

Popliteal Vein Aneurysm

Seattle Veteran's Hospital

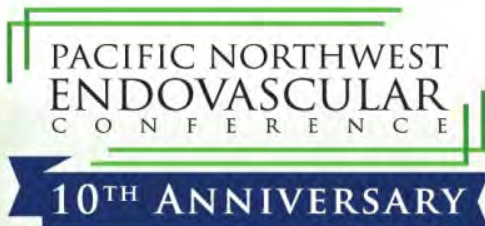
Bellevue College Student Intern:

Susan Wisker

and

Vascular Sonographer:

Janelle Barnes BS RVT



PNEC-SEATTLE.ORG

DISCLOSURES

Janelle Barnes, BS, RVT

- No relevant financial relationship reported

History

- 29-year-old male Veteran
- Long history of bilateral knee pain, left greater than right
- Medial joint line tenderness on both sides going up and down stairs

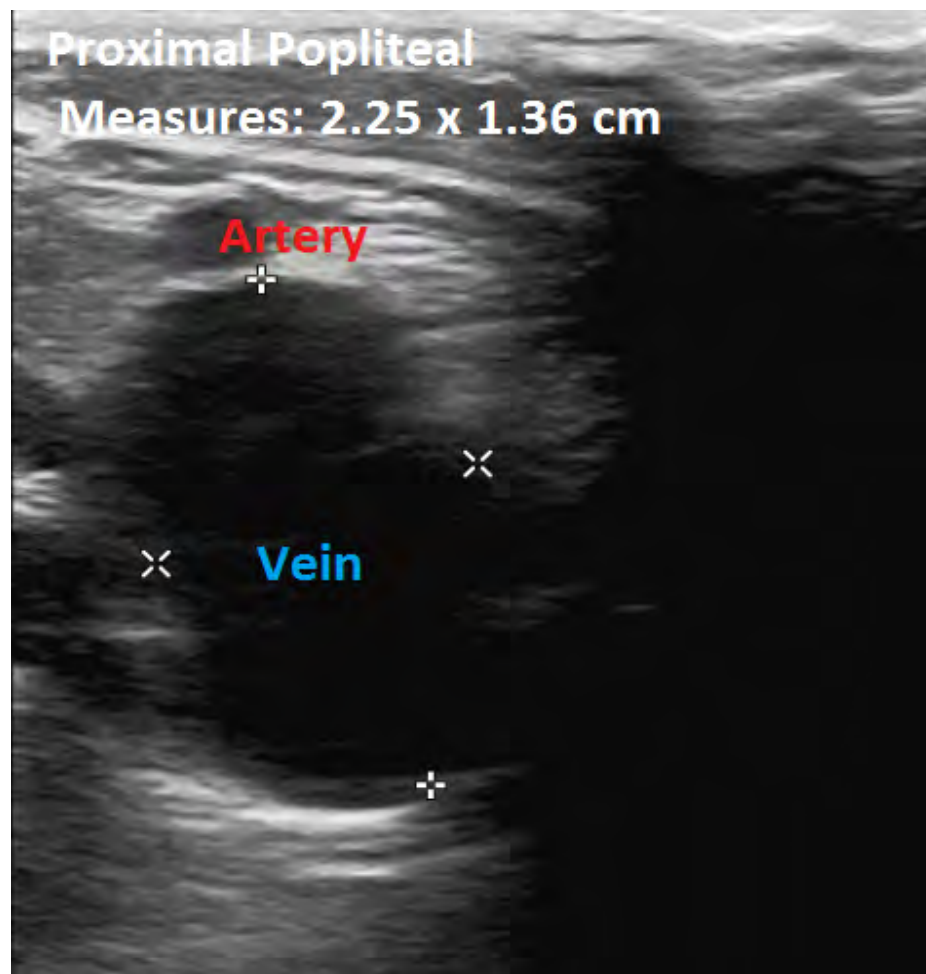
MRI

- Torn meniscus
- Fusiform, 2.0 cm right popliteal venous aneurysm
- Bedside ultrasound re-demonstrates 2.3 cm, fully compressible, right popliteal venous aneurysm



Venous Duplex

- No DVT
- 2.25 cm, right popliteal venous aneurysm
- Vascular appointment to discuss:
 1. Possible repair given size > 2cm
 2. Increased risk for DVT/PE



Orthopedic Surgery

Scheduled orthopedic surgery was cancelled, patient to be seen by vascular surgery



Vascular Surgery Conference Discussion

Should orthopedic proceed with arthroscopic meniscus surgery?

