Vascular Surgery for Primary Care Providers

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Fransiscan Vascular Surgery Associates, Silverdale

November 7, 2025

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Disclosures

None

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Objectives

- To recognize signs of Chronic Limb Threatening Ischemia (Peripheral Arterial Disease)
- Review indications for referral for Aortic Aneurysm Disease and Carotid Stenosis
- Review Vascular causes of lower extremity swelling

Peripheral Arterial Disease

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Lower Extremity Peripheral Arterial Disease (PAD)

- 8-12 million Americans affected
  - 3-10% of the American population
- Increasing prevalence with increasing age
  - Affects 15-20% of patients older than 70
- Fewer than 40% will report symptoms

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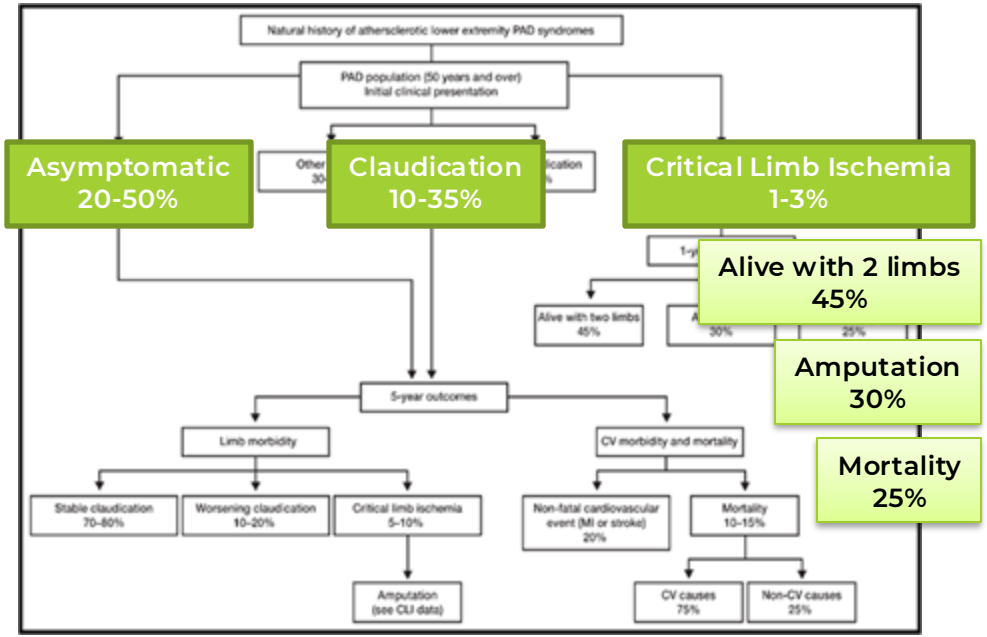
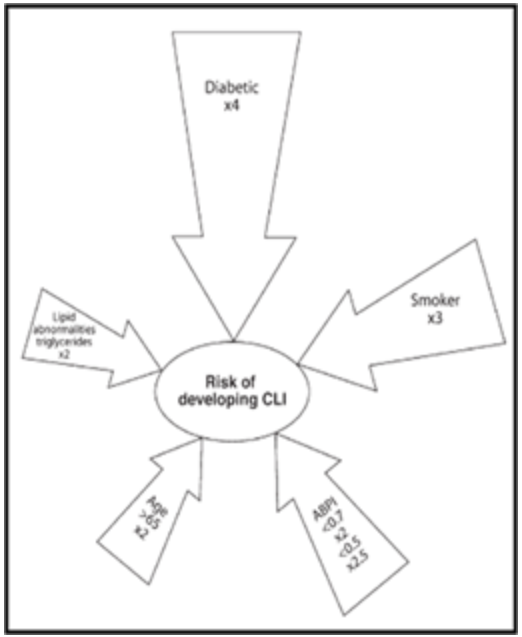
Conte, Michael S., et al. "Society for Vascular Surgery Practice Guidelines for Atherosclerotic Occlusive Disease of the Lower Extremities: Management of Asymptomatic Disease and Claudication." *Journal of Vascular Surgery*, vol. 61, no. 3, 2015.
Hirsch AT, et al. JAMA 2001;286:1317-24

PAD – Natural History



Five-year history of a claudicant



Magnitude of the effect of risk factors in PAD patients

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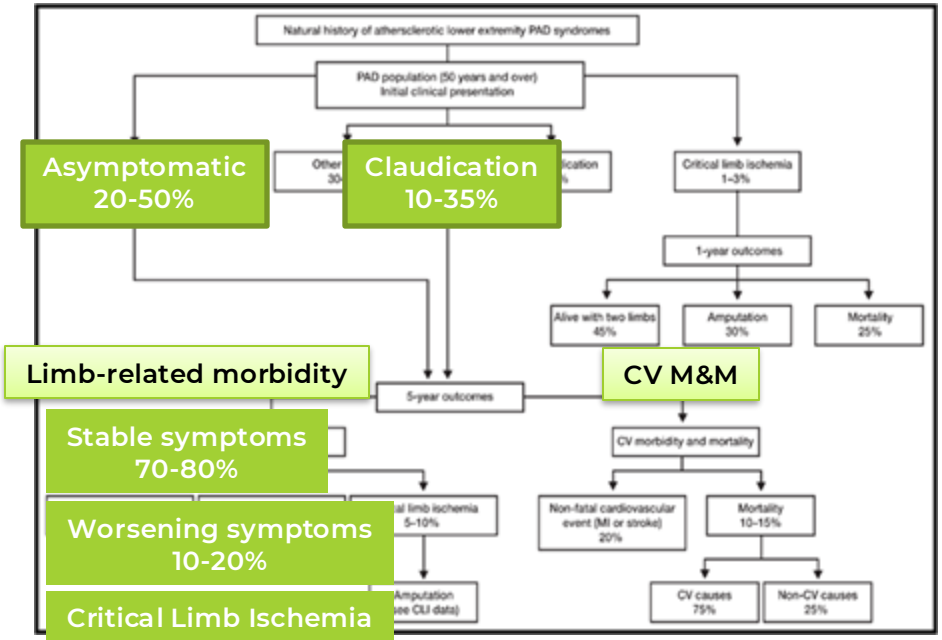
Norgren, L, et al. J Vasc Surg 2007; 45 Suppl S: S5-67

