



Oxford University Hospitals  
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# Ultrasound appearances post RFA/sclerotherapy

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# Outline

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Introduction to varicose veins

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Anatomy and pathophysiology

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Varicose vein treatments- RFA and foam

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What does successful treatment look like?

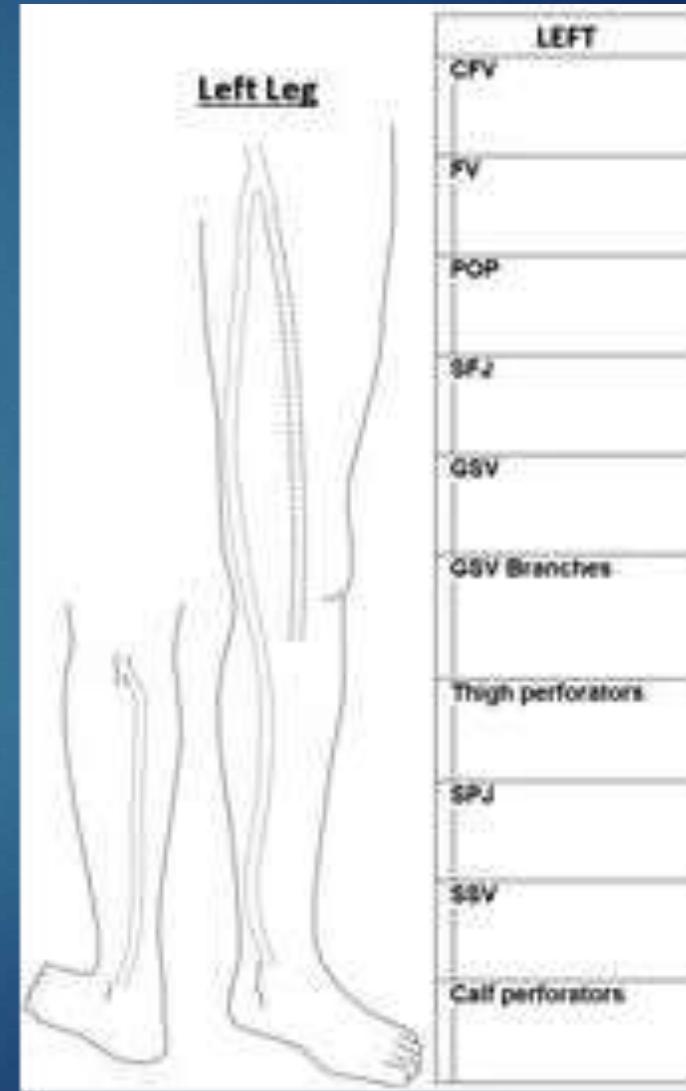
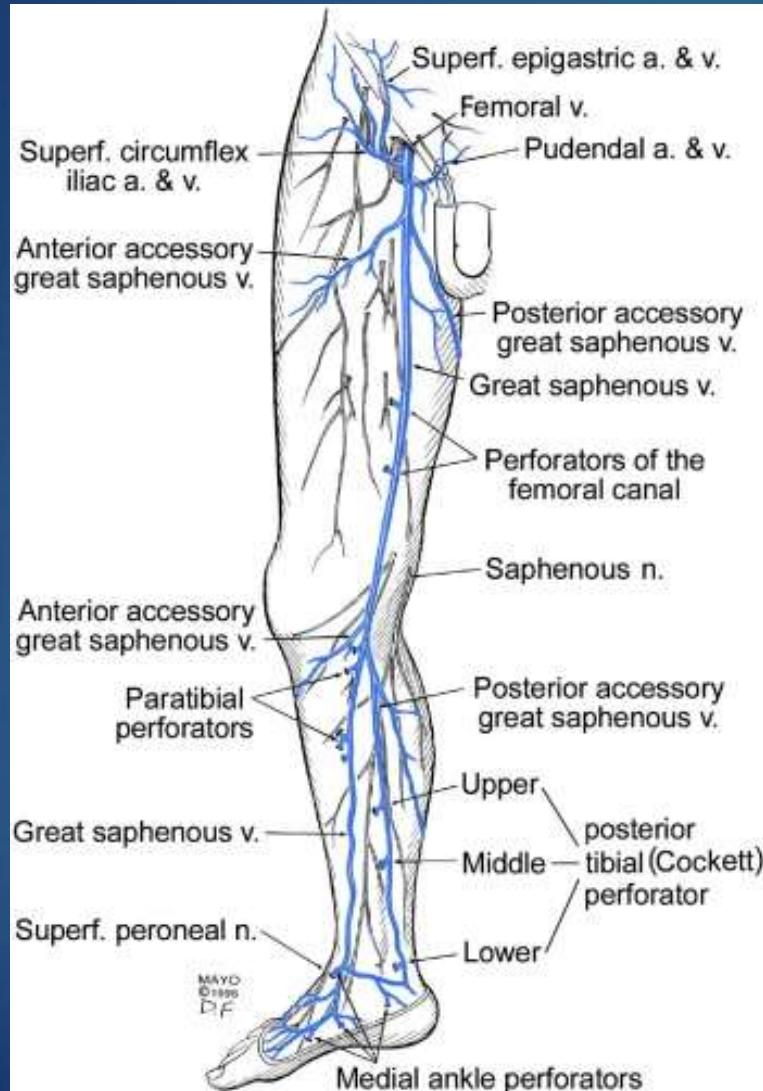
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What can go wrong?