If orthopedic surgery is done first, vascular surgery recommends prophylactic LMWH x 1 month postoperatively *to decrease risk of DVT*

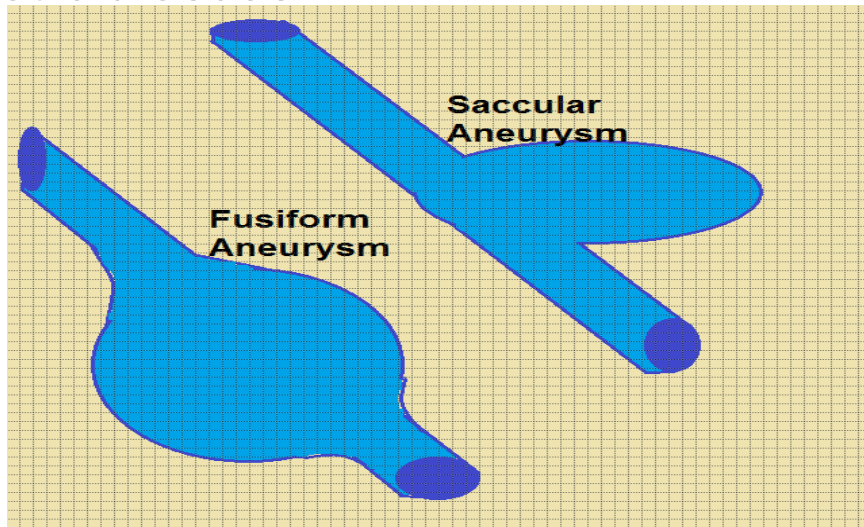
TABLE 1 Different types of LMWH	
Enoxaparin	Nadroparin
Dalteparin	Tinzaparin
Ardeparin	Reviparin



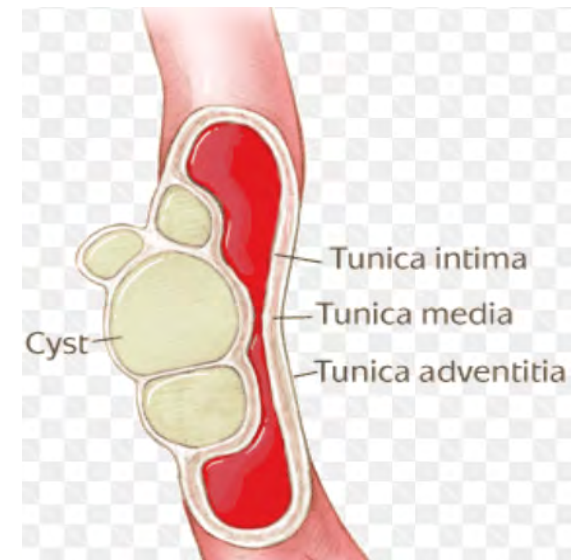
Vascular Surgery Conference Discussion

Non-contrast MRI was reviewed, unclear whether this is:
vein aneurysm or adventitial cystic disease

