2019 MID-ATLANTIC
CONFERENCE

9th ANNUAL CURRENT CONCEPTS IN
VASCULAR THERAPIES

2019

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May 3rd 2019

Treatment of Truncal Veins in 2019

Disclosures

Outline

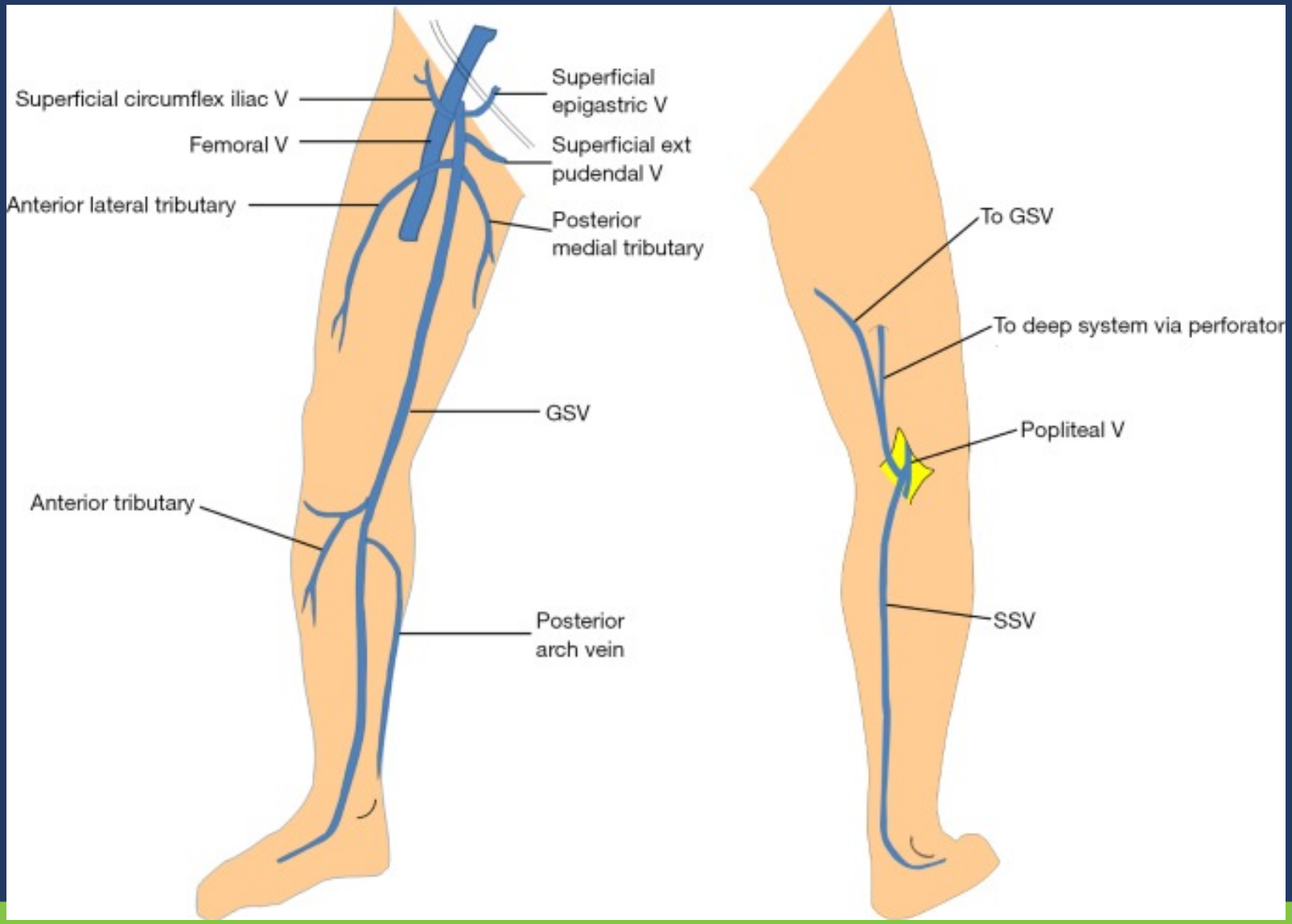
- What are Truncal Veins?
  - Venous anatomy
- Treatment options for Truncal Veins
  - Surgical
  - Endovascular

Venous Leg Anatomy

- Venous anatomy in the leg can be divided into three major components
  - **Superficial venous system**
    - Thin walled
    - Thick walled - AKA **"Truncal veins"**
      - **Greater Saphenous Vein (GSV)**
      - **Short Saphenous Vein (SSV)**
  - **Deep venous system**
  - **Perforating veins**