# Introduction

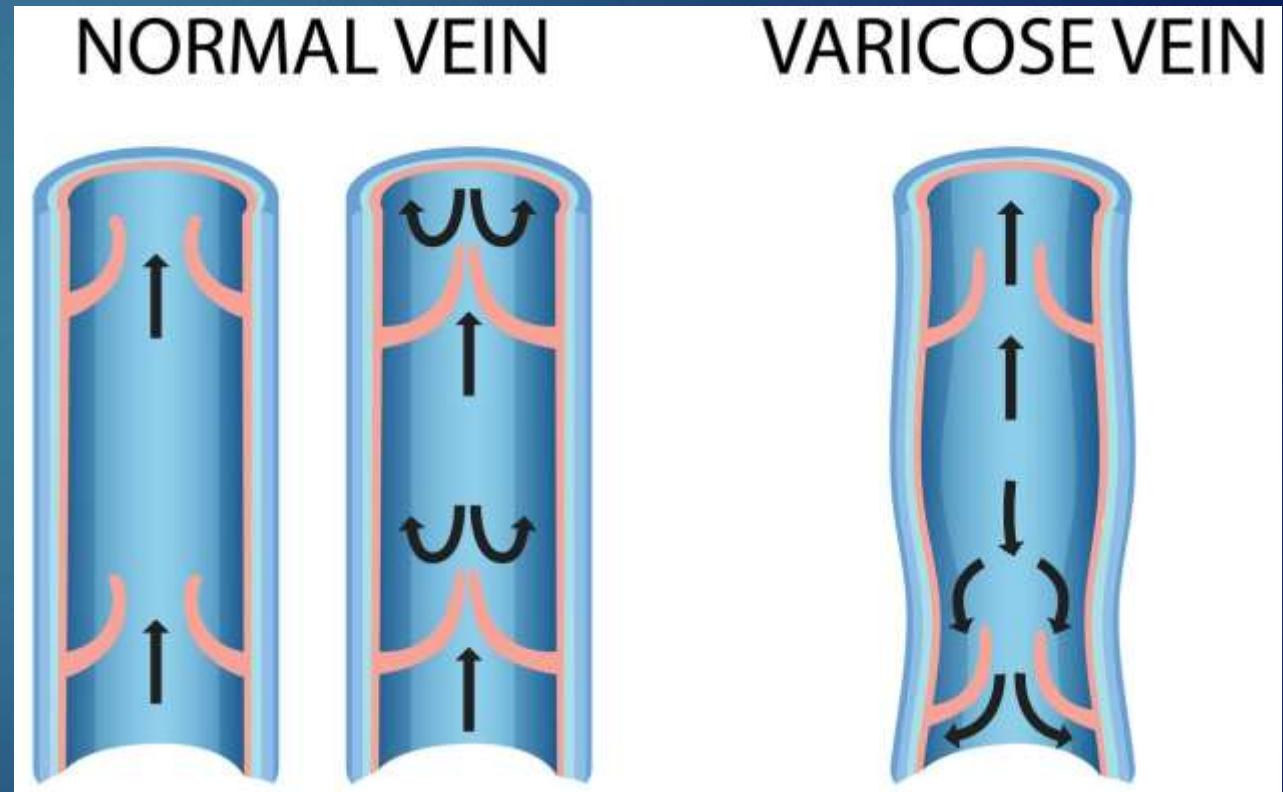
- ▶ ~One third of men and women aged 18-64 suffer with varicose veins
- ▶ 3-6% of people who have varicose veins in their lifetime will develop venous ulcers

# Anatomy



# Pathophysiology

- ▶ Varicose veins - dilated subcutaneous veins with reversed blood flow due to incompetent valves
- ▶ Risk factors - age, genetics, pregnancy, prolonged periods of standing



# Treatment

Endothermal:

- ▶ Radiofrequency ablation (RFA), Endovenous laser therapy (EVLT)

Surgical:

- ▶ Vein stripping, ligation of the saphenofemoral junction (SFJ)

Other:

- ▶ Foam sclerotherapy, cyanoacrylate closure, compression stockings
- ▶ What is a good vein for each treatment?

