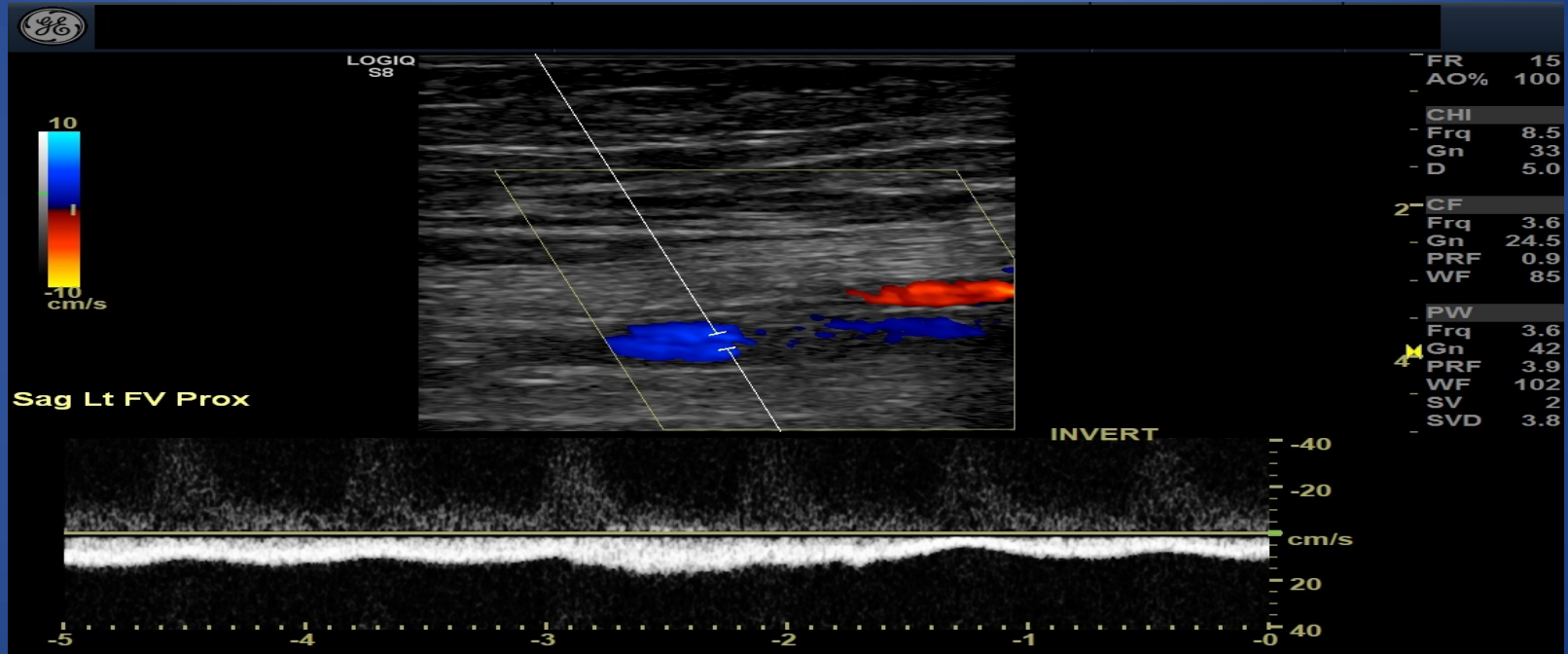
Right side with no venous reflux with inspiration