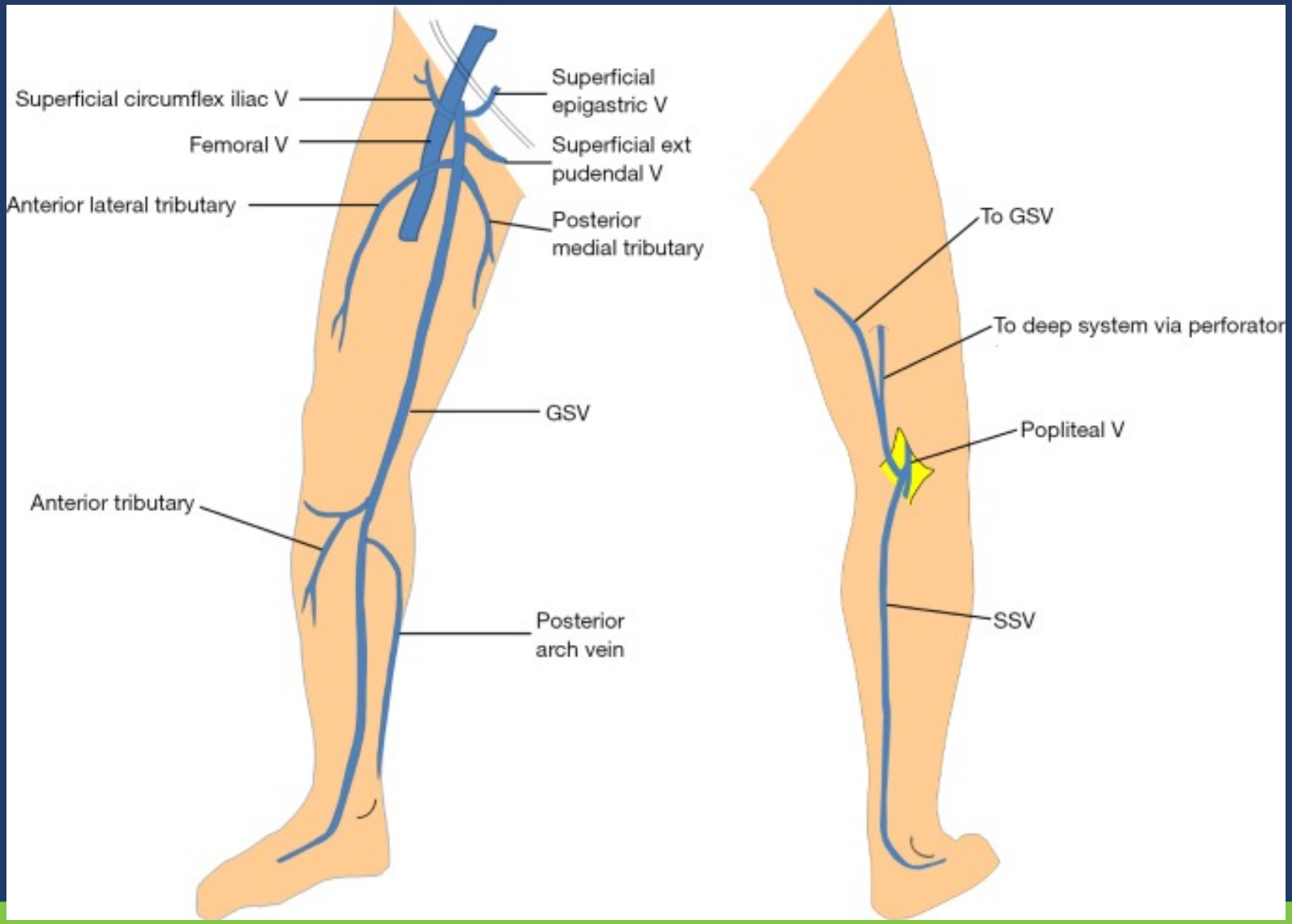
Superficial Venous System

- GSV
  - Continuation of the dorsal venous arch in the foot
  - Travels anterior to the medial malleolus and ascends in along the medial aspect of the lower extremity and drains into the deep system via the saphenofemoral junction
  - GSV can be congenitally duplicated in approximately 1%
  - Harvested for coronary bypass and vascular surgery


Superficial circumflex iliac V
Femoral V
Anterior lateral tributary
Superficial epigastric V
Superficial ext pudendal V
Posterior medial tributary
GSV
Anterior tributary
Posterior arch vein
To GSV
To deep system via perforator
Popliteal V
SSV

Superficial Venous System

- SSV
  - Begins on the lateral aspect of the foot
  - Travels posterior to the lateral malleolus and ascends along the posterior midline
  - In 2/3 of patient the SSV terminates at popliteal fossa to form the saphenopopliteal junction
  - In 1/3 of patients its course is variable:
    - Posterior medial tributary of the GSV, directly into the GSV as the thigh extension of the SSV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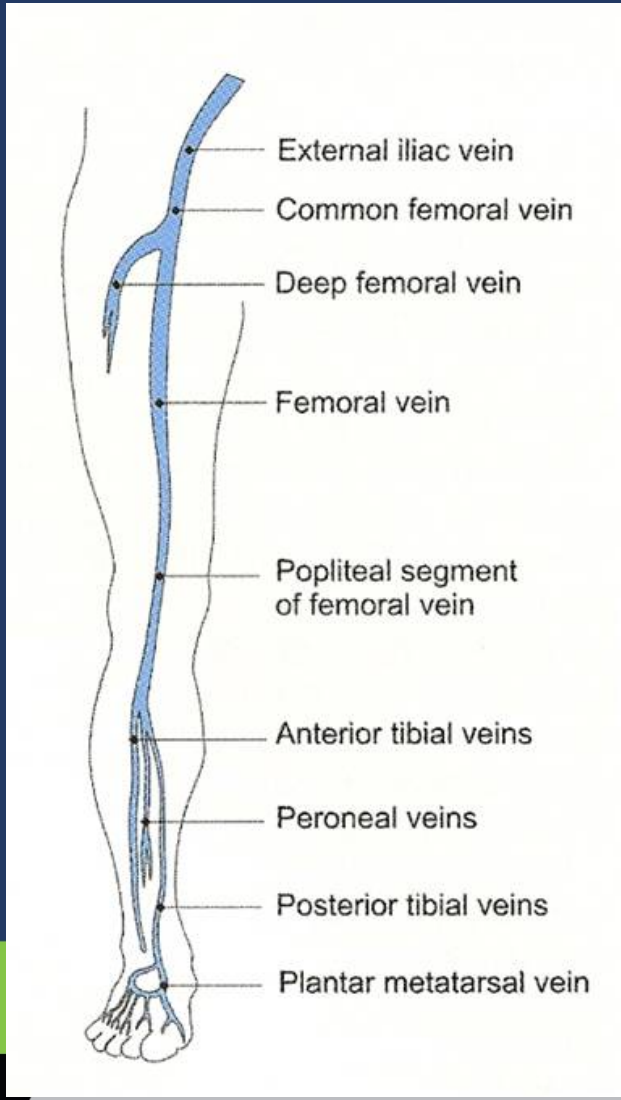
Anterior tributary
Posterior arch vein
To GSV
To deep system via perforator
Popliteal V
SSV