PAD – Natural History



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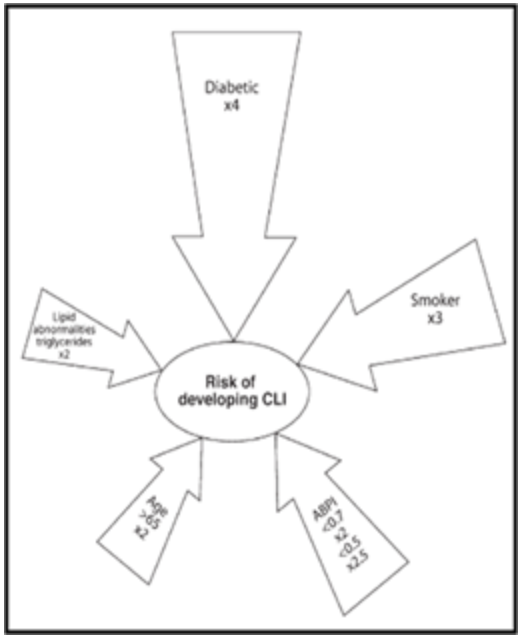

Magnitude of the effect of risk factors in PAD patients

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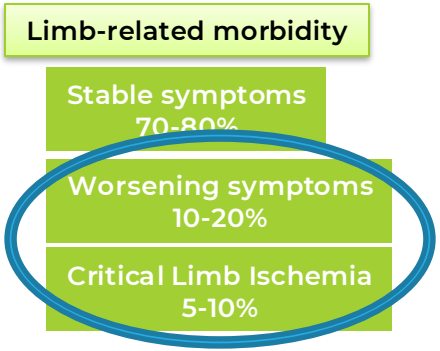
PAD – Asymptomatic Patients

- Interventions
  - Smoking cessation
  - Management of comorbidities
    - HTN, DM, CAD
  - Medications
    - Statin, +/- ASA
  - Exercise
    - 30-60min/day; 5-7days/wk



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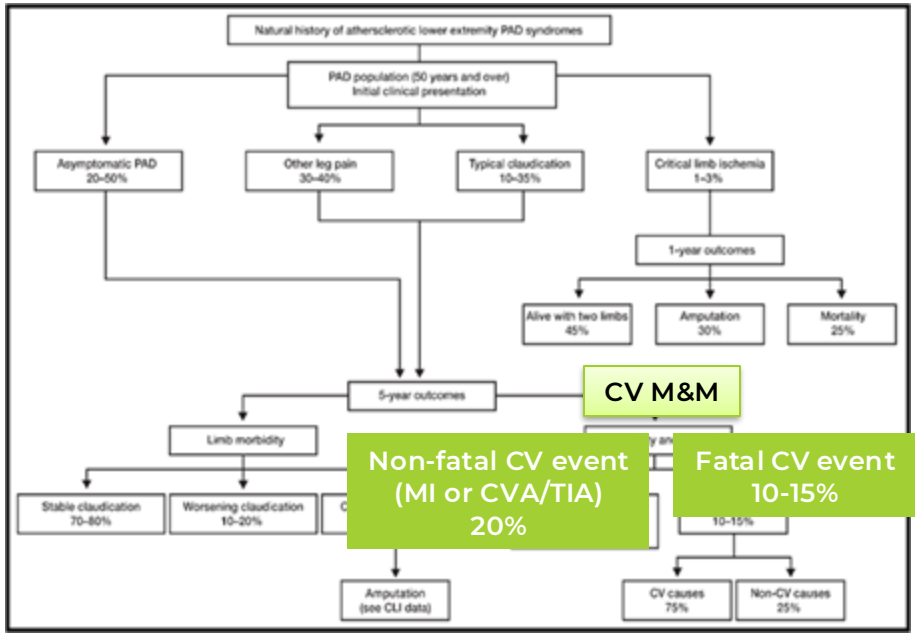
PAD – Asymptomatic Patients-Mortality

- Interventions
  - Smoking cessation
  - Management of comorbidities
    - HTN, DM, CAD
  - Medications
    - Statin, +/- ASA
  - Exercise
    - 30-60min/day; 5-7days/wk



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Norgren, L, et al. J Vasc Surg 2007; 45 Suppl S: S5-67

PAD – Criteria for Referral

- Acute Limb Ischemia
  - Immediate – go to ER
- Progression to critical limb ischemia
  - Tissue loss/non-healing ulcer
  - Ischemic rest pain
  - Urgent outpatient referral within 2 weeks

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Acute Limb Ischemia

- Sudden Arterial Occlusion
  - Embolic/Thrombotic
- 5 Ps
  - Pulseless
  - Pain
  - Pallor
  - Poikilothermia
  - Paralysis

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Intervention

- Do not pass go, Do not collect 200 $- Straight to ER
- Start heparin drip
- Vascular intervention within 6 hours of symptom onset.
  - Endovascular thrombectomy
  - Open embolectomy
  - Will almost always require fasciotomy
  - Evaluation for cause of acute ischemia

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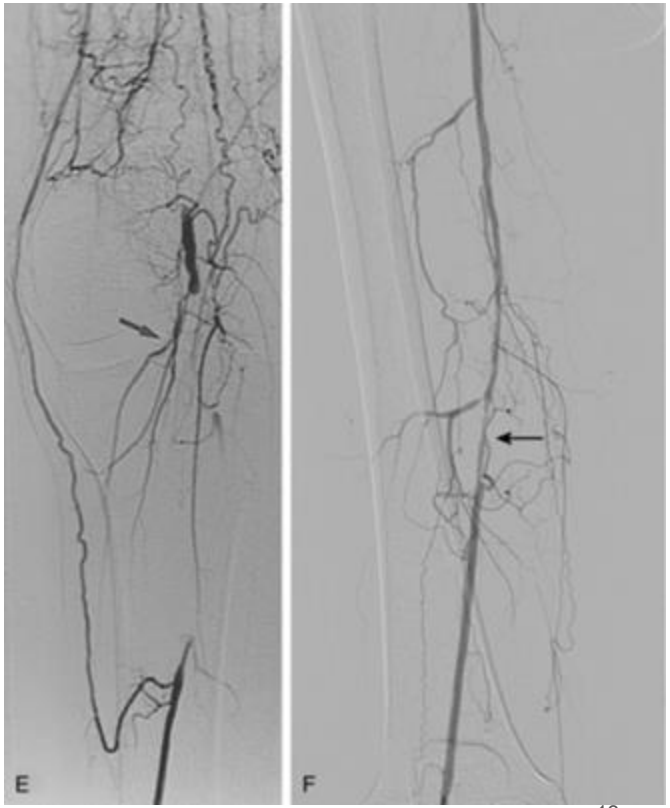
Chronic Limb ischemia (PAD)

