



Endo-Thermal Heat Induced Thrombosis (E-HIT)

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E-HIT

- Objectives:
 - What is E-HIT?
 - How do I report it?
 - How do I treat it?

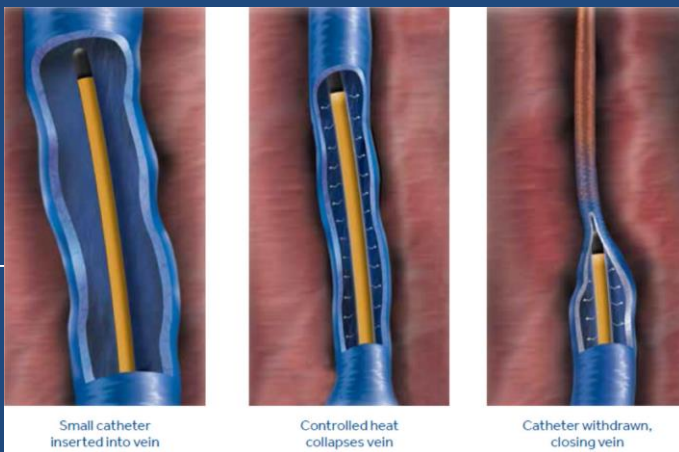
E-HIT

- Late 1990's:

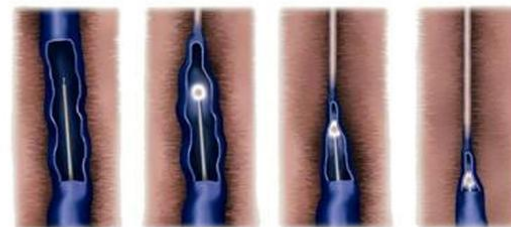
RFA and EVLT were introduced as a minimally invasive treatment options for axial vein reflux of the GSV and SSV as an alternative to saphenous stripping and ligation.

- The incompetent saphenous vein is purposely thrombosed (closed) by means of damaging the intimal portion of the vein wall by a heat generating transducer at the end of a catheter.
- Radiofrequency or laser generated energy induces thermal damage.

Radiofrequency Ablation



Endovenous Laser Treatment



1. Fiber-optic laser is inserted into the diseased vein.

2. Laser energy causes vein to collapse.

3. Laser is slowly withdrawn and vein closes.

4. Vein becomes harmless fibrous tissue and is gradually absorbed.

E-HIT

- 2004

Higorani et al, JVS vol 40, issue 3 Sept 2004;500-504

Deep Venous Thrombosis after Radiofrequency Ablation of the GSV: A word of caution

16% incidence of DVT

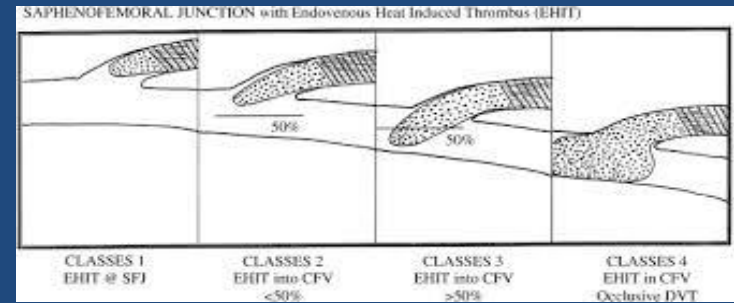
- 2005-2006:

Kabnick LS, Ombrellino M, Agis H et al

Endovenous heat induced thrombosis (EHIT) at the superficial deep venous junction: a new post-treatment clinical entity classification and potential treatment strategies

18th annual meeting of American Venous Forum, Miami FL

EHIT occurs when the clinically induced thrombus extends up to or beyond the junctions of the deep venous systems



Kabnick Classification Extension of thrombosis:

- Class I: Up to the junction of superficial and deep venous systems.
- Class II: Extends beyond the junction, with a cross-sectional diameter < 50%.
- Class III: Extends beyond the junction, with a cross-sectional diameter > 50%.
- Class IV: Totally occlusive deep venous thrombosis.

E-HIT

- Incidence:
 - Overall risk < 1.5-2% (all classes)
 - Class I most prevalent
 - Class IV extremely rare
 - Risk of progressing from class I-II to III-IV is < 3%
 - Risk of symptomatic PE progression extremely rare (0.01-0.04%)
- Symptoms:
 - 87% asymptomatic
 - 10% report groin pain
 - 2.9% report leg swelling

Concern that EHIT can lead to DVT/PE which can cause significant disability and rarely death

E-HIT

- Risk Factors:
 - Hx of VTE
 - CEAP class > 2
 - Tobacco use
 - Concomitant micro-phlebectomy
 - EHIT was significantly higher in patients with concomitant stab phlebectomies vs RF alone
 - 23% vs 7% P=0.01
 - Vein diameter > 7.5 mm
 - Treatment distance less than 2 – 2.5 cm from junction

E-HIT

Protocol:

- Ultrasound 24-72 hrs post operatively
- Sonographer utilizes B-mode.
- Patient is supine or prone depending on which vein is visualized (SFJ or SPJ).
- Low frequency linear array probe following standard protocol to R/O DVT.
- Deep veins are visualized in cross-sectional plane with compression maneuvers.