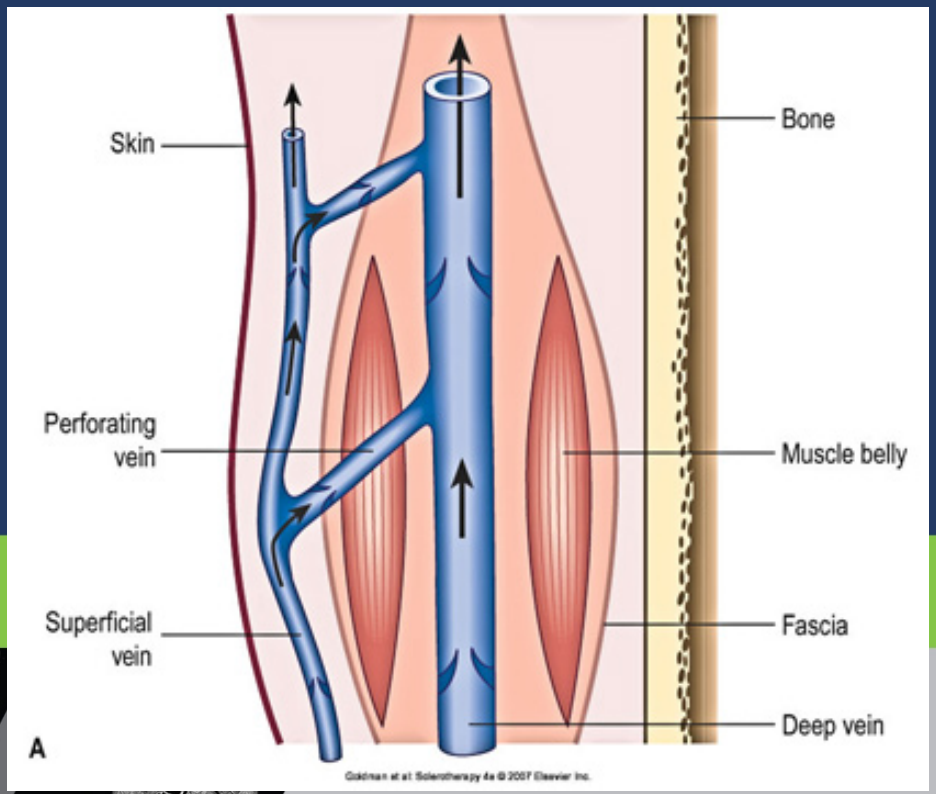
Deep Venous System

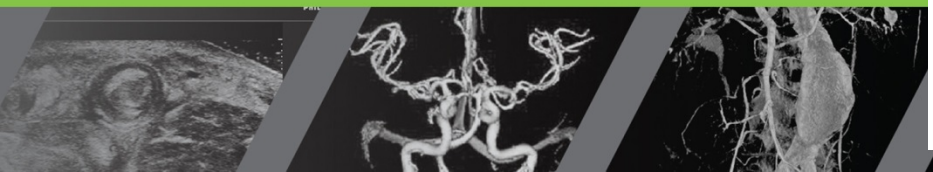
- Deep Venous System
  - Plantar vein (foot)
  - Tibial veins (lower leg)
    - Peroneal
    - Anterior tibial
    - Posterior tibial
  - Popliteal vein (knee)
  - Femoral veins (thigh)