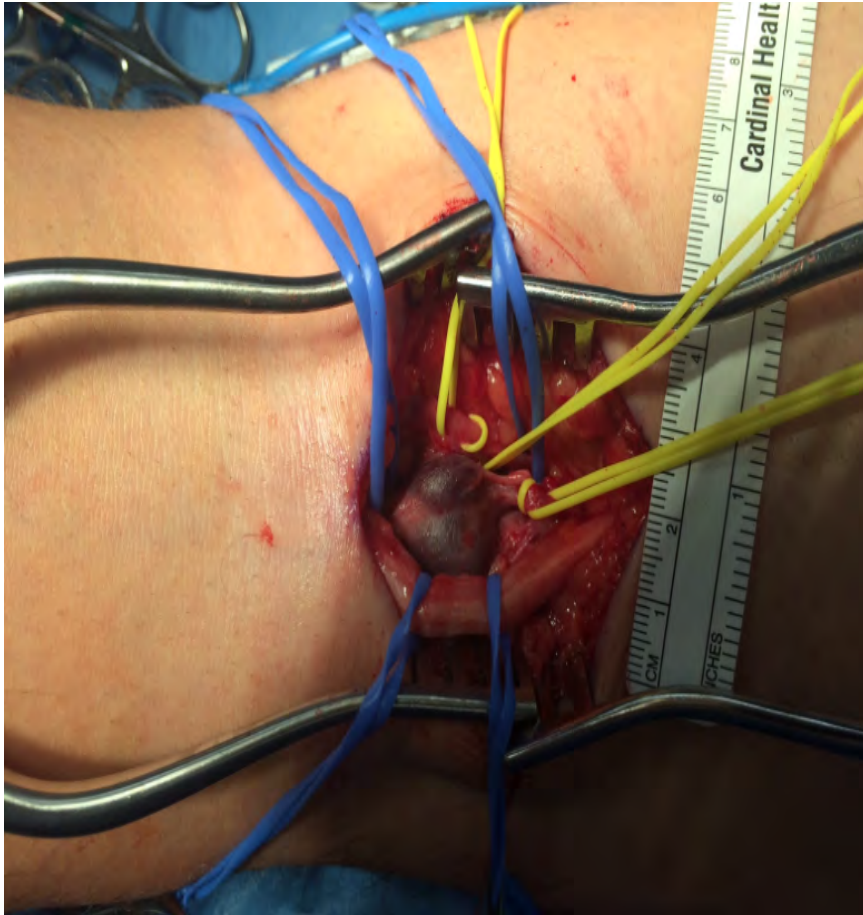
Treatment for both would be surgical resection to prevent:
DVT/PE from the aneurysm or compression from adventitial
cystic disease



VS



Surgery



Highlights:

- 10-12 cm longitudinal skin incision was performed above the knee flexion crease
- The popliteal vein was clamped
- 2 cm, fusiform aneurysm was resected
- The vein was mobilized to allow for end-to-end primary spatulated anastomosis, with 4 points of fixation
- The clamps and vessel loops were released restoring flow through the popliteal vein
- Continuous wave Doppler was used to confirm patency of the reconstructed vein

Outcome & Surgical Findings

- Patient tolerated the procedure well and was transferred to post anesthesia care unit in stable condition
- ~2cm popliteal venous aneurysm resected
- 2+ right DP/PT pulse at end of case