E-HIT

If E-HIT is identified and recorded:

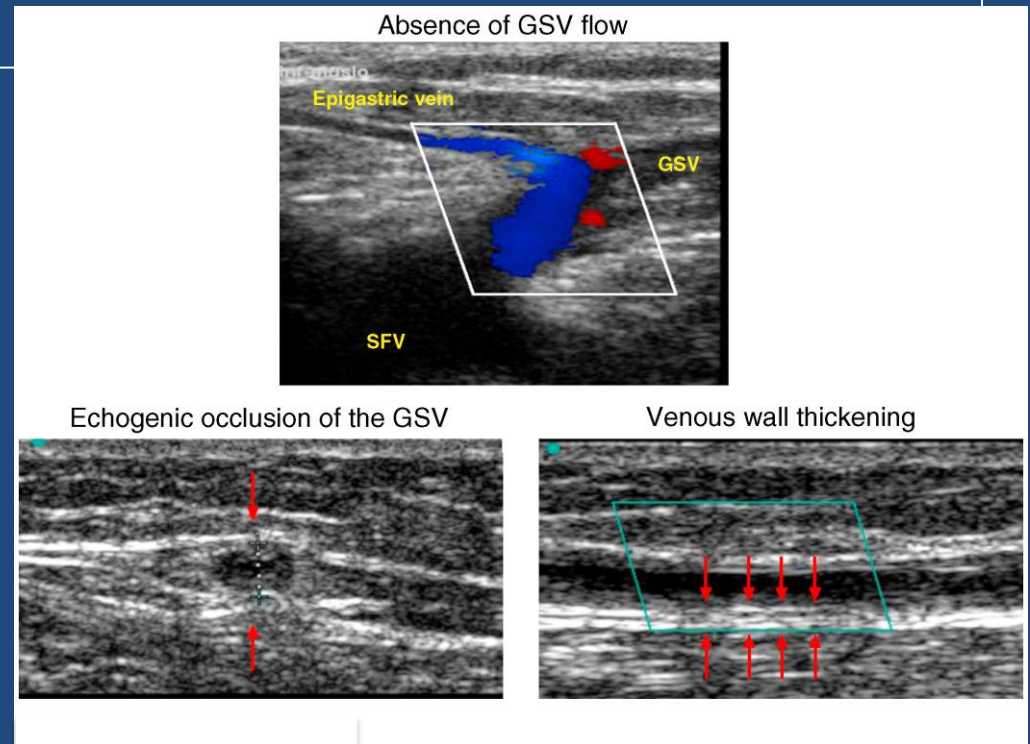
- Sonographer changes orientation of probe to visualize the deep veins in the long axis.
- Length of the thrombus into the junction must be measured and cross-sectional diameter calculated.
- It is imperative that the sonographer inform the physician as soon as possible so that potential therapy is not delayed.

E-HIT

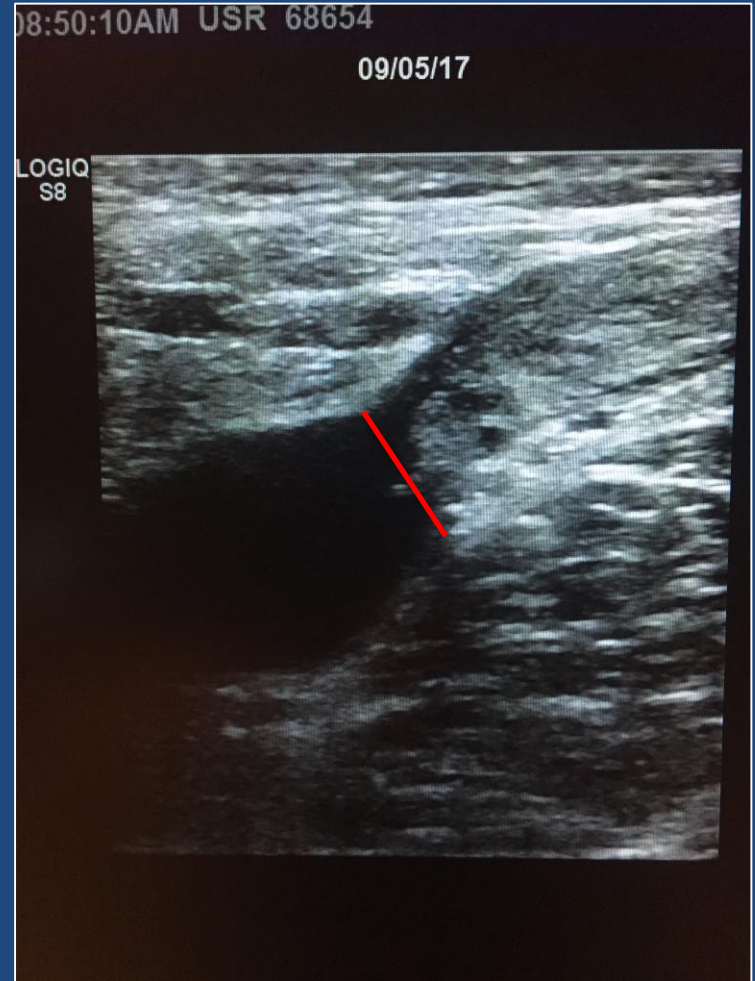
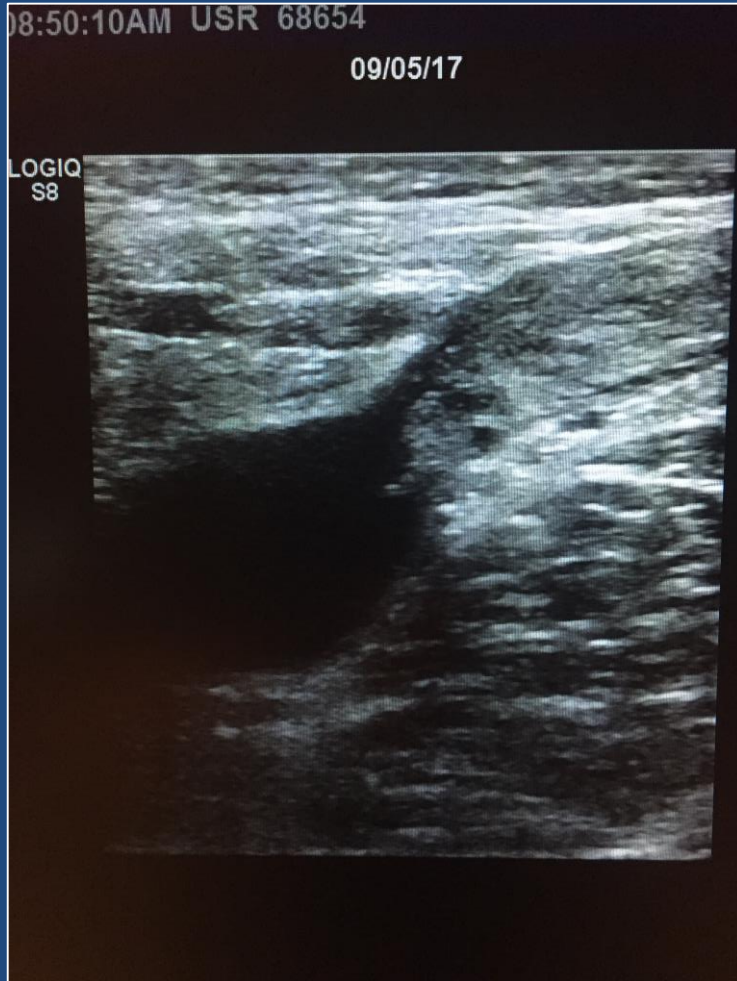
IMAGES