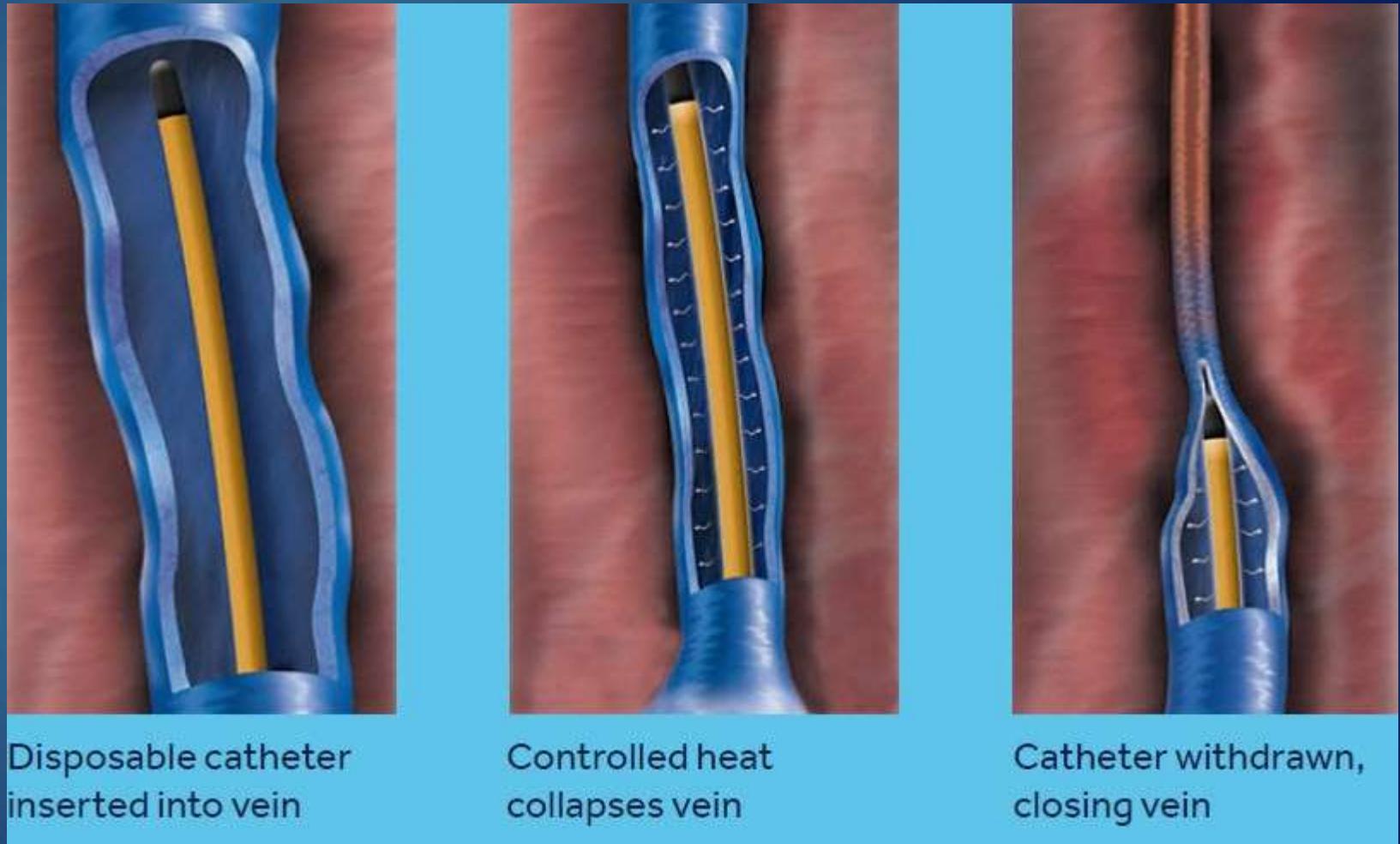
# Indications for treatment

**C**linal Manifestations, **E**tiology, **A**natomic distribution, **P**athophysiology

<b>CEAP classification</b>	<b>Clinical description</b>
C0	No visible signs of venous disease
C1	Telangiectasias or reticular veins
C2	Varicose veins
C3	Oedema
C4	Skin changes
C5	Healed venous ulcer
C6	Active or recurrent venous ulcer

# What is RFA?

- Radiofrequency energy heats vein walls so vein collapses
- Incision made and RFA catheter inserted under ultrasound guidance
- Catheter 2-3cm from junction



Medtronic ClosureFast™

# RFA tumescence



- Local anaesthetic pumped within fascia to surround GSV
- Pain relief, prevents damage to tissues and helps with post treatment inflammation

# RFA room set up



# RFA room set up



# What is foam sclerotherapy?

- ▶ Injections of sclerosing substance into the vein to damage the endothelium and close it off.

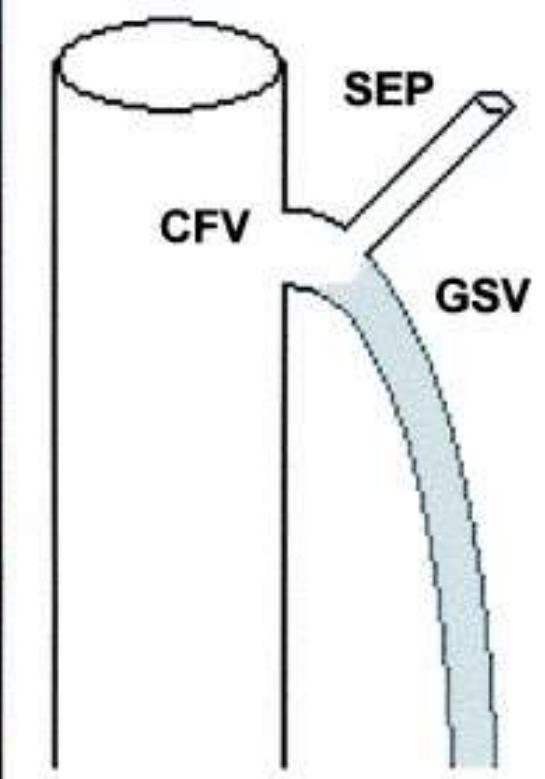
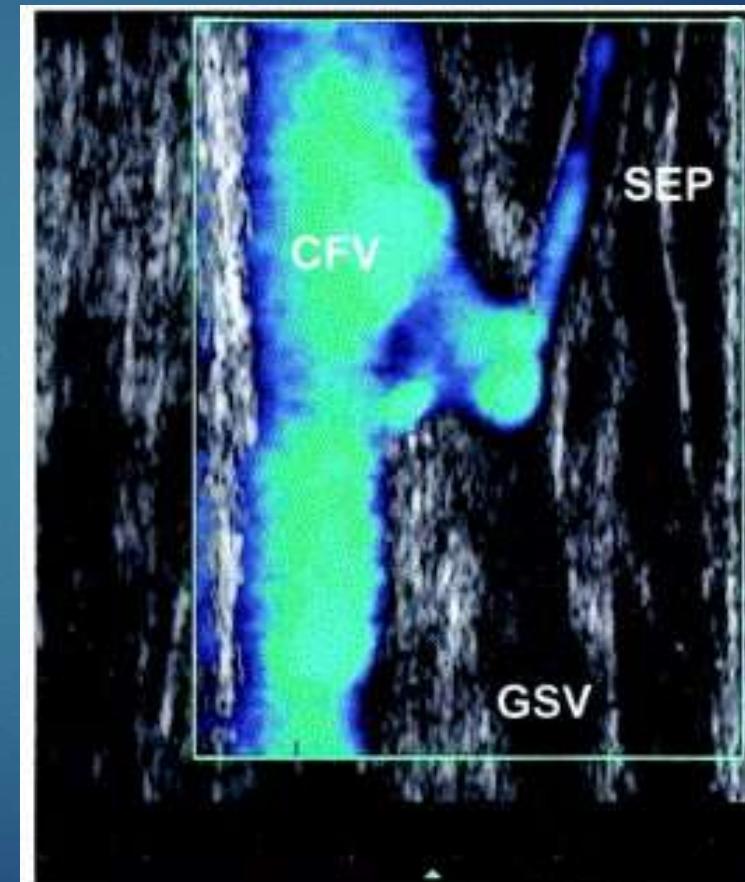