Perforating Venous System

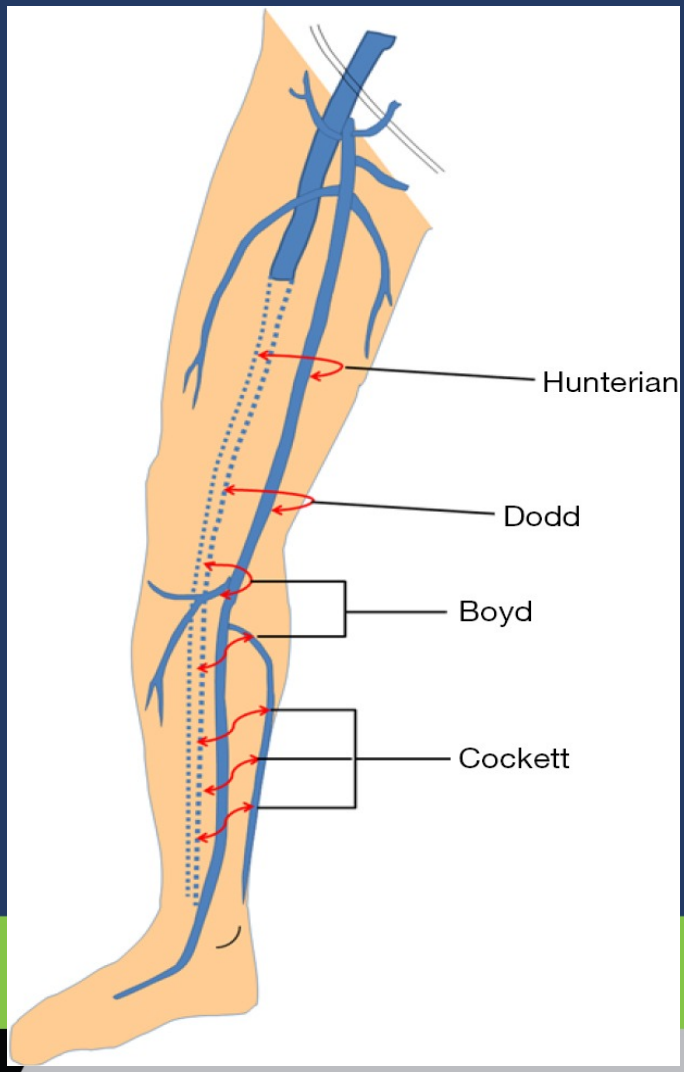
- Perforating Venous System
  - Bridging channels between the superficial and deep venous systems
  - Important role in equilibrating blood-flow during calf muscle contraction





Perforating Venous System

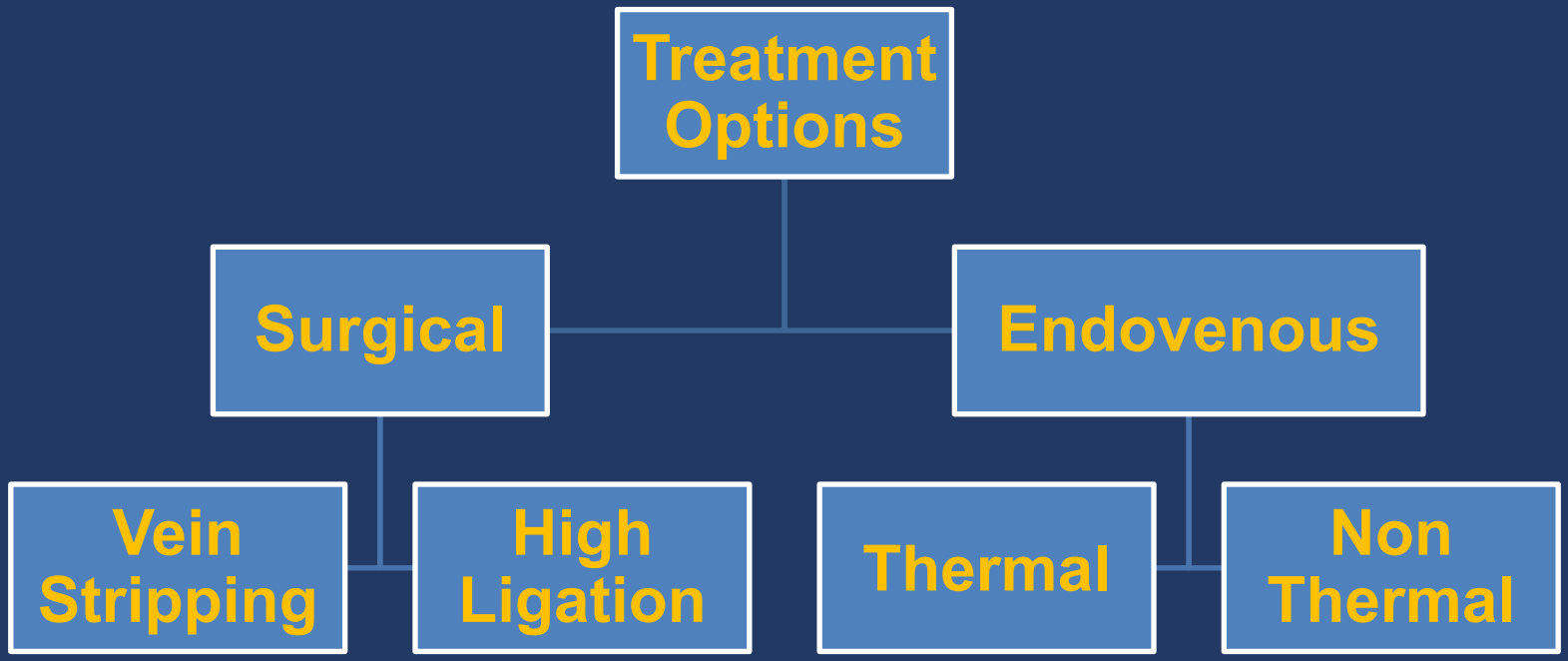
- Perforating Venous System
  - 4 important perforator groups
    - Upper thigh (Hunterian)
    - Lower thigh (Dodd's)
    - Knee (Boyd's)
    - Calf (Cockett's)