- Slow build up of atherosclerotic disease over time
- Occurs over months and years
- Allows collateral development
- Symptoms
  - None
  - Claudication
  - Rest Pain
  - Non Healing Wounds



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PAD – Presentations

- Intermittent claudication
  - Reproducible, exertional pain (Ex. Calf cramping) that resolves with rest
  - Varied description of pain -cramping, fatigue, burning, sharp
  - Intervention is only indicated for lifestyle-limiting symptoms
    - Failure of exercise regimen/pharmacologic therapy
    - Favorable risk-to-benefit ratio – aortoiliac disease

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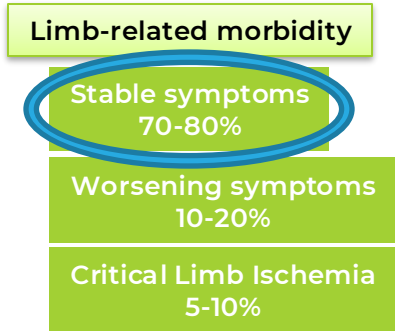
PAD – Initial Intervention

- Interventions
  - Smoking cessation
  - Management of comorbidities
    - HTN, DM, CAD
  - Medications
    - Statin, +/- ASA
  - **Exercise**
    - **30-60min/day; 5-7days/wk**



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PAD – What happens next?

- Interventions
  - Smoking cessation
  - Manage[illegible]
    - HTN[illegible]
  - Medications
    - Statin, +/- ASA
  - Exercise
    - 30-60min/day; 5-7days/wk

Follow-up in 3 months

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PAD – What happens next?

Risk of major amputation in patients with intermittent claudication undergoing early revascularization

J. Golledge[1,2,3,4], J. V. Moxon[1,2], S. Rowbotham[1,5,6], J. Pinchbeck[1], L. Yip[1], R. Velu[3,4], F. Quigley[4], J. Jenkins[6] and D. R. Morris[1,7]

[1]Queensland Research Centre for Peripheral Vascular Disease, College of Medicine and Dentistry, and [2]Australian Institute of Tropical Health and Medicine, James Cook University, [3]Department of Vascular and Endovascular Surgery, Townsville Hospital, and [4]Department of Vascular and Endovascular Surgery, Mater Hospital, Townsville, [5]School of Medicine, University of Queensland, Brisbane, and [6]Department of Vascular and Endovascular Surgery, Royal Brisbane and Women's Hospital, Herston, Queensland, Australia, and [7]Nuffield Department of Population Health, University of Oxford, Oxford, UK

Correspondence to: Professor J. Golledge, Director, Queensland Research Centre for Peripheral Vascular Disease, College of Medicine and Dentistry, James Cook University, Townsville, Queensland, Australia, 4811 (e-mail: Jonathan.Golledge@jcu.edu.au)

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J Golledge, J V Moxon, S Rowbotham, J Pinchbeck, L Yip, R Velu, F Quigley, J Jenkins, D R Morris, Risk of major amputation in patients with intermittent claudication undergoing early revascularization, *British Journal of Surgery*, Volume 105, Issue 6, May 2018, Pages 699–708, https://doi.org/10.1002/bjs.10765

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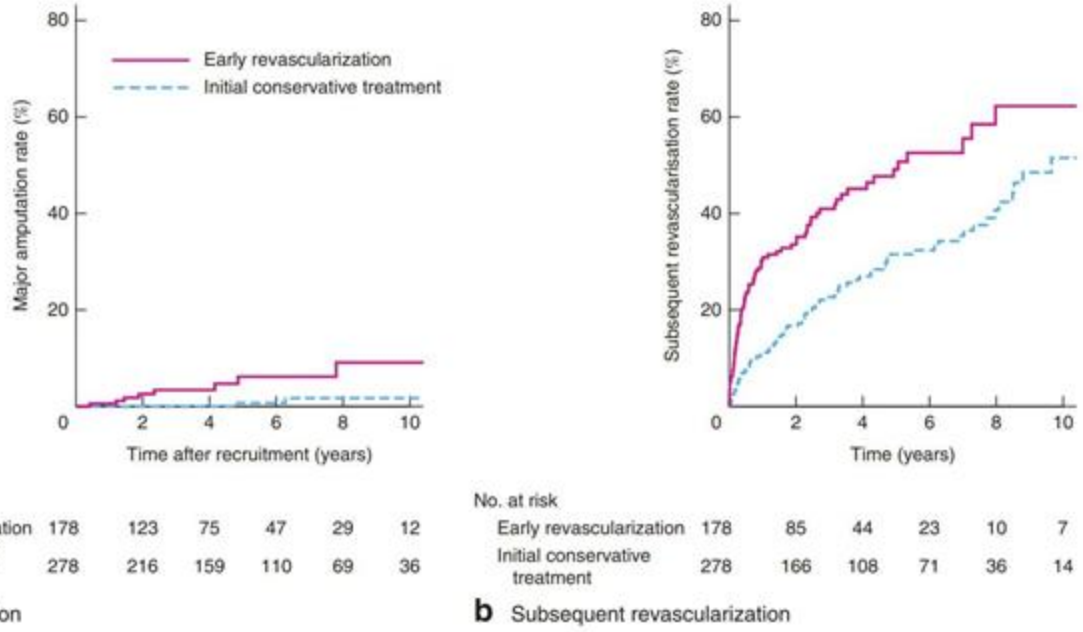

No. at risk						
Early revascularization	178	123	75	47	29	12
Initial conservative treatment	278	216	159	110	69	36

a Major amputation

No. at risk						
Early revascularization	178	85	44	23	10	7
Initial conservative treatment	278	166	108	71	36	14

b Subsequent revascularization

Fig. 1 Kaplan–Meier curves for the risk of **a** major amputation and **b** subsequent revascularization in patients with intermittent claudication who underwent early revascularization or had initial conservative management. **b** Follow-up in patients who had early revascularization is from the index revascularization procedure, and that in patients who received initial conservative management is from 6 months after the initial treatment decision, as there were no revascularizations within the first 6 months in this group. **a** $P = 0{\cdot}003$, **b** $P < 0{\cdot}001$ (log rank test)

J Golledge, J V Moxon, S Rowbotham, J Pinchbeck, L Yip, R Velu, F Quigley, J Jenkins, D R Morris, Risk of major amputation in patients with intermittent claudication undergoing early revascularization, *British Journal of Surgery*, Volume 105, Issue 6, May 2018, Pages 699–708, https://doi.org/10.1002/bjs.10765