E-HIT

- Optimally, post-op scan demonstrates the induced thrombus to be at least 1-2 cm from the junction or proximal to the epigastric vein in the SFJ

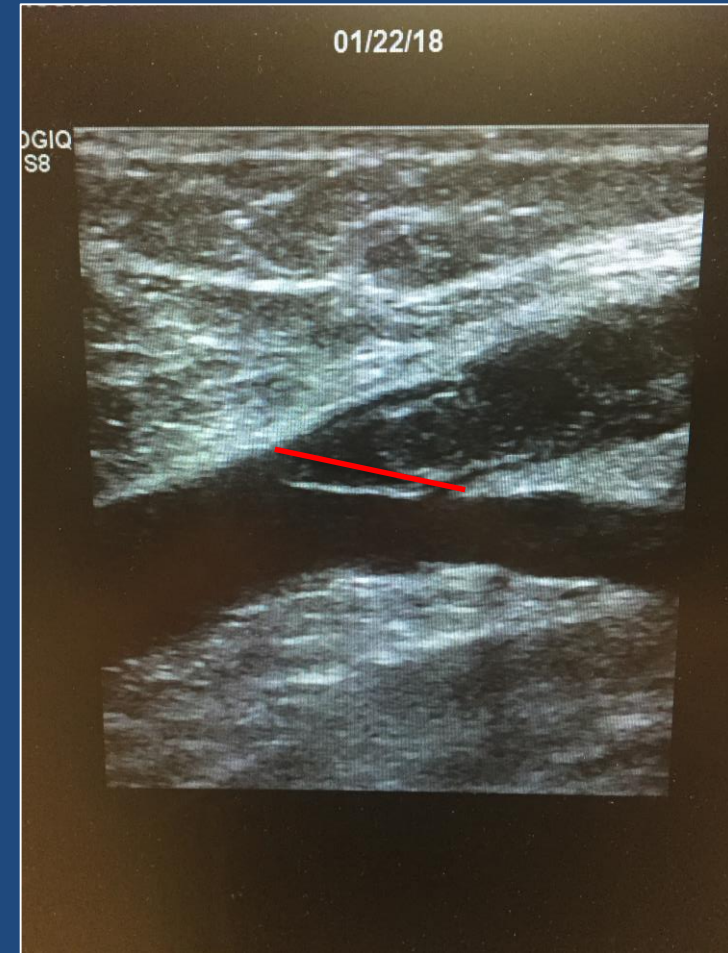
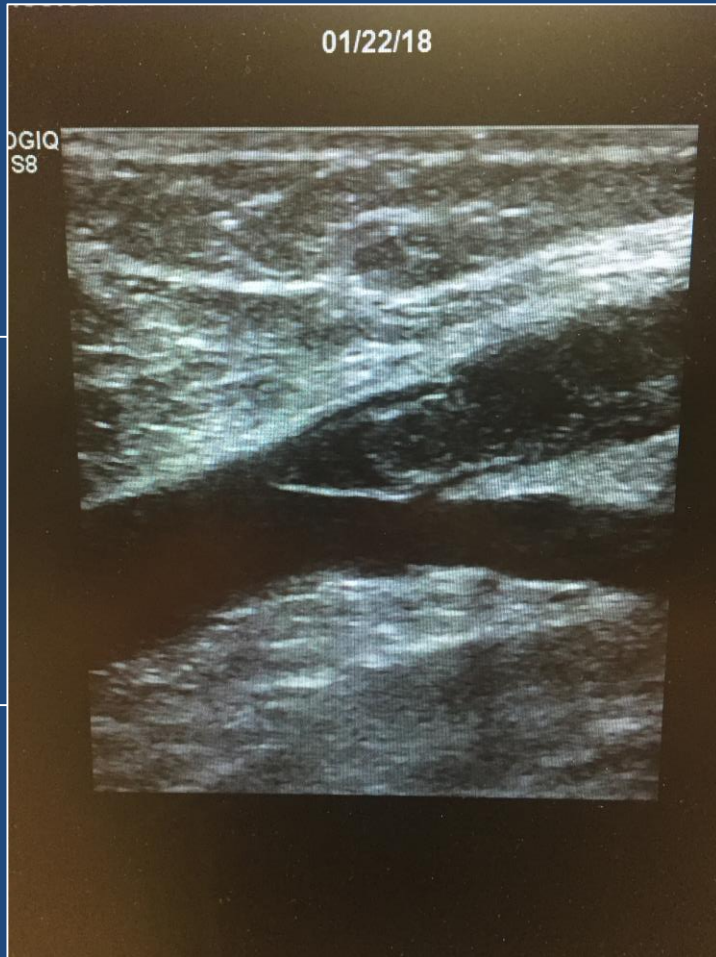