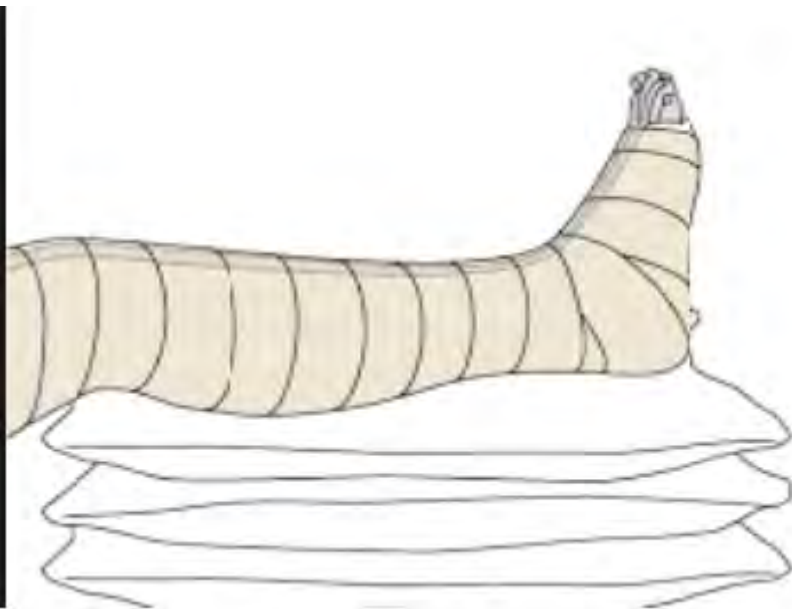


Post-Op Follow-Up

- Anticoagulated with warfarin for 6 weeks following surgery
- Encouraged leg straightening to avoid knee contracture
- 3 month follow up venous duplex



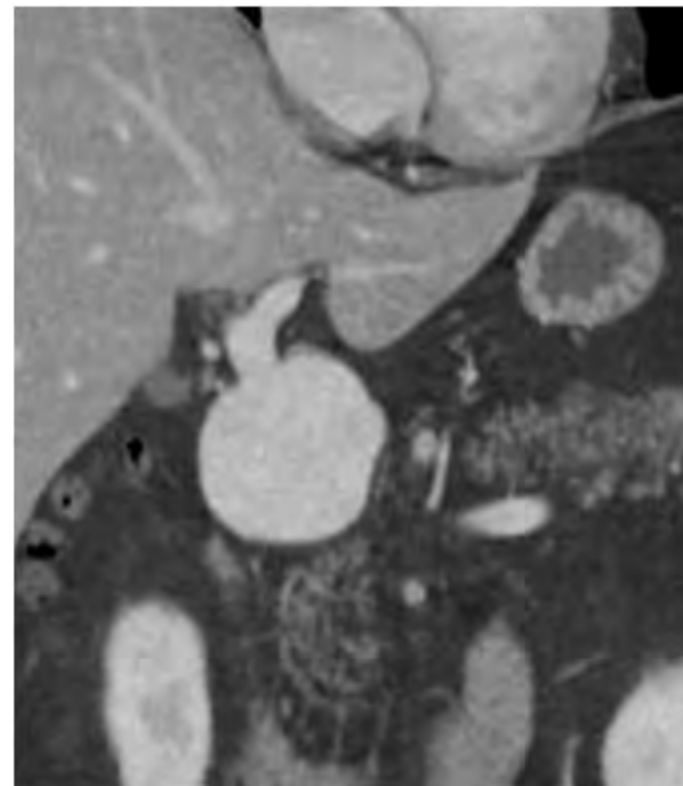
Vascular Surgery Plan Regarding Orthopedic Surgery



- Follow up with ortho for possible right knee steroid injection to help with meniscal pain
- Meniscus repair currently deferred
- Recover from right popliteal venous aneurysm surgery and postoperative anticoagulation course

What is a Venous Aneurysm?

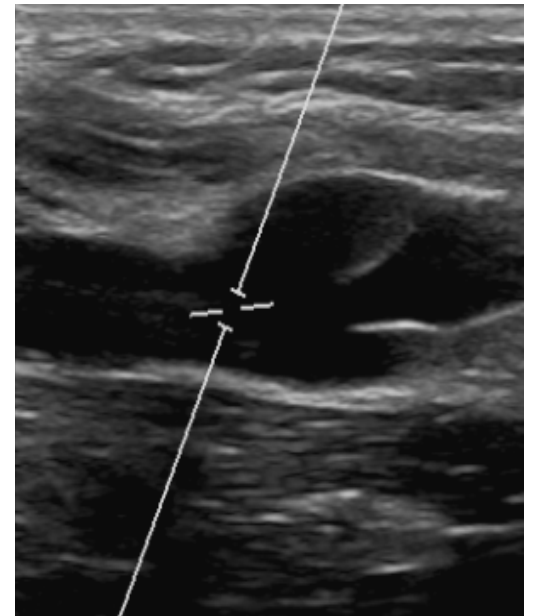
- Fusiform or saccular dilatation containing all three layers of the vein wall ⁽¹¹⁾
- Dilation is focal and communicates with a main venous structure by single channel ⁽¹¹⁾
- A 2006 article suggests VA definition is controversial ⁽⁶⁾