Claudication Intervention

- IRONIC Trial
- Compared Best Medical Therapy plus intervention vs BMT and exercise therapy
  - Initial benefit in walking distance (treadmill and QOL in intervention group
  - Benefit lost at 5 year mark

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Absence of Long-term Benefit of Revascularization in Patients With Intermittent Claudication: Five-Year Results From the IRONIC Randomized Controlled Trial
Djerf, H. et al.
Journal of Vascular Surgery, Volume 72, Issue 2, 747

Rest Pain

Pain caused by inadequate arterial perfusion

Early rest pain pain in the foot at night that wakes patient from sleep.

alleviated by dependent positioning

Late rest pain constant and unrelenting

Patients describe amputation as a relief comparatively

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Non Healing Wounds

- Classically distal most point of extremity
- Can look like anything
  - dry or wet gangrene
  - pressure wound
  - diabetic wound
  - venous ulcer
- Any time a patient has a wound a pulse exam should be performed.

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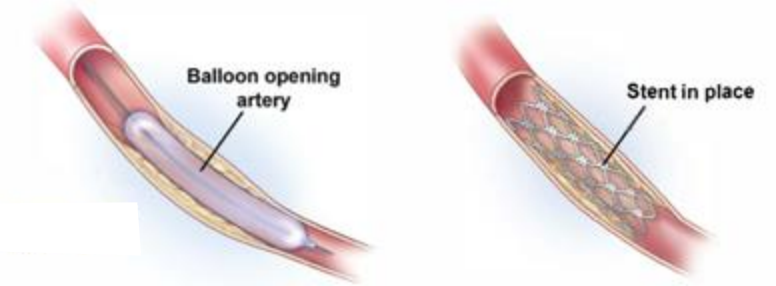
PAD – What happens next?



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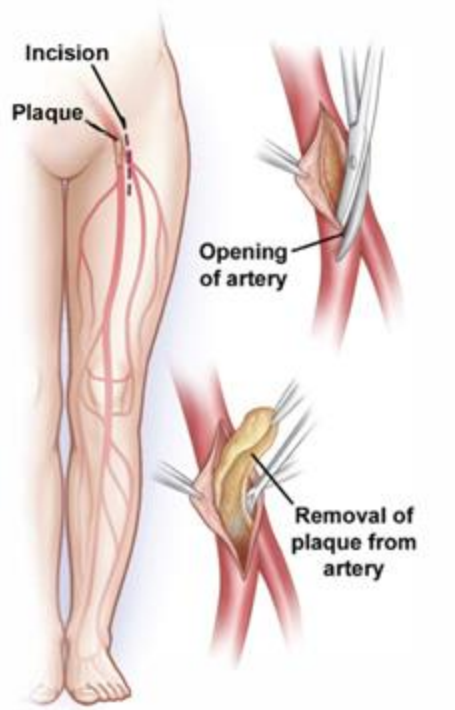
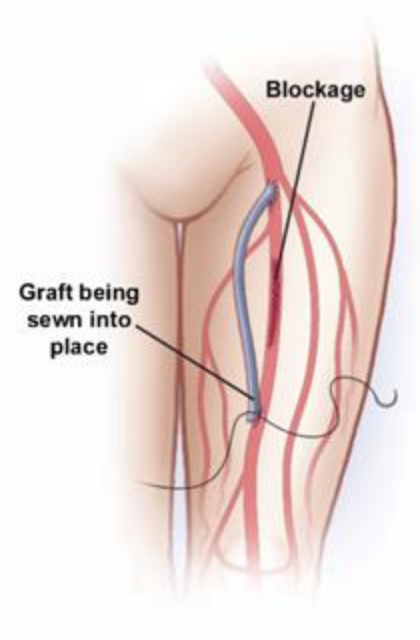
https://vascular.org/sites/default/files/2018_PAD_Flyer_NoBleeds_w_link.pdf

PAD – What happens next?





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https://vascular.org/sites/default/files/2018_PAD_Flyer_NoBleeds_w_link.pdf

PAD – Post-operative care & surveillance

- Interventions
  - Smoking cessation
  - Management of comorbidities
    - HTN, DM, CAD
  - Medications
    - Statin, ASA, +/- Plavix
  - Exercise
    - 30-60min/day; 5-7days/wk
- Follow-up studies
  - ABIs
  - Arterial duplex
- ?Re-intervention

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Aortic Aneurysm Disease

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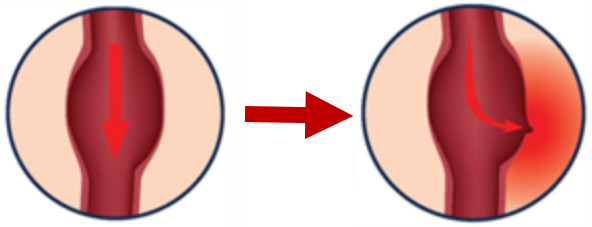
Abdominal Aortic Aneurysm



- 200,000 people are diagnosed with AAA each year in the U.S.
  - Ruptured AAA is the 15th leading cause of death
    - 10th leading cause of death in men >55 years old
- "AAAs occur in 13% of men and 6% of women >65 years old"

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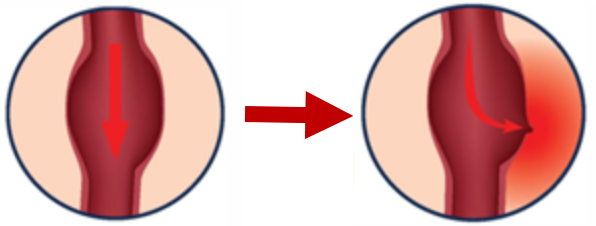
https://vascular.org/referral-resources/who-refer/patients-abdominal-arotic-anerusym-aaa

Abdominal Aortic Aneurysm



- Morbidity and mortality are significantly lower in **elective** repair as opposed to an **emergency rupture** repair

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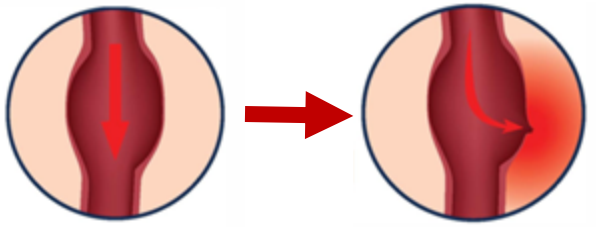
https://vascular.org/referral-resources/who-refer/patients-abdominal-arotic-anerusym-aaa