E-HIT Class I

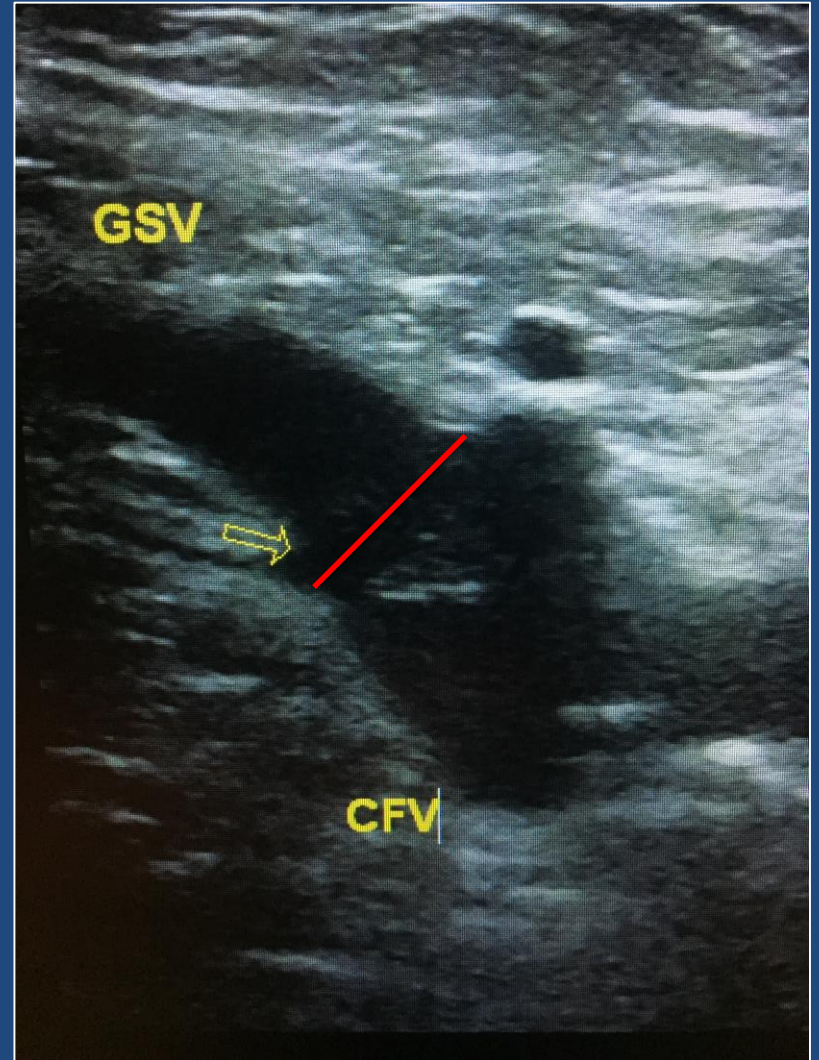
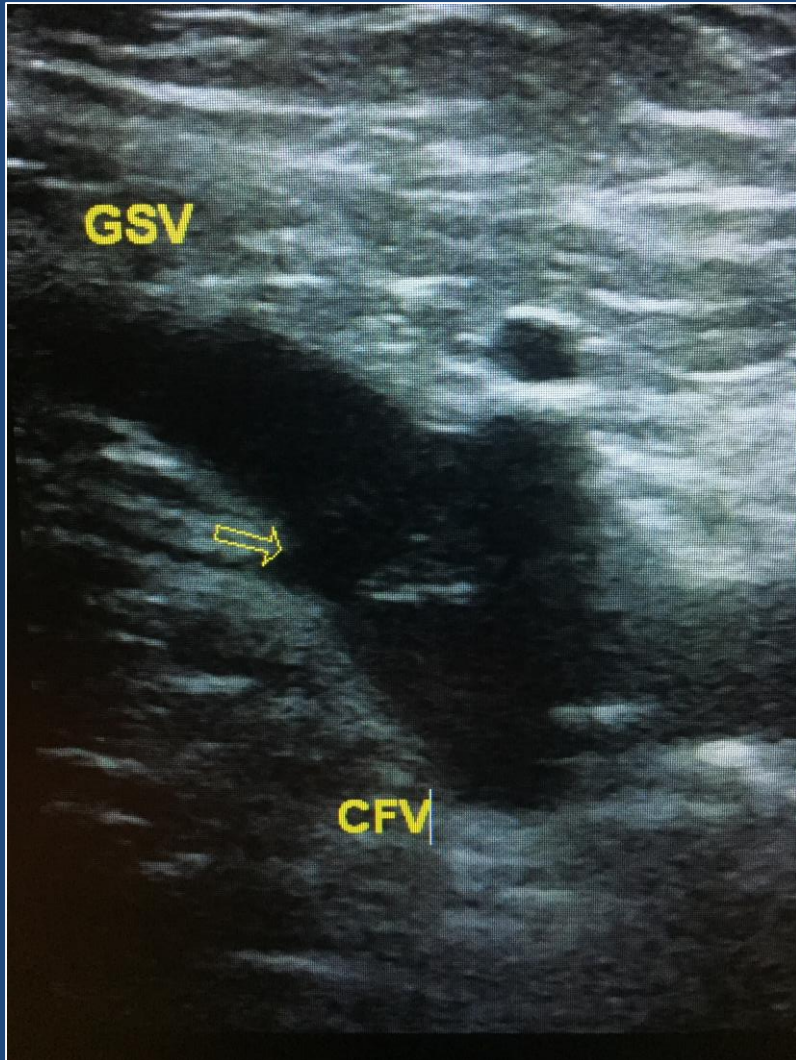