Saccular Portal Vein Aneurysm

Not a Venous Aneurysm

- **Varicose veins:** dilated, elongated, tortuous, subcutaneous veins 5 millimeters or greater in diameter ⁽¹¹⁾
- **Venous malformation:** the most frequent low-flow vascular malformations. ⁽¹¹⁾
- **Pseudo aneurysm:** confined flow outside the vessel wall
- **Valve cusp dilation**



Lower Extremity Venous Aneurysm Stats

- Sources agree venous aneurysms are rare with (?) incidence rate ⁽¹⁾
- Saccular ~75% Fusiform ~25% ⁽¹⁾⁽⁵⁾⁽⁶⁾
- Gender bias: Female ⁽¹⁾⁽⁵⁾
- Lower Extremity Most Common ~77% ⁽⁵⁾⁽¹¹⁾
- Unilateral⁽⁴⁾

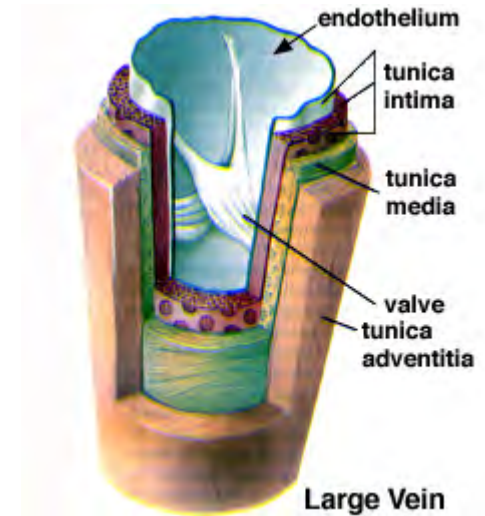


Potential causes of Venous Aneurysm

- Congenital wall weakness ^{(4) (11)}
 - Neurofibromatosis type I (NFI) (genetic mutation on the long arm of chromosome 17) ⁽¹⁵⁾
 - Klippel Trenaunay Syndrome ⁽⁸⁾
- Trauma ⁽⁴⁾
- Infection ⁽⁴⁾
- Inflammation ⁽⁴⁾
- Venous hypertension ⁽⁴⁾
- Venous reflux ⁽⁴⁾
- High body mass index ⁽⁸⁾
- Connective tissue loss with age ⁽³⁾
- Hemodynamic changes ⁽⁴⁾

Degenerative changes found in venous aneurysm tissue

- Increase of select metalloproteinases ⁽⁸⁾
- Loss of elastin in internal elastic lamina ⁽²⁾
- Increase of fibrous tissue and decrease of smooth muscle ⁽⁴⁾



Locations of Venous Aneurysms

Extremities:

Femoral, Popliteal, Great Saphenous ⁽⁵⁾⁽¹¹⁾

- **account for 77% of VAs**
- **7 VAs of 2507 screened for varicose veins**
- **most dangerous -> PE**

Neck/Face:

Internal jugular ⁽⁶⁾⁽¹¹⁾

- **children & young adults**
- **enlarges with Valsalva maneuver**
- **treatment cosmetic**

Thoracic:

Superior vena cava, Azygos vein ⁽⁶⁾

- **incidentally found with imaging**
- **fatal rupture reported**

Abdominal:

Portal, Superior Mesenteric vein ⁽⁶⁾

- **associated with portal hypertension**
- **treated* with portocaval shunt, resection is difficult**
- **symptom: GI bleed**

Presentation

Asymptomatic ⁽¹⁾

- Found on imaging

Local

- Mass ⁽⁶⁾⁽¹³⁾
- Pain ⁽⁶⁾⁽¹³⁾
- Swelling ⁽⁶⁾⁽¹³⁾
- Dilated veins in overlying skin/varices ⁽⁶⁾⁽¹³⁾
- Nerve compression ⁽¹³⁾
- Venous ulcer ⁽⁶⁾