Left side with venous reflux with inspiration

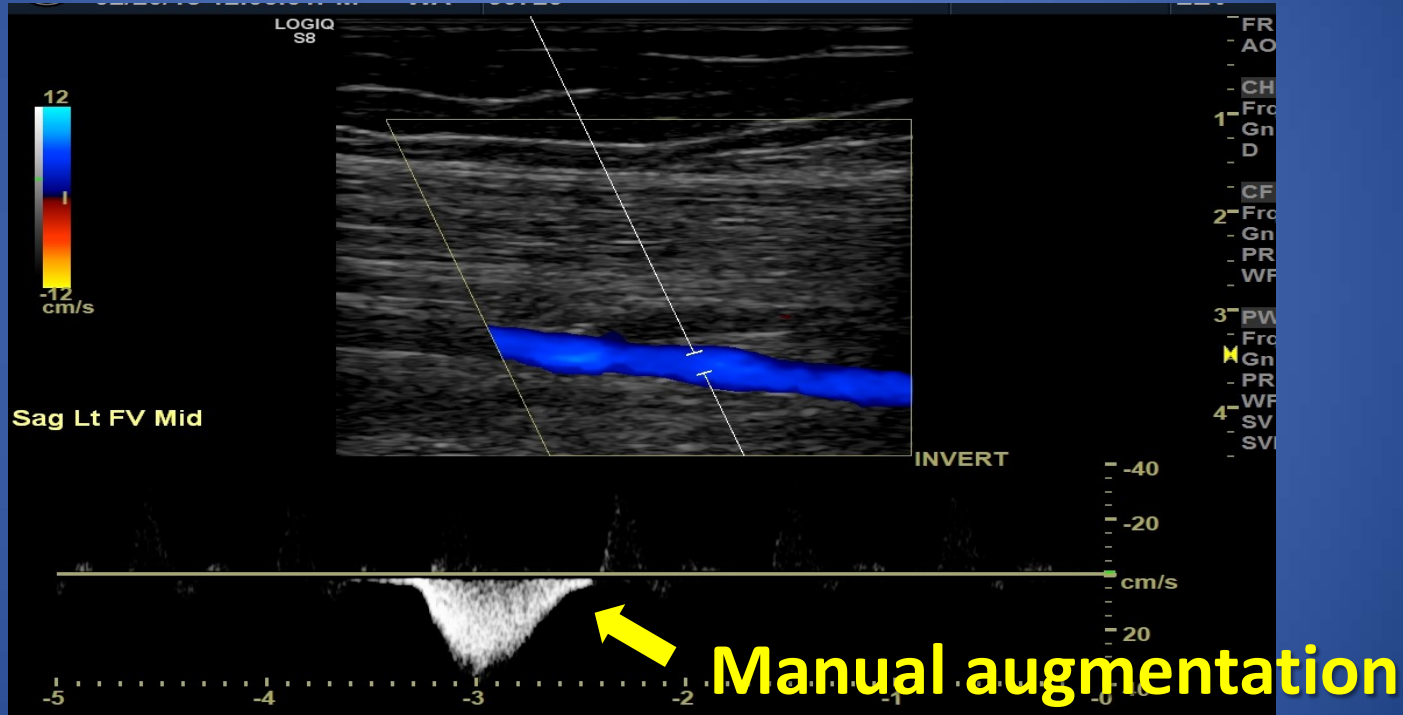


Patient was shown to have left MT by venogram & IVUS

Loss of Phasic and Spontaneous Flow In The Femoral Vein



Complete Loss of Respiratory Variance



Looking Beyond Acute DVT for Diagnosis

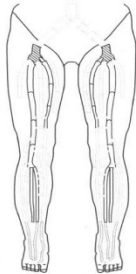
- Based on our detailed reports, we decided to evaluate patients with these positive findings with venography.
- Our reports mention in detail the changes of spontaneous flow and phasicity as well as reflux in patient inspiration.
- Chronic DVT is also described and well documented. Acute DVT is ruled out and documented as well.

RIGHT

	Compressibility	Thrombosis	Spontaneity	Phasicity	Augmentation	Competency	Reflux Time, s	AP mm	Trans mm
CFV	Normal	Normal	Reduced	Continuous	Normal	Moderately reduced	2.1		
FV Prox	Normal	Normal	Normal	Normal	Normal	Normal			
FV Mid	Normal	Normal	Normal	Normal	Normal	Normal			
FV Dist	Normal	Normal	Normal	Normal	Normal	Normal			
SFJ	Normal	Normal	Reduced	Continuous	Normal	Normal			
GSV Prox Thigh	Normal	Normal	Normal	Normal	Normal	Normal		3.1	3.3
GSV Mid Thigh	Normal	Normal						3.1	2.8
GSV Dist Thigh	Normal	Normal						3.1	3.1
POP	Normal	Normal	Normal	Normal	Normal	Normal			
PTV	Normal	Normal							
PER	Normal	Normal							