E-HIT Class II

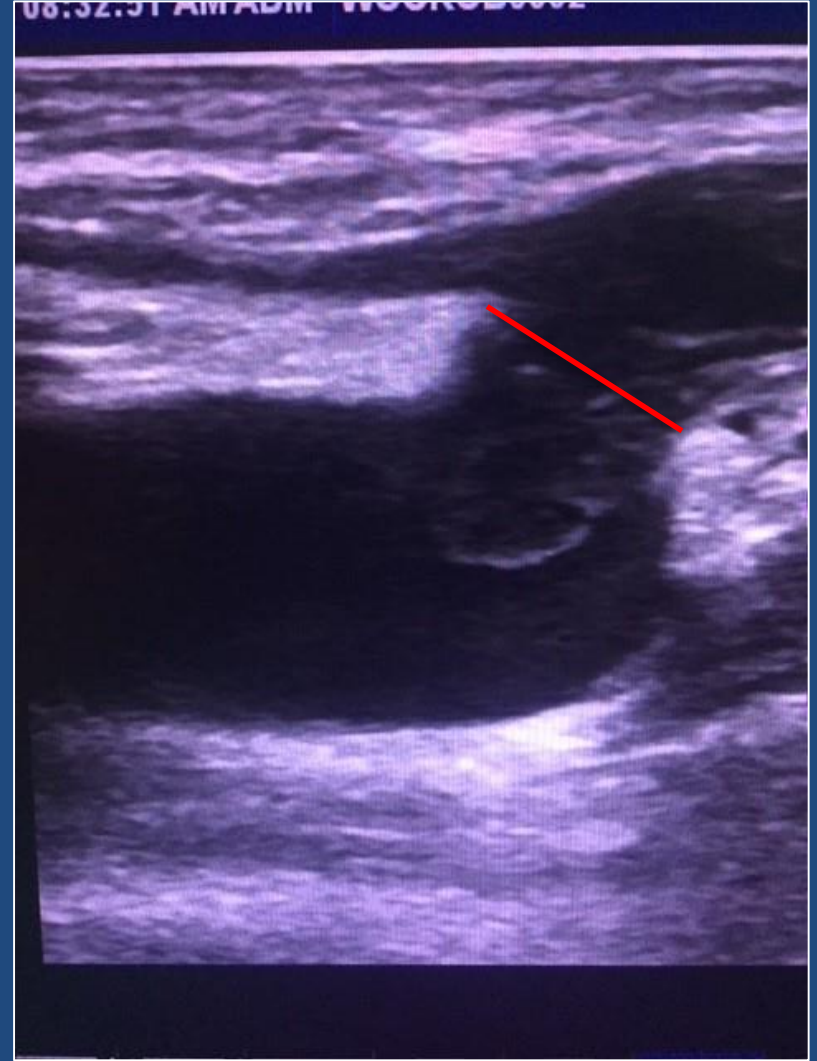
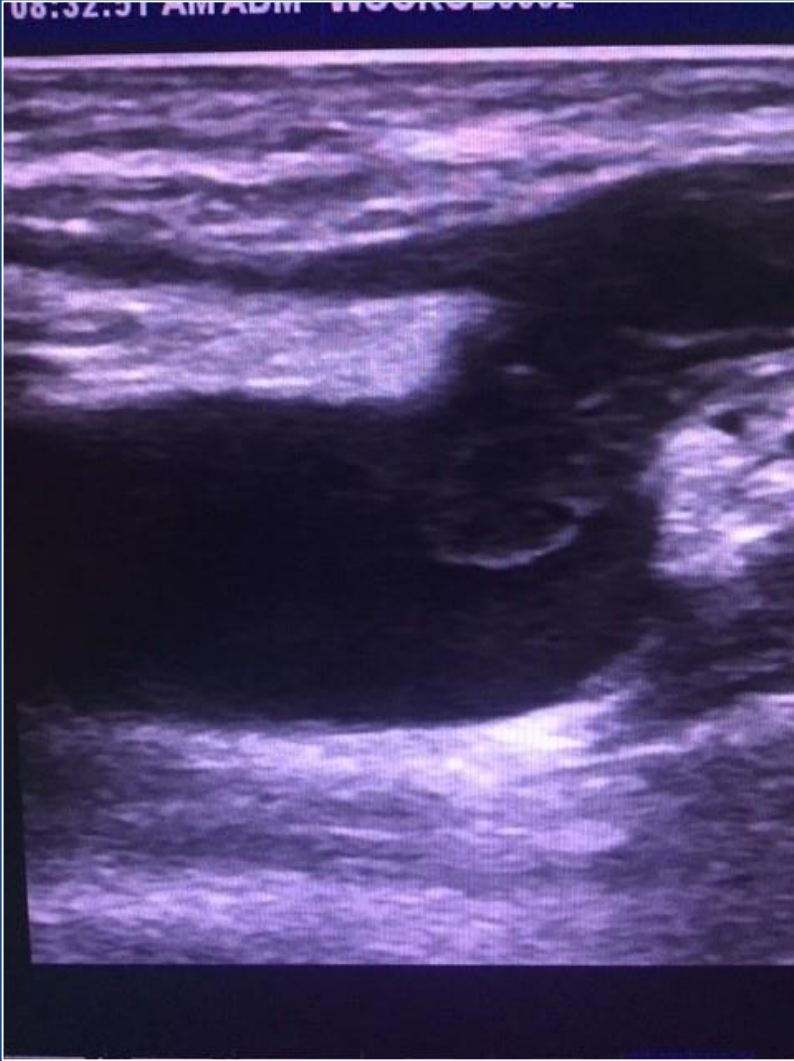
Notice the
“Lip” of
thrombus
extending
slightly
across SFJ