- ▶ A double syringe is used with a three way stopcock to mix the foam solution

# Post treatment



SEP- Superficial external pudendal vein



# Post RFA treatment

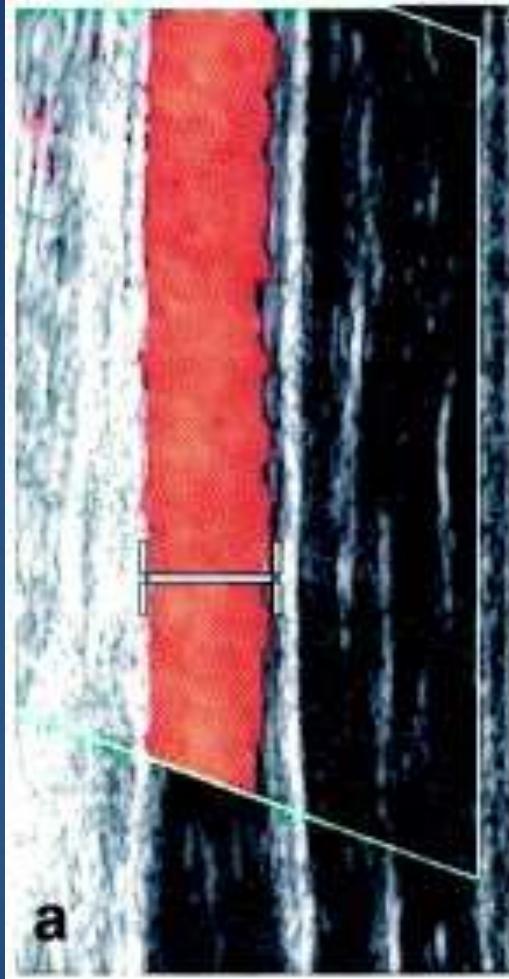
**Immediately after:** GSV is **smaller in diameter** showing evidence of inflammation and vein wall thickening. Lumen may not necessarily be closed

**1 week** after the procedure: GSV trunk appears **obliterated** with an echogenic lumen

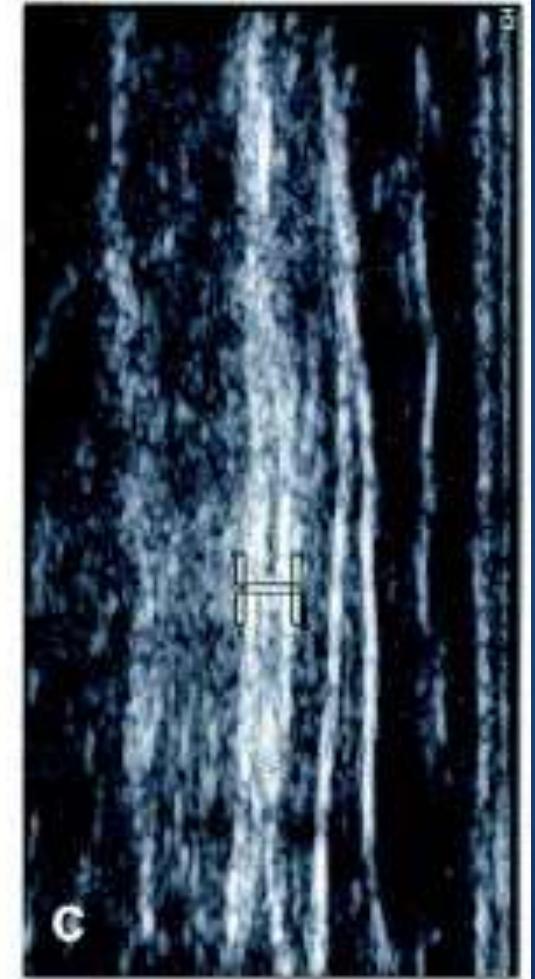
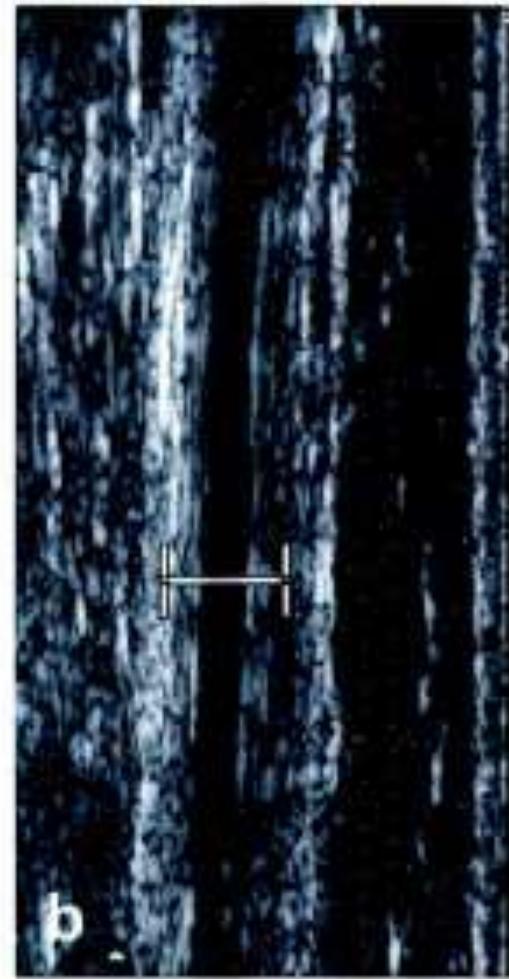
**1 year after procedure:** GSV trunk **shrunken** with a small area of normal antegrade flow at the SFJ.