Outline

- ~~What are Truncal Veins?~~
  - ~~Venous anatomy~~
- Treatment options for Truncal Veins
  - Surgical
  - Endovascular

Treatment of Truncal Veins

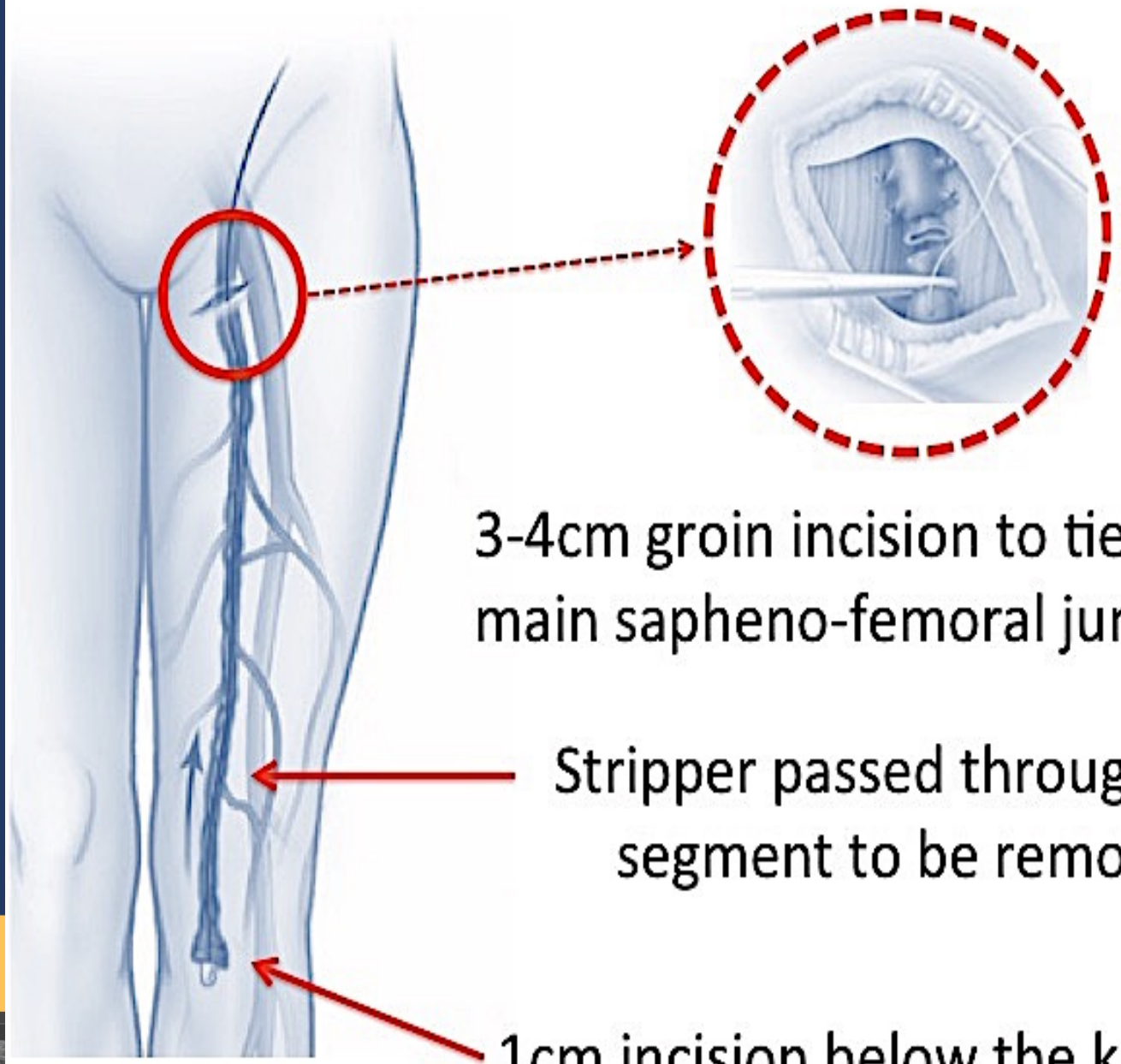


Surgical Treatment of Truncal Veins

- **Vein Stripping**
  - Removal of GSV or SSV
  - Outpatient but performed under General or Spinal anesthesia
  - 30 min to 1 hour
  - Requires groin incision and 1-2 counter-incisions (knee or ankle)

Surgical Treatment of Truncal Veins

- **Vein Stripping**
  - Surgeon will then thread a thin, flexible plastic wire into the vein through your groin and guide the wire through the vein toward the other cut farther down your leg
  - The wire is then tied to the vein and pulled out through the lower cut, which pulls the vein out with it