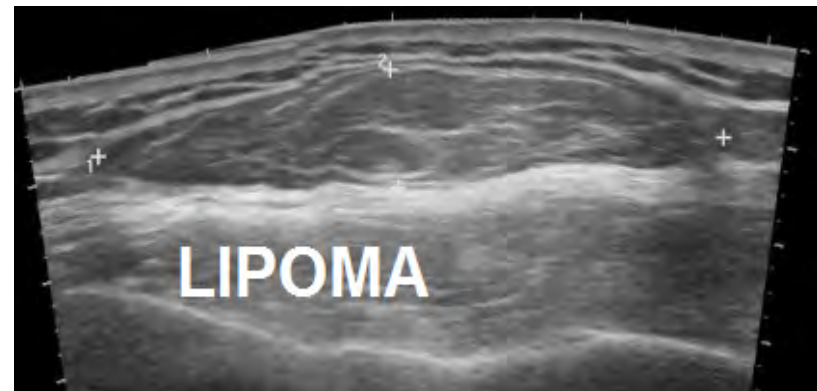
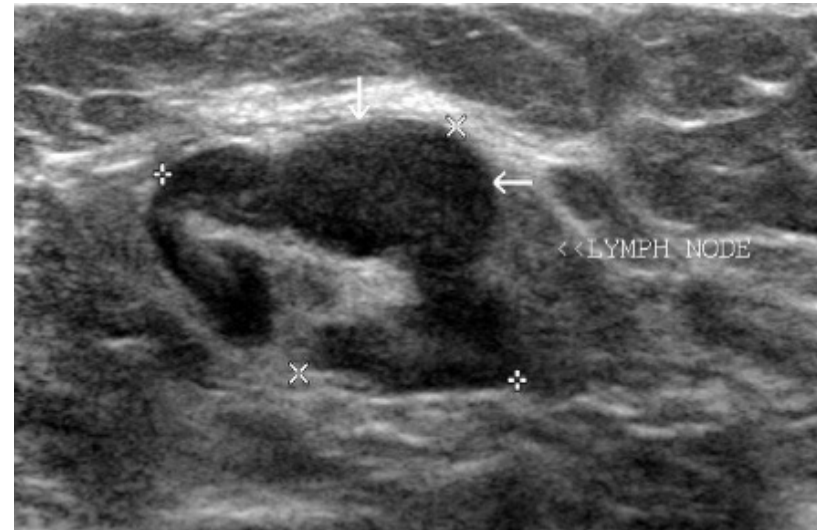


Systemic

- Venous Thromboembolism (VTE) ⁽³⁾⁽⁶⁾⁽¹³⁾
- Chest pain/dyspnea ⁽⁶⁾
- Gastrointestinal bleeding ⁽⁶⁾

Differential Diagnosis

- Cystic adventitial disease (CAD) (0.1% of all vascular diseases) (9) (10)
- Lymph node (10)
- Cyst (10)
- Lipoma (10)
- Mass (10)
- Vascular malformations (10)
- Hernia (inguinal) (4) (10)
- Arterial Aneurysm (10)



What is Venous Cystic Adventitial Disease?

- Characterized by a collection of mucinous materials in the adventitia of blood vessel ⁽⁹⁾
- Cystic material histologically similar to ganglia ⁽⁹⁾
- Narrows lumen of vessel ⁽⁹⁾
- Most affected: External iliac vein ⁽⁹⁾
- Mistaken for deep vein thrombosis (DVT) ⁽⁹⁾
- MRV is helpful in cases of cystic adventitial disease since it may demonstrate a connection with the joint, and there is superior soft tissue detail ^(GT)
- Other suggested imaging modalities include U/S and Venography ⁽⁹⁾