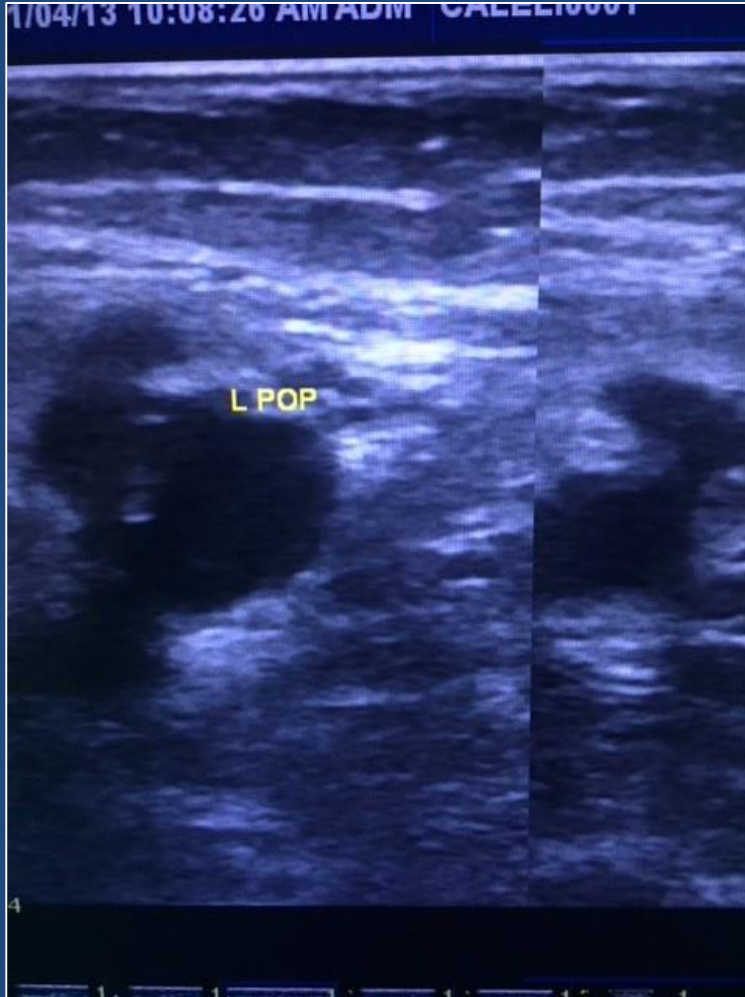
E-HIT Class II



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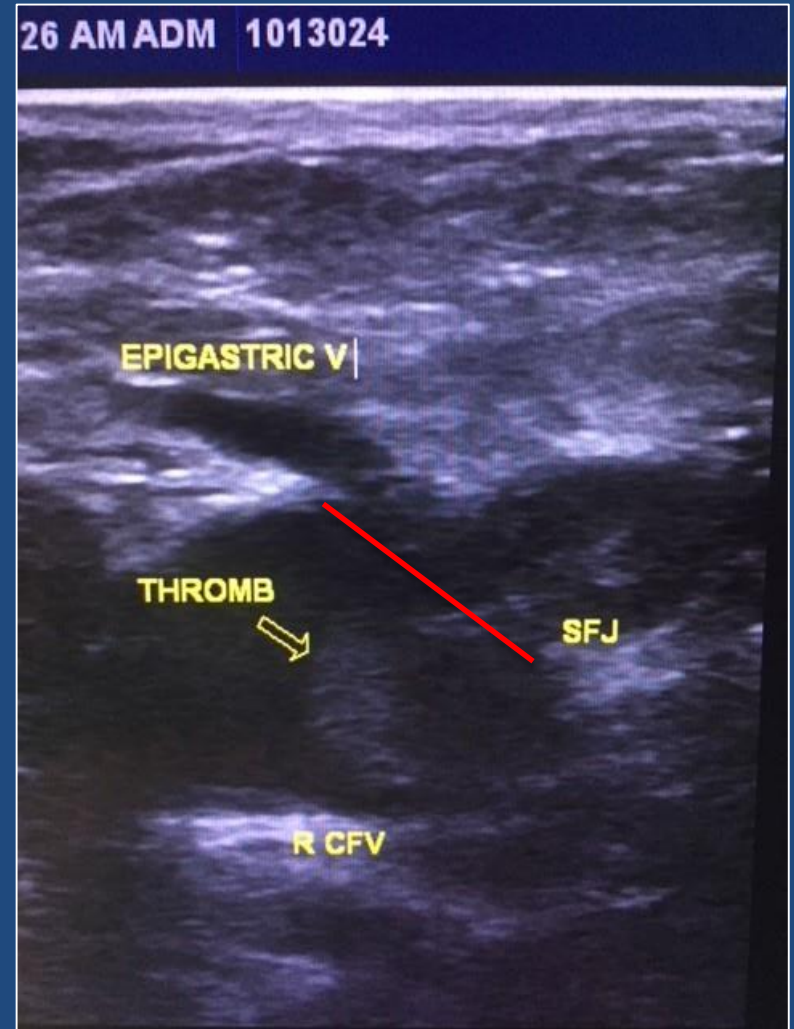
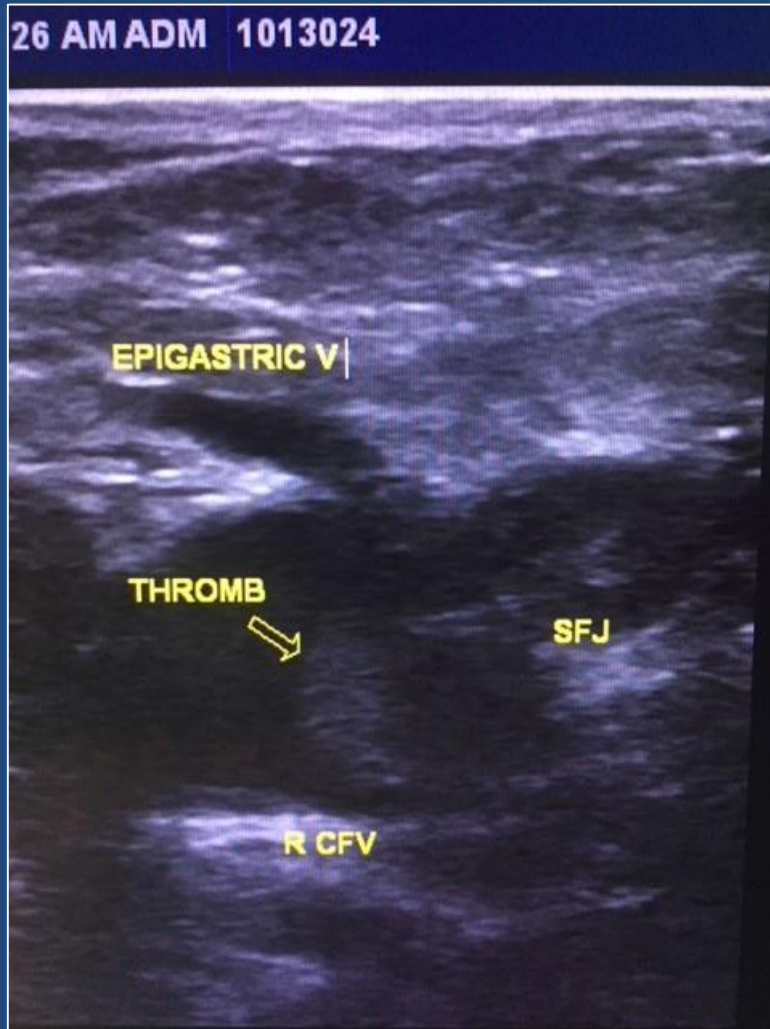
E-HIT Class II