Abdominal Aortic Aneurysm



- SVS recommends screening
  - Patients >65 years old with a history of smoking
  - Patients with a first degree relative with a AAA
- Aortoiliac duplex is the screening test of choice

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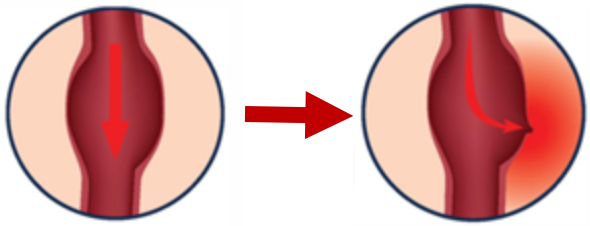
https://vascular.org/referral-resources/who-refer/patients-abdominal-arotic-anerusym-aaa

Criteria for referral



- Diagnosis of **aneurysm** of the aorta is defined as a dilation 1.5x the diameter of the "normal" aorta OR 3cm
- Indications for repair
  - Saccular morphology
  - >5cm size in women
  - >5.5cm size in men
  - >5mm of growth in 6 months
  - Back/abdominal that is clearly attributable to the aneurysm
  - Emboli to lower extremities attributable to the aneurysm

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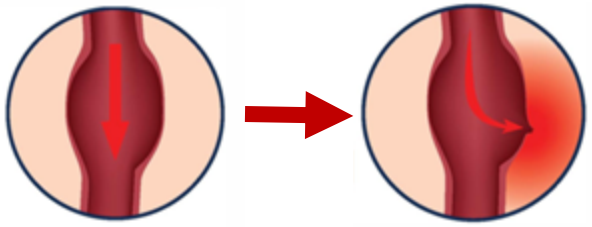
https://vascular.org/referral-resources/who-refer/patients-abdominal-arotic-anerusym-aaa

What happens next?



- Interventions
  - Smoking cessation
  - Management of comorbidities
    - HTN, DM, CAD
- Routine surveillance
  - Duplex every 12 months
  - Increase frequency to every months once aneurysm is within 5mm of repair cutoff

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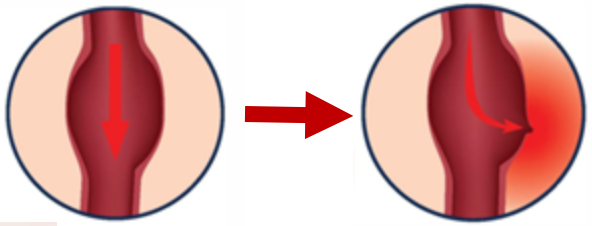
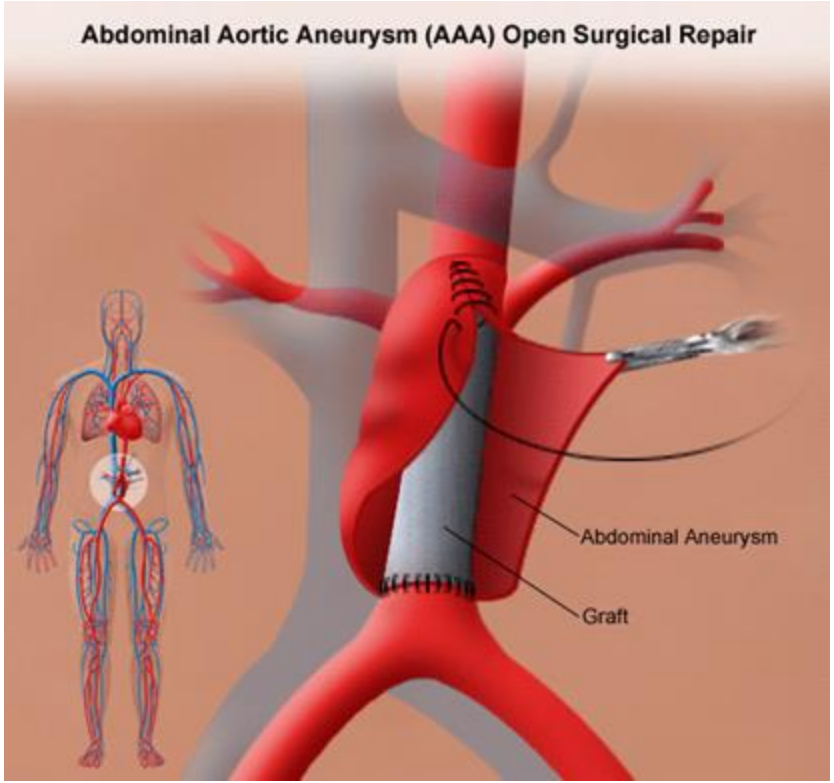
What happens next?





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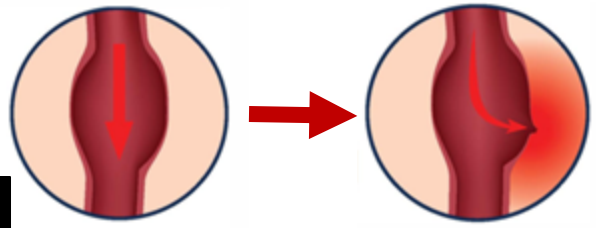
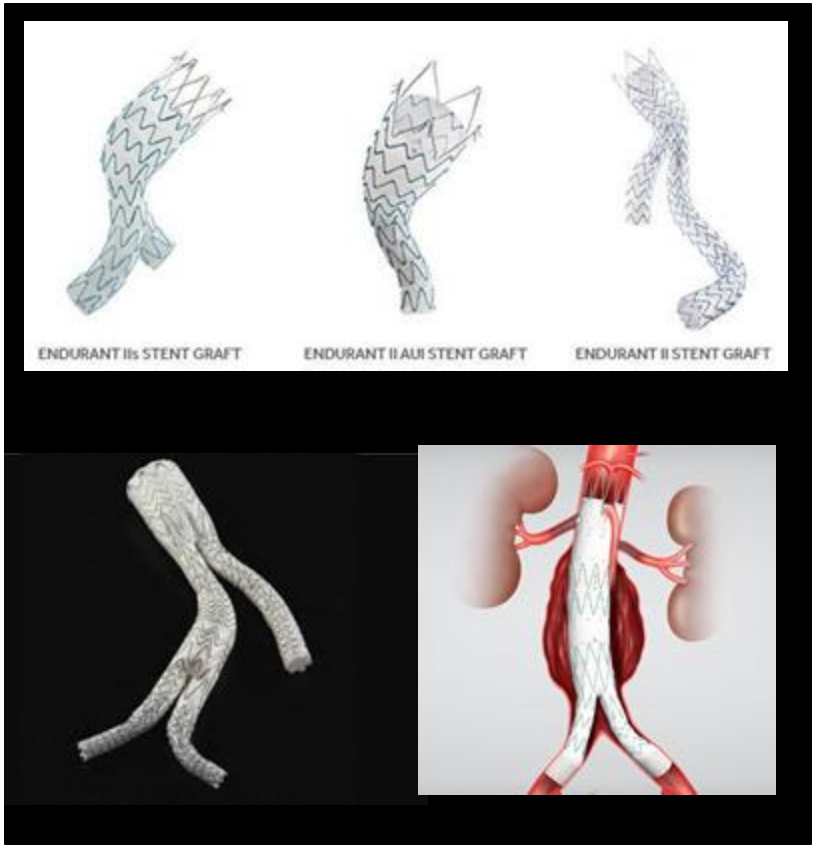
https://stanfordhealthcare.org/medical-conditions/blood-heart-circulation/abdominal-aortic-aneurysm/treatments/abdominal-aortic-aneurysm-open-repair.html