LEFT

	Compressibility	Thrombosis	Spontaneity	Phasicity	Augmentation	Competency	Reflux Time, s	AP mm	Trans mm
CFV	Normal	Normal	Reduced	Continuous	Normal	Moderately reduced	2.1		
FV Prox	Normal	Normal	Normal	Normal	Normal	Normal			
FV Mid	Reduced	Chronic	Normal	Normal	Normal	Normal			
FV Dist	Reduced	Chronic	Normal	Normal	Normal	Normal			
SFJ	Normal	Normal	Normal	Normal	Normal	Normal			
GSV Prox Thigh	Absent	Chronic						3.6	3.3
GSV Mid Thigh	Absent	Chronic						4.2	4.1
GSV Dist Thigh	Absent	Chronic						3.6	3.5
POP	Normal	Normal	Normal	Normal	Normal	Normal			
PTV	Normal	Normal							
PER	Normal	Normal							



- Normal
- Mildly reduced
- Moderately reduced
- Severely reduced
- Absent
- Inconclusive

Right Findings:

Normal compressibility of the deep veins in the right lower extremity. Reduced spontaneous flow in the right common femoral and saphenofemoral junction veins. Continuous flow in the right common femoral and saphenofemoral junction veins. Normal spontaneous phasic augmented flow in the right femoral proximal, femoral mid, femoral distal, great saphenous thigh and popliteal veins. Normal augmented flow in the right common femoral and saphenofemoral junction veins. Moderate reflux with inspiration noted in the right common femoral (2.1 s) vein. No evidence of valvular incompetence of the right femoral proximal, femoral mid, femoral distal, saphenofemoral junction, great saphenous thigh and popliteal veins.

Left Findings:

Partially compressible left femoral mid and femoral distal veins. Incompressible left great saphenous thigh and great saphenous below knee veins, recent post ablation. Normal compressibility of the deep veins in the left common femoral, femoral proximal, saphenofemoral junction, popliteal, posterior tibial and peroneal veins. Non-occluding (mild) chronic thrombosis in the left femoral mid and femoral distal vein. Occlusion of the great saphenous thigh and below knee vein, post-ablation.

Left Findings:

Reduced spontaneous flow in the left common femoral vein. Continuous flow in the left common femoral vein. Normal spontaneous phasic augmented flow in the left femoral proximal, femoral mid, femoral distal, saphenofemoral junction and popliteal veins. Normal augmented flow in the left common femoral vein. Moderate reflux with inspiration noted in the left common femoral (2.1 s) vein. No evidence of valvular incompetence of the left femoral proximal, femoral mid, femoral distal, saphenofemoral junction and popliteal veins.

Conclusions:

No evidence of deep vein thrombosis of the right lower extremity with continuous venous return. Non-occluding (mild) chronic thrombosis in the left femoral vein. Total occlusion of the left great saphenous thigh and below knee vein, post-ablation procedure. Moderate valvular incompetence with inspiration (chronic venous insufficiency) of the bilateral common femoral veins, suggestive of a proximal stenosis.

February 27, 2019 07:24 PM EST

Electronically Signed

Our Venous Reports

Detailed findings with descriptions, measurements and location of abnormalities.

Conclusions suggest that the moderate reflux with patient inspiration is "suggestive of proximal stenosis"

Methods

- 77 patients in a four year period with suspected MTS had leg swelling and pain, despite duplex ultrasound showing no DVT or reflux.
- Studies done demonstrate arterial pulsatility, loss of respiratory variation and/or reflux with patient respiration.
- Based on duplex findings, all 77 patients were subsequently studied in our outpatient endovascular suite.

Results of Vascular Intervention

- 77 patients underwent 89 procedures
 - 32 males
 - 45 females
 - Average age 60.8(\pm 17.5)
- 97.8% were shown to have MTS by venography and IVUS.

The New Standard of Diagnostic Imaging

- Changing the standard of ultrasound imaging of the lower extremity venous system and the reporting of the findings of the exam will greatly improve the chances of a more accurate diagnosis and better patient care.
- Accurate and detailed reports are necessary to give treating physicians the information needed to treat the patient effectively.

Conclusions

- Patients with leg edema are often overlooked when they have treatable pelvic venous compression syndrome(s)
- Ultrasound finding(s) of arterial pulsatility in the venous flow signals and/or venous reflux with inspiration of the common femoral vein is highly suggestive of central pelvic vein stenosis and/or DVT
- Highly trained sonographers can help in diagnosing MT which we can confirm with venography and IVUS and subsequent treatment

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