3-4cm groin incision to tie off the main sapheno-femoral junction

Stripper passed through vein segment to be removed

1cm incision below the knee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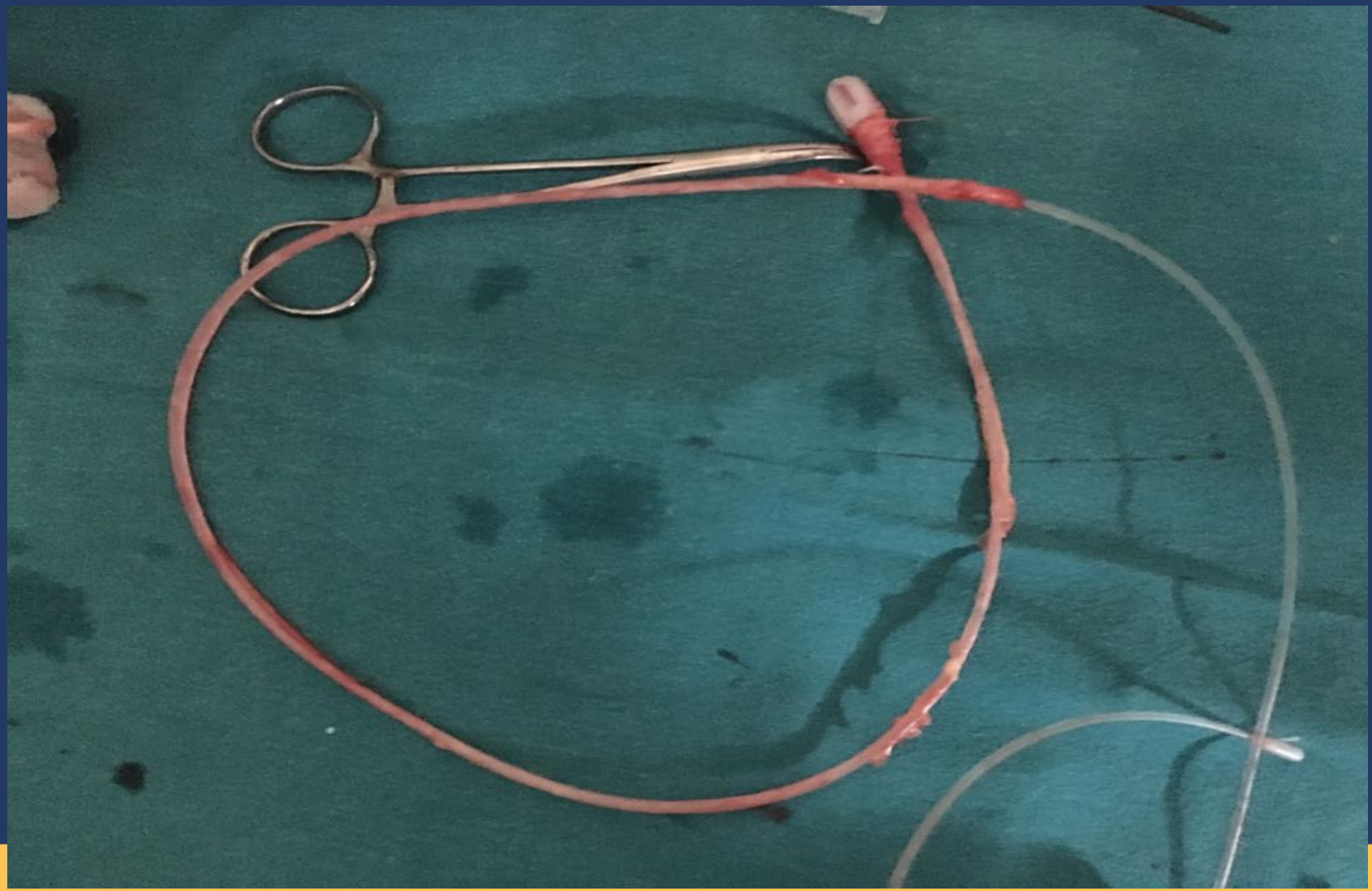