What happens next?





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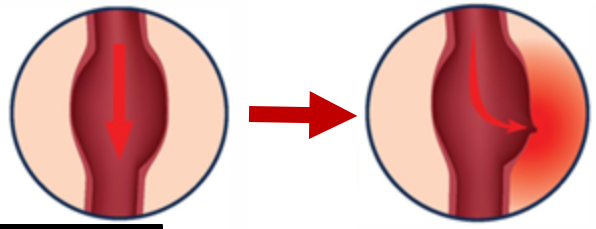
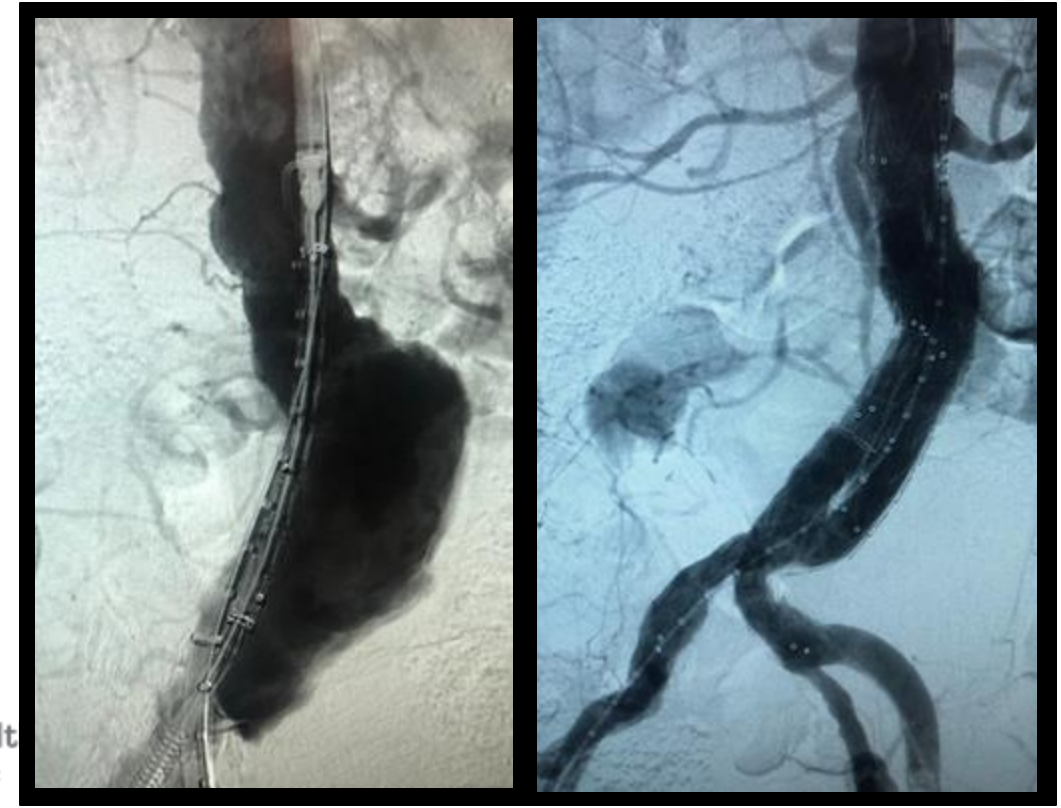
https://www.medtronic.com/us-en/healthcare-professionals/products/cardiovascular/aortic-stent-grafts/endurant-ii.html
https://www.goremedical.com/eu/resource/AW1019-EN1
https://www.cookmedical.com/products/adc82bec-ce78-46fd-8df0-0c78e4c6ebd3/

What happens next?





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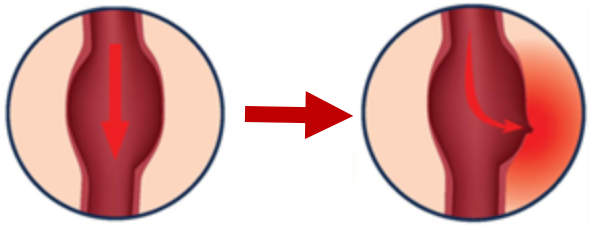
Post-operative care & surveillance



- Interventions
  - Smoking cessation
  - Management of comorbidities
    - HTN, DM, CAD
  - Medications
    - Statin, ASA, +/- Plavix
- Follow-up studies
  - Aortoiliac duplex

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Carotid Artery Stenosis

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Extracranial Carotid Stenosis

- Stroke is the 3rd leading cause of death in the U.S.
  - 25% of strokes originate in the extracranial ICA
- Asymptomatic disease has a low prevalence in the general population
  - <1% for adults less than 50 years old
  - 5-8% for patients >80 years old

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AbuRahma, Ali F., et al. "Society for Vascular Surgery Clinical Practice Guidelines for Management of Extracranial Cerebrovascular Disease." *Journal of Vascular Surgery*, 2021.