# Post RFA treatment

a) Pre-treatment

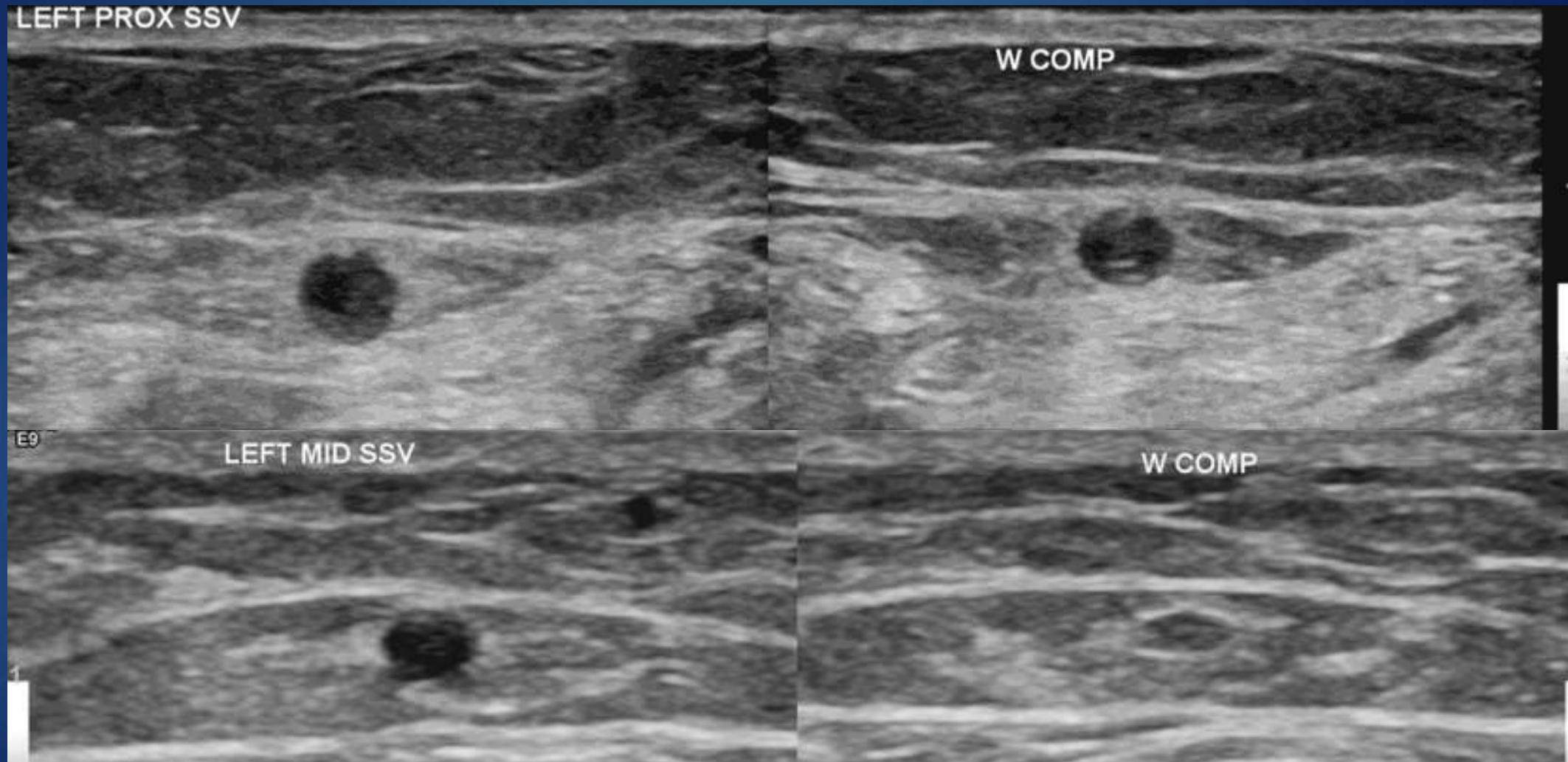


b) 6 months post treatment



c) 2 years  
post  
treatment

# Post treatment

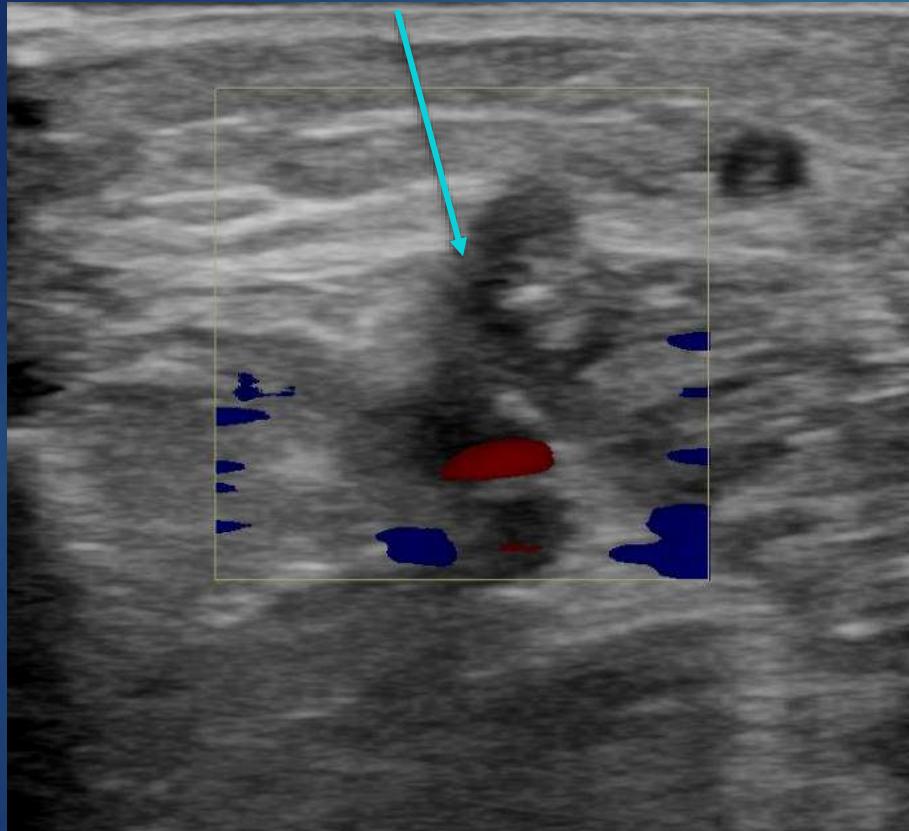


# Post treatment

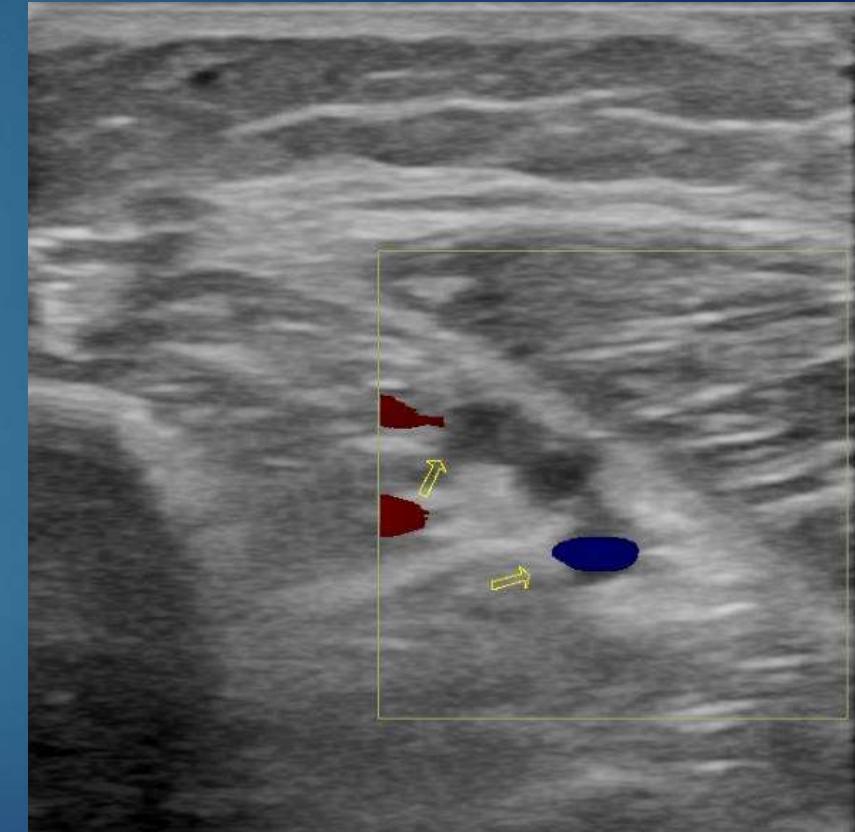


- Foam targeted tortuous branches may show mixed echogenicity, which can change over time

# Perforators



Occluded perforator



Occluded posterior tibial vein

# Vein treatment vs. phlebitis

- ▶ Difficult to tell the difference. Phlebitis may appear more irregular compared to RFA/foam
- ▶ **Clinical history** is very important