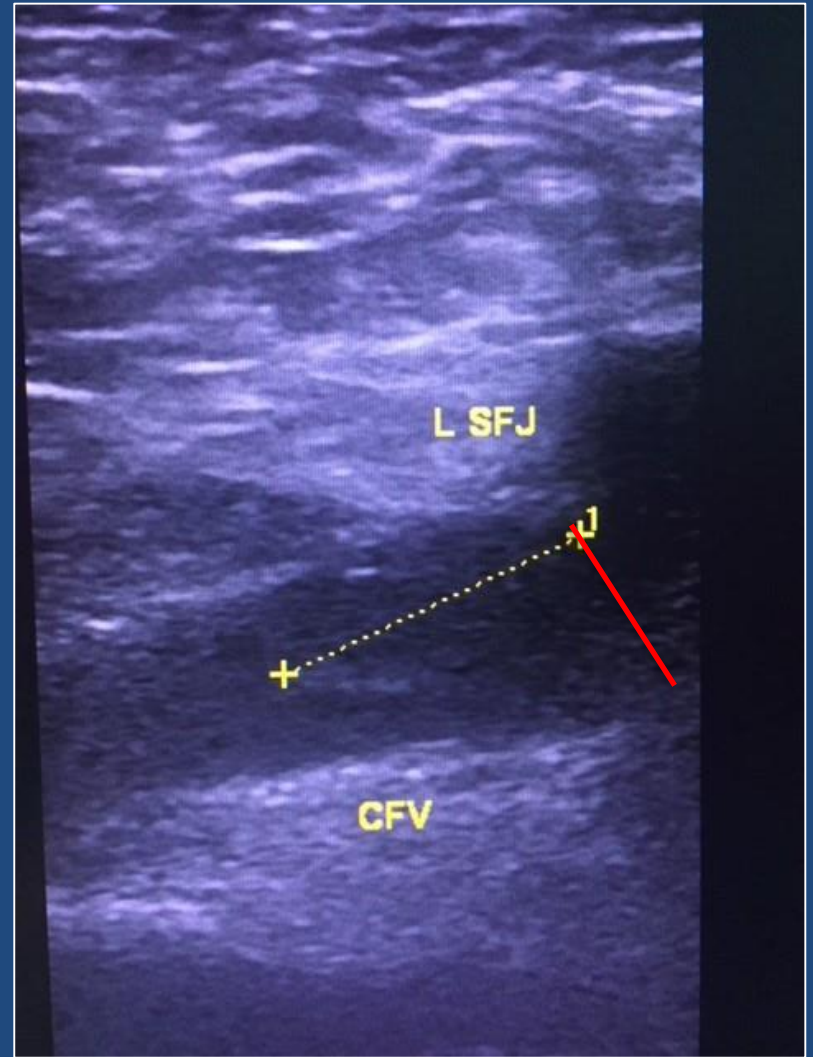
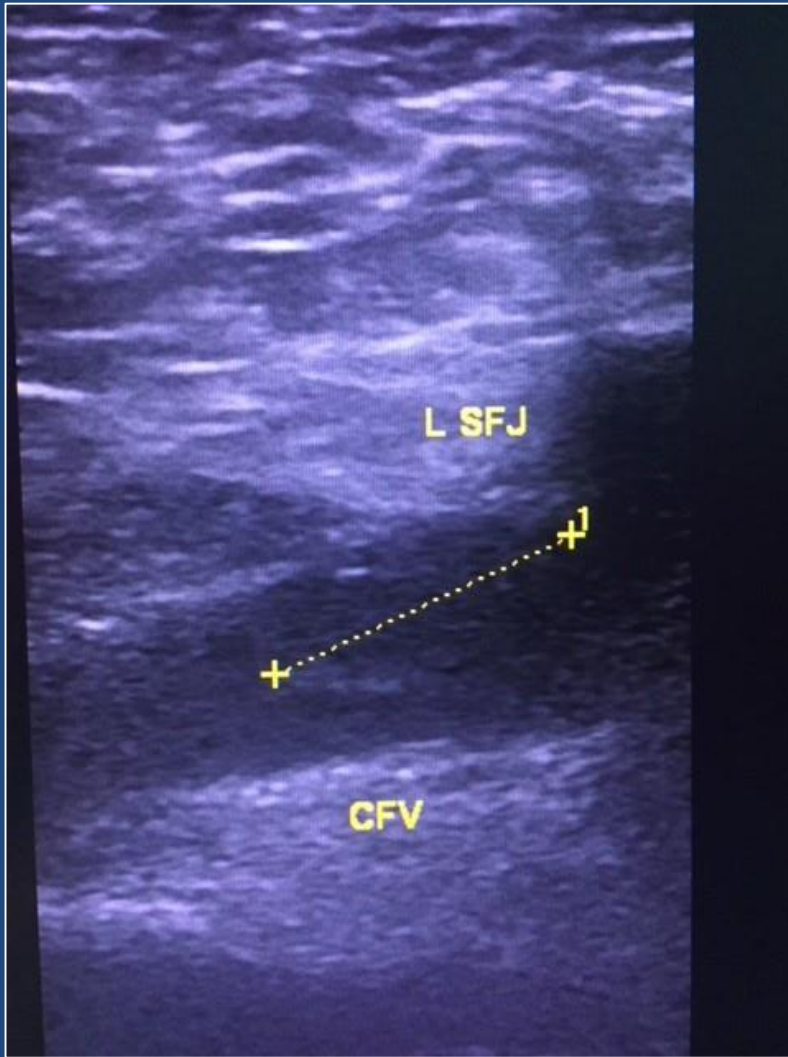
E-HIT Class II