The
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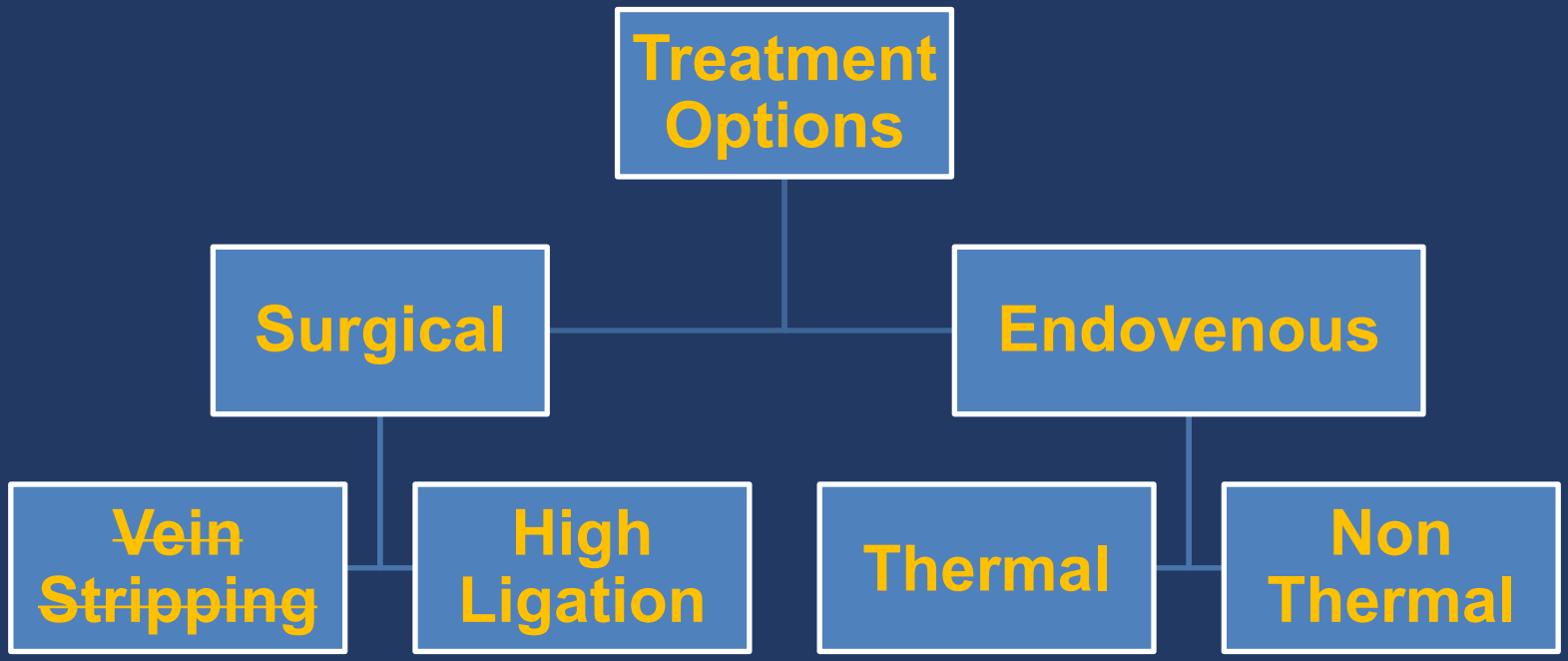
Surgical Treatment of Truncal Veins

- **Does Vein Stripping work?**
  - Yes……but has a high recurrence rate of 20-60% after 5 years and even high after longer periods of time
  - Causes of recurrence
    - Progression of disease
    - Inadequate initial surgery
    - Neovascularization around the stump of the great or short saphenous veins or to the development of incompetence in pre-existing collateral

Surgical Treatment of Truncal Veins

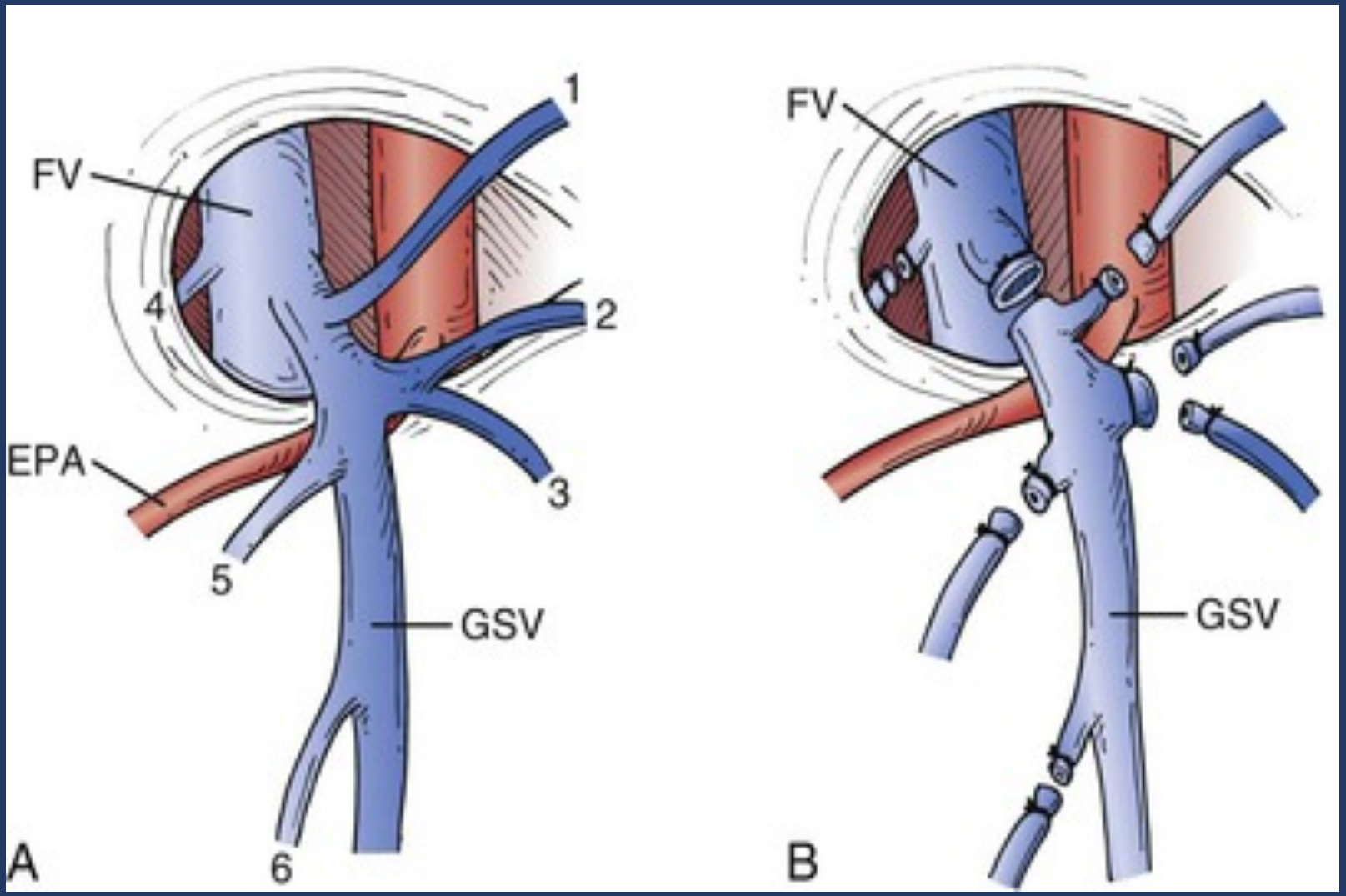
- **Vein Stripping**
  - I believe is……..
    - Barbaric
    - Historical Value Only
    - No indication
    - Leave Doctor's office immediately