- ▶ **Symptoms** of phlebitis may be different- focal symptoms of inflammation and pain. Although same just after treatment
- ▶ Accurate **reporting**- use terms like partially occluded or occluded rather than 'phlebitis'

# When to refer onwards?

- ▶ STP <3cm from the SFJ is usually treated as a DVT
- ▶ After vein treatment the occlusion may begin <3cm from the SFJ, this can be normal
- ▶ **Refer to a vascular team before** referring for anticoagulation/alert medical team
- ▶ Note the echogenicity of the region, this may affect treatment decision, ?mobile thrombus

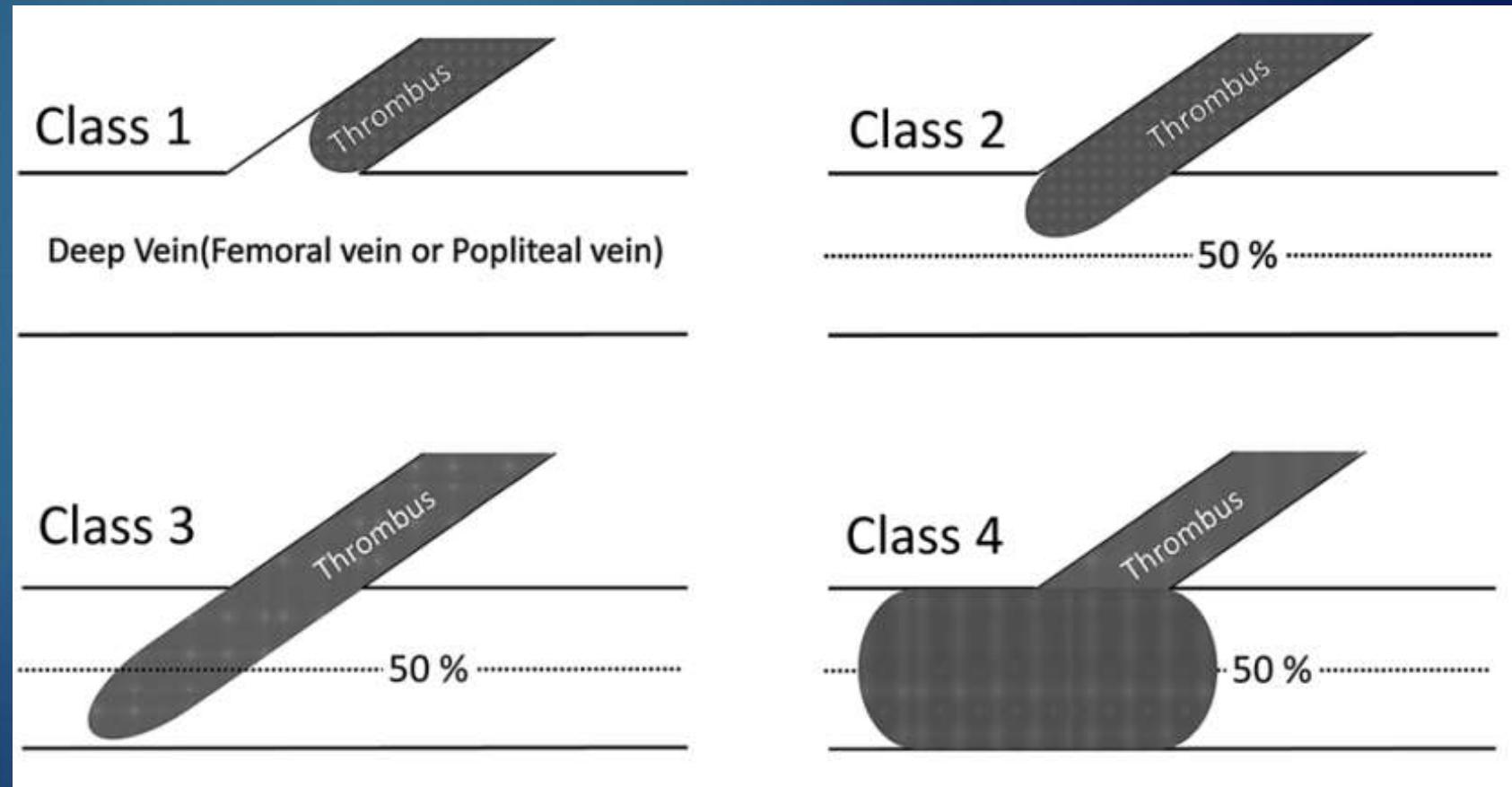
# Endovenous heat induced thrombosis (EHIT)