Extracranial Carotid Stenosis

- Society for Vascular Surgery (SVS) recommends against screening of asymptomatic low risk patients
  - “Presence of carotid bruit does not warrant screening”

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AbuRahma, Ali F., et al. “Society for Vascular Surgery Clinical Practice Guidelines for Management of Extracranial Cerebrovascular Disease.” *Journal of Vascular Surgery*, 2021. https://vascular.org/referral-resources/who-refer/patients-carotid-disease

Extracranial Carotid Stenosis

- Who should be screened?
  - Patients >65yo with significant risk factors
    - Smoking history
    - CAD
    - HLD
- How should patients be screened?
  - **Carotid duplex**

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Extracranial Carotid Duplex

- Evaluates the subclavian & vertebral arteries
- Evaluates the CCA, ICA & ECA

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Extracranial Carotid Duplex – Stenosis Criteria

	Primary Parameters		Additional Parameters	
Degree of Stenosis (%)	ICA PSV (cm/sec)	Plaque Estimate (%)	ICA:CCA PSV Ratio	ICA EDV (cm/sec)
Normal	<180	None	<2.0	<40
<50%	<180	<50	<2.0	<40
50-69%	180-230	>50	2.0-4.0	40-100
70-99%	>230	>50	>4.0	>100
Near-occlusive	High, low or undetectable	Visible; "string sign"	Variable	Variable
Total occlusion	Undetectable	Visible; No lumen detected	NA	NA

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Criteria for referral

- Asymptomatic patients with >50% stenosis
- **Any symptomatic patient STAT**
  - Intervention recommended within 2 weeks of symptoms!
- Non-atherosclerotic disease
  - Fibromuscular dysplasia
  - Carotid body tumor
  - Carotid aneurysm
  - Carotid dissection

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Criteria for referral

- Once disease is detected, **symptoms** should be screened for
  - Amaurosis fugax
  - Speech slurring
  - Word-finding difficulty
  - Facial droop
  - Unilateral weakness
  - Unilateral paresis
  - Unilateral sensory change

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What happens next?

- Interventions
  - Smoking cessation
  - Management of comorbidities
    - HTN, DM, CAD
  - Medications
    - Statin, Anti-platelet
- Routine surveillance
  - Duplex every 6-12mo

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What happens next?

- Determination of procedural intervention
  - 70-99% stenosis or near-occlusion
  - Symptomatic

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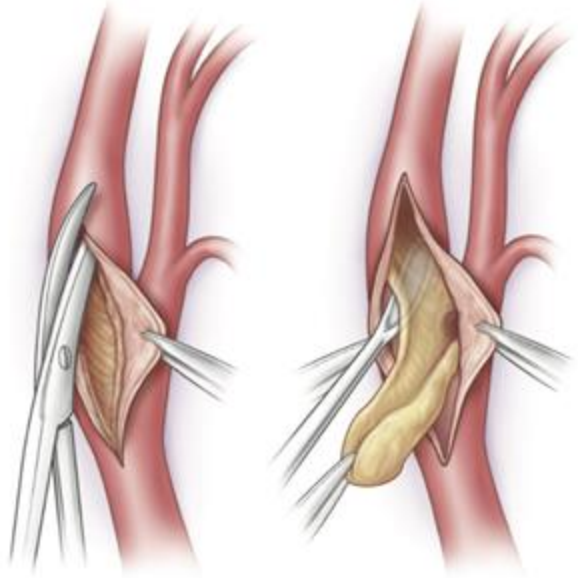
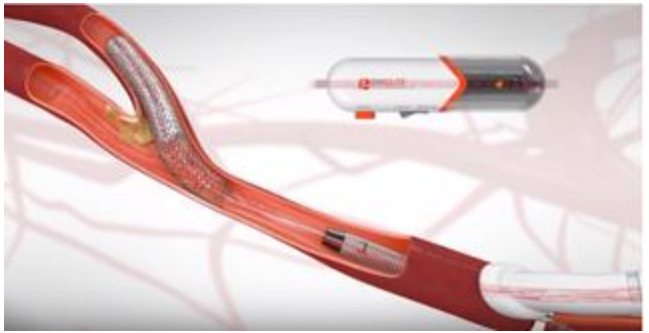
What happens next?





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    - HTN, DM, CAD
  - Medications
    - Statin, ASA, +/- Plavix
- Follow-up studies
  - Carotid duplex

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Venous Causes of Leg Swelling

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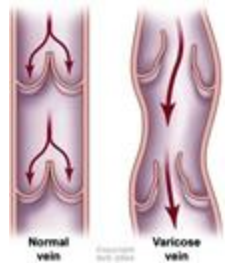
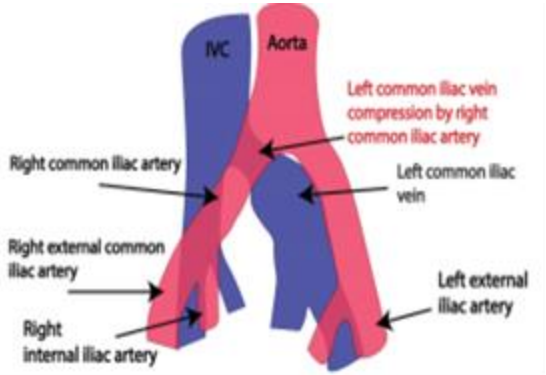
Venous Disease

- Functional
  - Venous reflux of deep or superficial veins
- Obstructive disease
  - Thrombotic (DVT)
  - Non thrombotic (May Thurner, external compression, scarring, surgical ligation, etc





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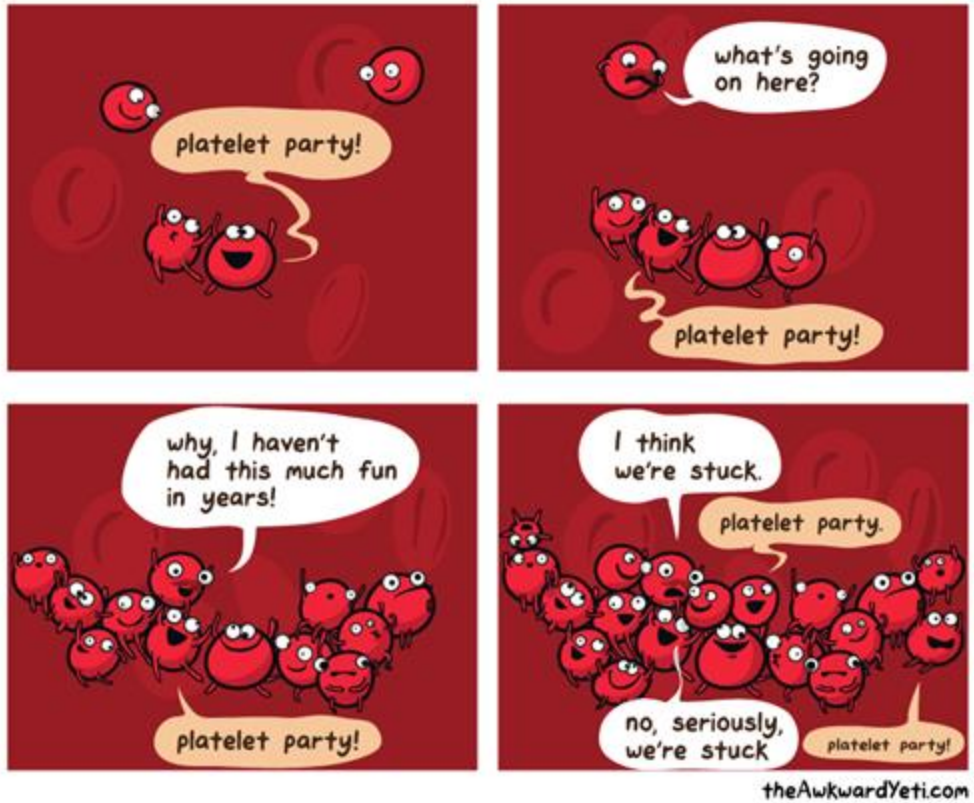
https://vascular.org/patient-resources/vascular-conditions/varicose-veins