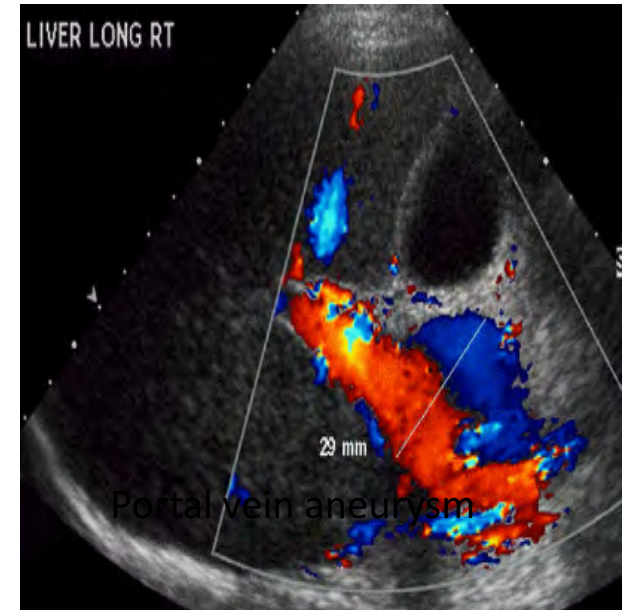
Duplex Ultrasound Diagnosis of Venous Aneurysm

How to Demonstrate Venous Aneurysm:

- Valsalva/squeeze calf
- Low color scale/adjust gain
- Power angio/power Doppler
- Dual image with compression
- Spectral Doppler- low velocity

CAD:

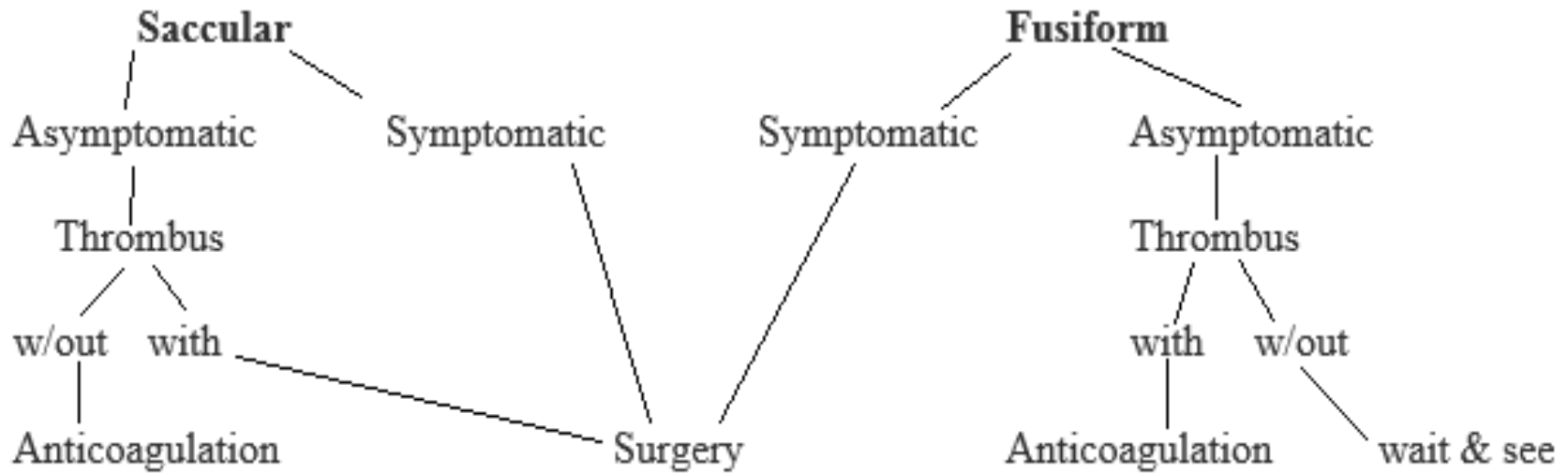
- No active vascular flow
- No color filling should be demonstrated in cystic structures
- Incomplete compression