- Propagation of thrombus into the deep vein after endothermal ablation

Class	Definition
1	Thrombus extended up to and including the deep vein junction
2	Thrombus propagation into the adjacent deep vein but comprising <50% of the deep vein
3	Thrombus propagation into the adjacent deep vein but comprising >50% of the deep vein
4	Occlusive deep vein thrombus contiguous with the treated superficial vein

# EHIT

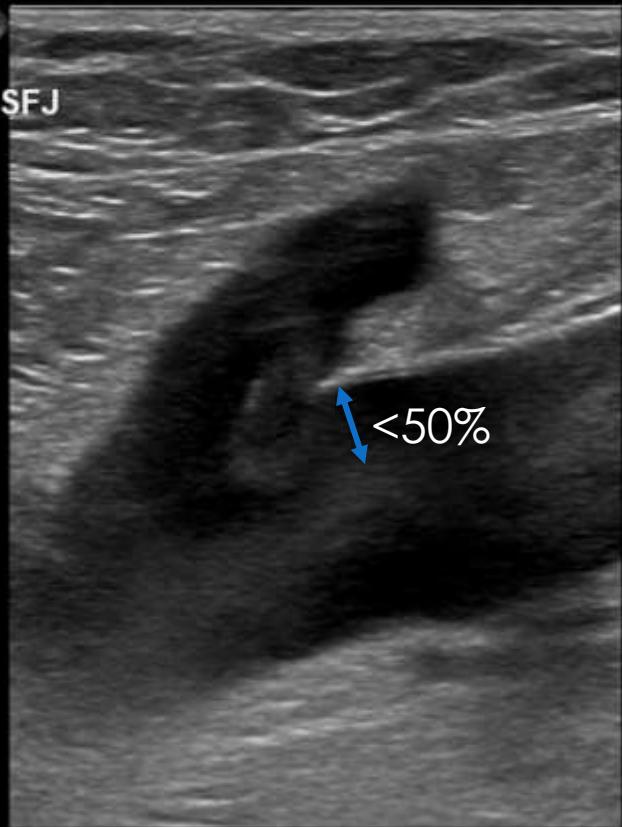
- Rare and should always be considered a pathological finding
- Post ablation superficial thrombus extension (**PASTE**) or ablation related thrombus extension (**ARTE**)