Thrombotic- Deep Venous Thrombosis

- Symptom onset typically quick
- Leg pain, swelling, bluish/purple
- Infrainguinal (fempop)
  - treat with anticoag
- Iliofemoral
  - Anticoag +/- mechanical thrombectomy/lysis



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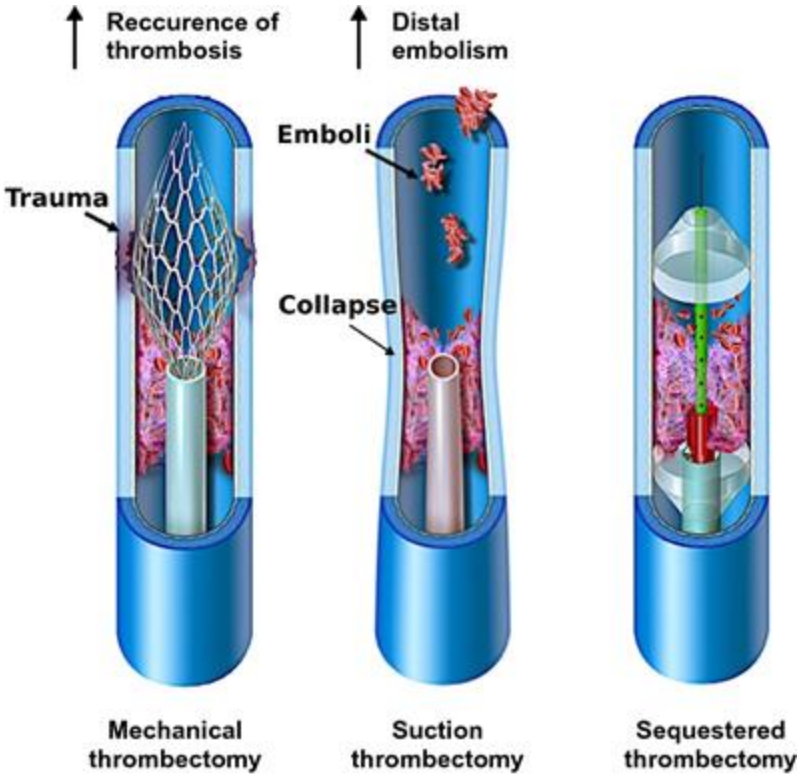
Surgical Treatment

- Many device now
- Usually do not need overnight lysis
- Decrease PTS rates after intervention only in Iliofemoral DVT
- RARE IVC filter
  - Only if anticoagulation not tolerated
  - If filter in place refer for removal!!!



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Non Thrombotic Obstructive

- External Compression
- Iliac artery
- Post surgical scar
- Chronic inflammation

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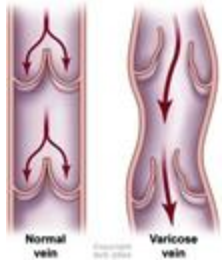
Functional Venous Insufficiency/Reflux



- Can occur in anyone
  - Major genetic component
  - More common in women
- Varicose veins are present in up to 35% of people in the U.S.

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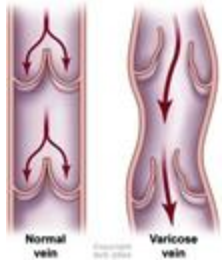
https://vascular.org/patient-resources/vascular-conditions/varicose-veins

Criteria for referral



- Symptoms present
  - Leg swelling/edema
    - Separate from heart failure
  - Pain, itching, burning
  - Leg heaviness/tiredness
  - Skin discoloration
  - **Ulcerations**
    - Distinguish from arterial ulcers
  - **Phlebitis**
    - Not a DVT
    - Anticoagulation indicated if >10cm in length
  - **Bleeding**

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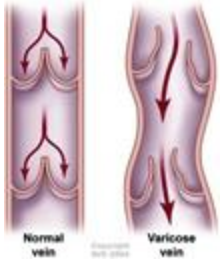
https://vascular.org/patient-resources/vascularconditions/varicose-veins

Criteria for referral



- Venous **insufficiency/reflux** duplex
  - Standard venous duplex looks for evidence of DVT
  - Trial of compression stockings-medical supply or OTC
  - knee high at least
  - 20-30 mmHg ideally
  - 6-12 weeks
- Presence of active ulcers/recent bleed – more urgent intervention

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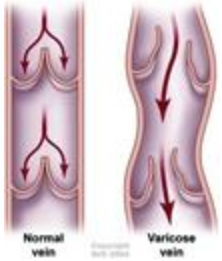
AbuRahma, Ali F., et al. "Society for Vascular Surgery Clinical Practice Guidelines for Management of Extracranial Cerebrovascular Disease." *Journal of Vascular Surgery*, 2021. https://vascular.org/referral-resources/who-refer/patients-carotid-disease

What happens next?



- Superficial venous insufficiency present in GSV or SSV
- “Failure” of compression stockings

- GSV or SSV Ablation – RFA, VenaSeal
- Sclerotherapy
- Phlebectomy
- High ligation

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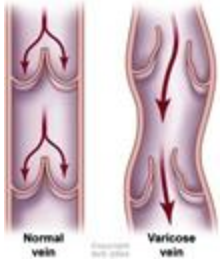
Post-operative care & surveillance



- Post-procedure venous duplex
- Follow-up as needed

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Thank you

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