Diagnosis

- Venous duplex imaging is the best initial examination and to follow patency post surgical repair ⁽⁴⁾⁽¹¹⁾
 - Misdiagnosis attributed to: habitus, sonographer expertise, anatomic variants ⁽⁸⁾
- Venography demonstrates the type and size of VA and associated collateral channels. Helpful for any planned surgical repair. ⁽⁵⁾⁽¹¹⁾
- CT and MR prove highly effective in detecting VAs and identifying vascular origin, size and extent ⁽⁵⁾⁽¹¹⁾

When to Treat a Popliteal Venous Aneurysm?



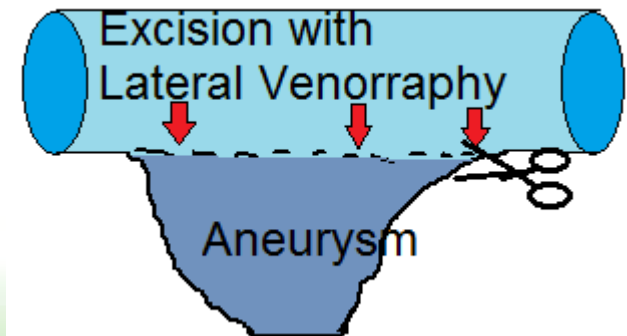
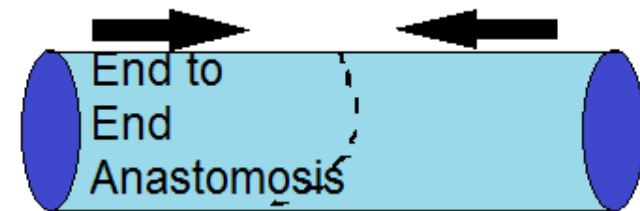
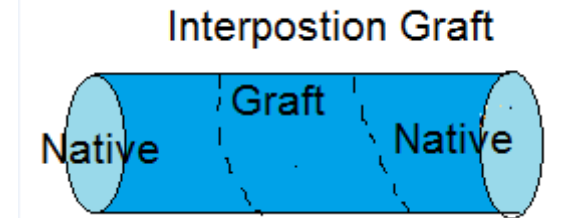
Popliteal Venous Aneurysm as a Rare Finding: Management and Therapy Presented in a Case Report. N. Schoen. International Journal of Angiology, February **2005**, Volume 14, Issue 1, pp 37–39

When to treat a Popliteal Venous Aneurysm, Today?

- Popliteal venous aneurysms >2cm ⁽⁵⁾
- Lower extremity VAs considered the most dangerous due to high incidence of DVT and PE ⁽¹¹⁾
- Lower extremity: all deep and symptomatic superficial VAs require treatment ⁽³⁾
- Aneurysm morphology is not a definite parameter to predict complication ⁽⁴⁾

Surgical Treatment

- Resection with saphenous vein interposition graft
 - The most successful treatment of a venous aneurysm ⁽¹¹⁾
- Ligation (superficial veins, duplicated deep veins)
- Resection with end-to-end venous anastomosis
- Aneurysmorrhaphy or tangential excision with lateral venorrhaphy ⁽¹¹⁾



Surgical Treatment Cont'd

- Temporary IVC filter, removed 2-3 months post op ⁽⁴⁾
- Varied duration of anticoagulation following surgery ~3 months ⁽³⁾⁽⁴⁾

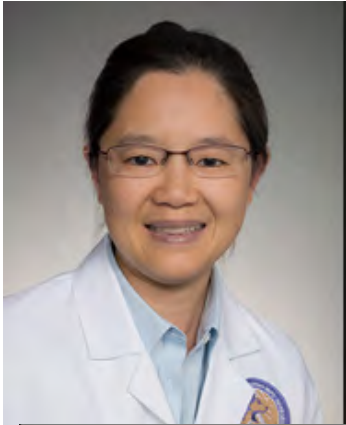
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Thank You!



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