E-HIT Class III



E-HIT Class III



E-HIT Class IV



E-HIT

Kabnick Classification Extension of Thrombosis: 2005

Class I: Up to the junction of superficial and deep venous systems. No treatment

Class II: Extends beyond the junction, with a cross-sectional diameter $< 50\%$. Low molecular weight heparin until resolution of the thrombus, with ultrasound follow-up.

Class III: Extends beyond the junction, with a cross-sectional diameter $> 50\%$. Low molecular weight heparin and vitamin k antagonist for minimum of 3 months.

Class IV: Totally occlusive deep venous thrombosis. Low molecular weight heparin and vitamin k antagonist minimum of 3 months.

E-HIT

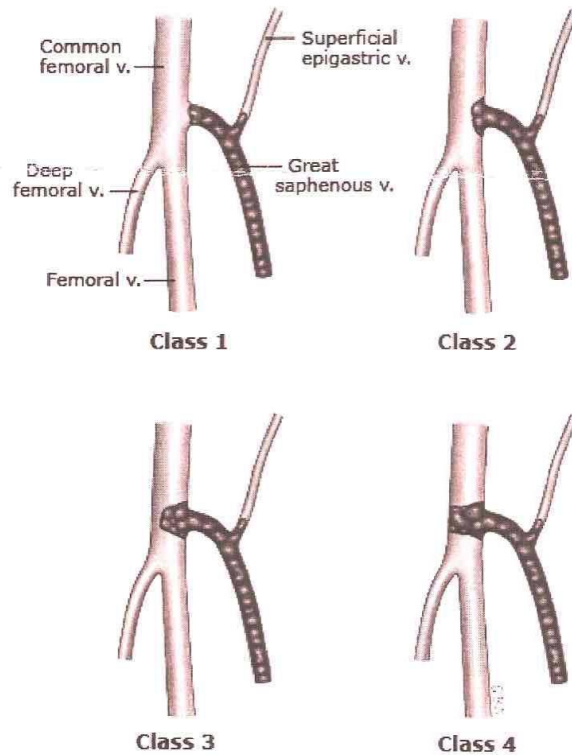
- In 2018 there is no standardized consensus regarding the management and treatment of E-HIT:
 - No post-op US and therefore no treatment
 - Suarez L, Tangney E, O'Donnell TF et al. Cost Analysis and Implication of Routine DVT duplex ultrasound screening after Endovenous ablation. J Vasc Surg Venous Lymphat Disord 2017 Jan; 5 (1): 126-133
 - Risk of DVT, PE and death extremely low
 - Not cost effective
 - Can't treat what you don't look for.

E-HIT

- Grade I and II: Daily ASA
- Grade III and IV: AC and repeat US in 1-2 weeks to track progression or regression. Stop if regression.

Korepta LM, Watson JJ, Mansour et al. Outcomes of single-center experience with classification and treatment of EHIT after endovenous ablation. *J Vasc Surg Venous Lymphat Disord* 2017 May; 5 (3): 332-338

Kabnick classification of endovenous heat-induced thrombus^[1]



Class I
Watchful waiting,
with serial US
follow-up, 5-7
days. ASA
optional

Class III
At least 4-6 weeks
AC and until US
regression

Class II
Novel oral AC
with serial US
follow up until
thrombus
regression
(< 2weeks)

Class IV
Min 3 months
AC

E-HIT

- Conclusion:
 - RFA and EVLT should continue to be the preferred and low risk treatment option
 - E-HIT is a low incidence occurrence with proper technique
 - E-HIT is rarely symptomatic
 - Post op US surveillance is still widely accepted (24-72 hours)
 - There are no widely accepted or standardized guidelines for management and treatment of E-HIT
 - Once discovered, careful US surveillance is essential
 - Immediate communication between the vascular lab and the physician is essential to properly treat the patient