# EHIT class 2

Vasc Venous  
L12-3  
50Hz  
RS  
2D  
50%  
Dyn R 56  
P Low  
HGen

Left SFJ

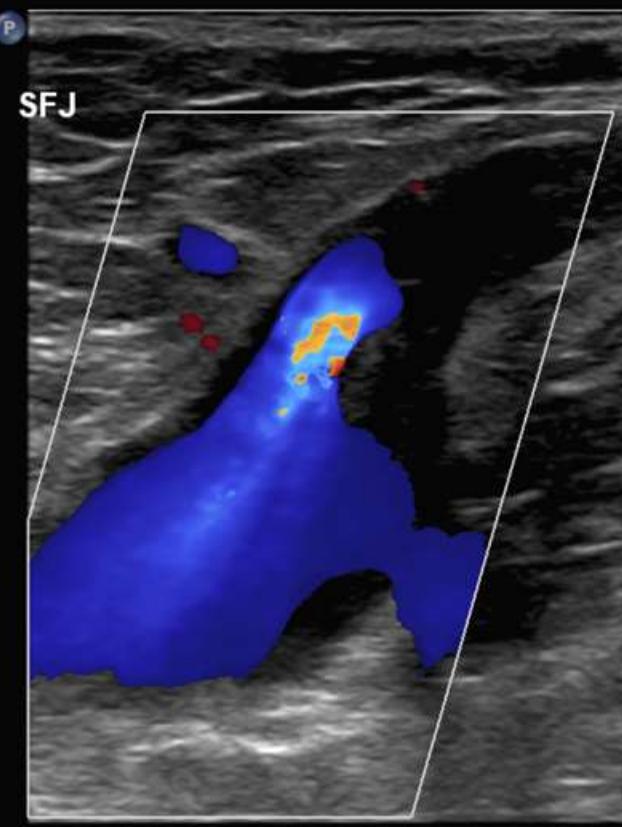


TIS0.3 MI 1.3 Vasc Venous  
- 0 M3  
- 1  
- 2  
- 3  
- 4  
- 5

2D 48%  
Dyn R 56  
P Low  
HGen

CF 33%  
1000Hz  
WF 38Hz  
4.0MHz

Left SFJ



TIS0.4 MI 1.3  
- 0 M3 M3  
- 1  
- 2  
- 3  
- 4  
- 5

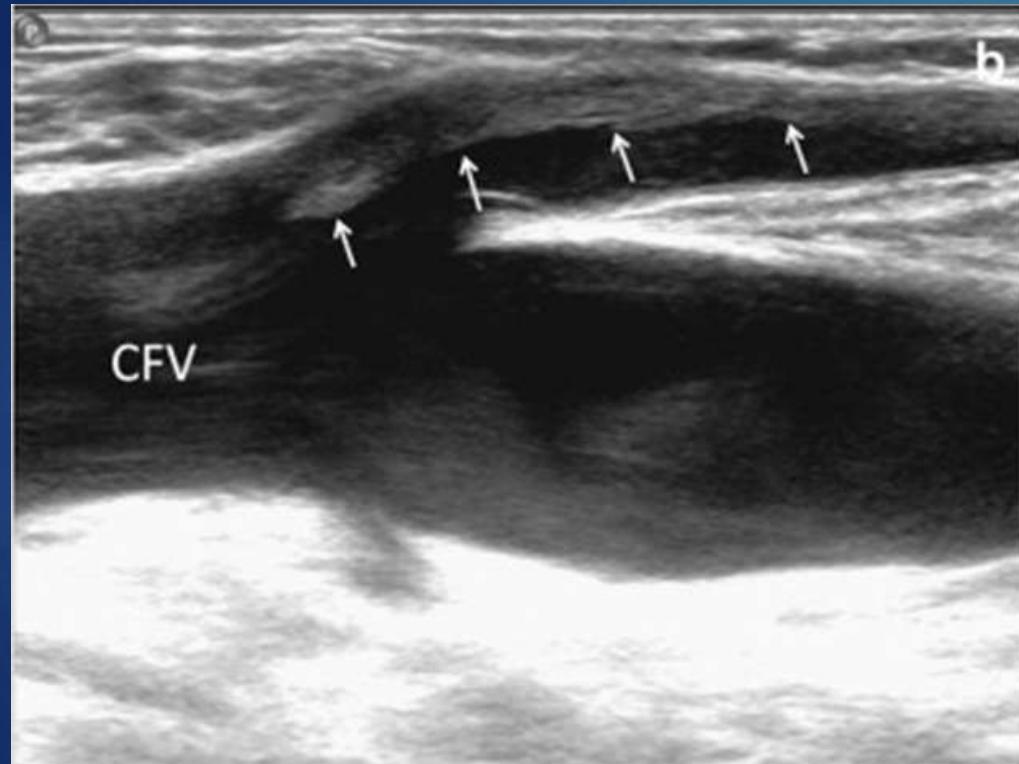
-9.6 cm/s

X3

# EHIT class 2

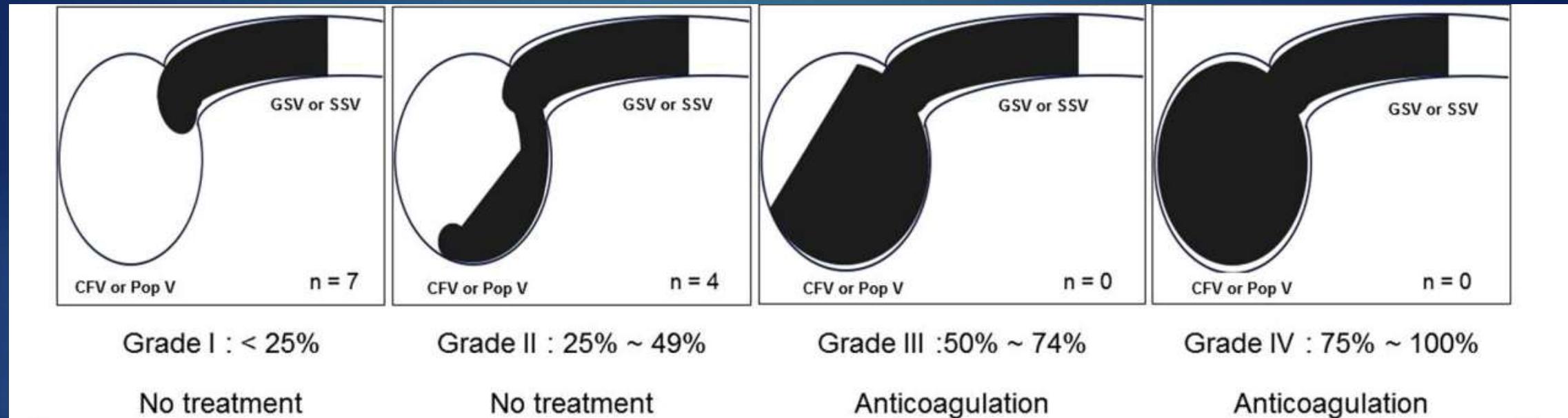


# Endovenous glue/foam induced thrombosis (EGIT/EFIT)



- ▶ Thrombus extension into the CFV after cyanoacrylate glue closure or foam sclerotherapy
- ▶ < Thrombus has developed along the anterior wall of the GSV and CFV after foam treatment
- ▶ Risk factor is small diameter of the saphenous vein

# EGIT



**Fig 4.** Classification of the endovenous glue-induced thrombosis (EGIT). **A** and **B**, The EGIT was classified as the glue-occupied area in the deep vein: total area of deep vein (dotted circle) and glue-occupied area (solid circle). CFV, Common femoral vein; GSV, great saphenous vein; Pop V, popliteal vein; SSV, small saphenous vein.



# Key takeaways

- ▶ Check **clinical history**, particularly when phlebitis is seen
- ▶ **Report** as occluded/partially occluded rather than 'phlebitis'
- ▶ Ensure visible **perforators** are patent
- ▶ Look for **EHIT/EGIT/EFIT**
- ▶ **If in doubt, check with the vascular/medical team. Ensure they are aware patient may have had vein treatment**

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