Treatment of Truncal Veins



Surgical Treatment of Truncal Veins

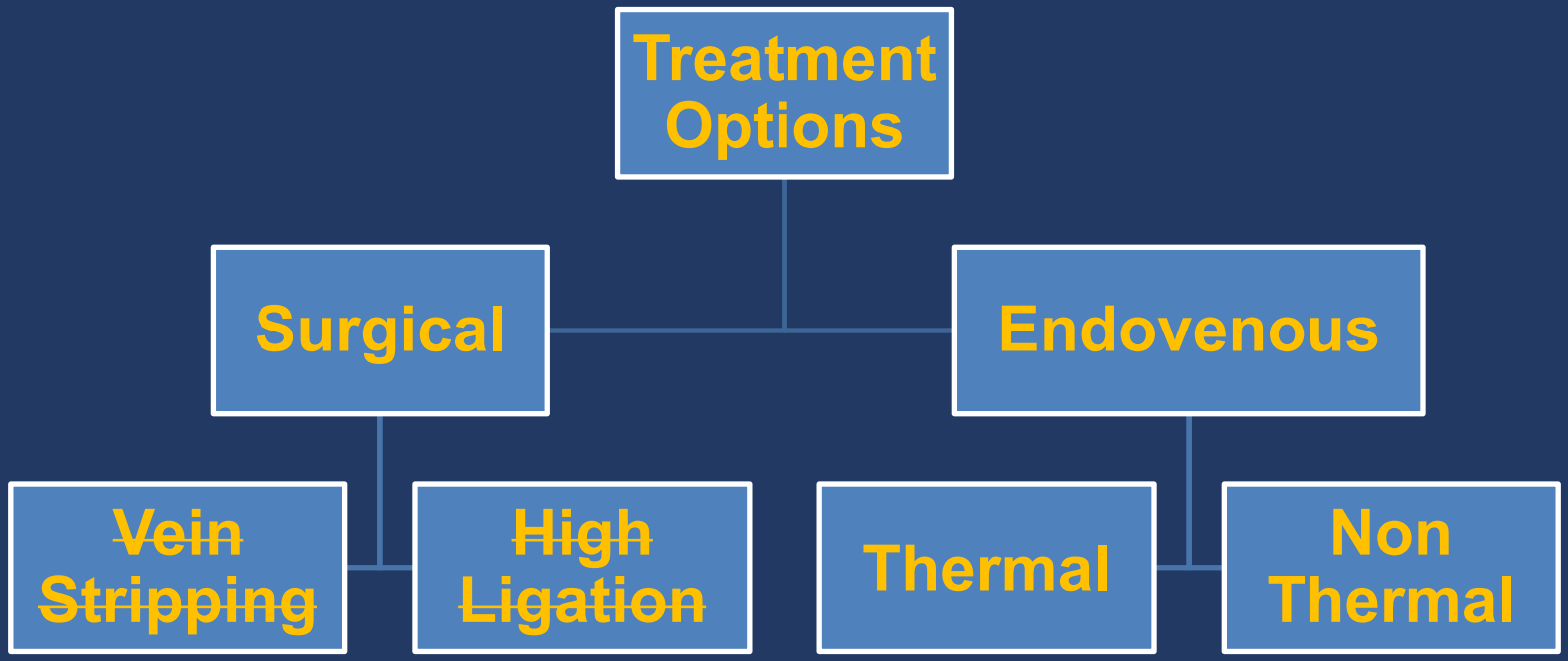
- **High Ligation**
  - Ligation and division of the GSV at the saphenofemoral junction
  - Ligation and division of the SSV at the saphenopopliteal junction
  - Outpatient surgery performed under local with sedation
  - 15 to 30 min
  - Single incision (groin or posterior knee)


FV
1
2
3
4
5
6
EPA
GSV
A
FV
GSV
B

Surgical Treatment of Truncal Veins

- **Does High Ligation work?**
  - Yes……but has a high recurrence rate also
  - Can be done in conjunction with vein stripping
  - There is still a role for high ligation

Treatment of Truncal Veins



Endovenous Treatment of Truncal Veins

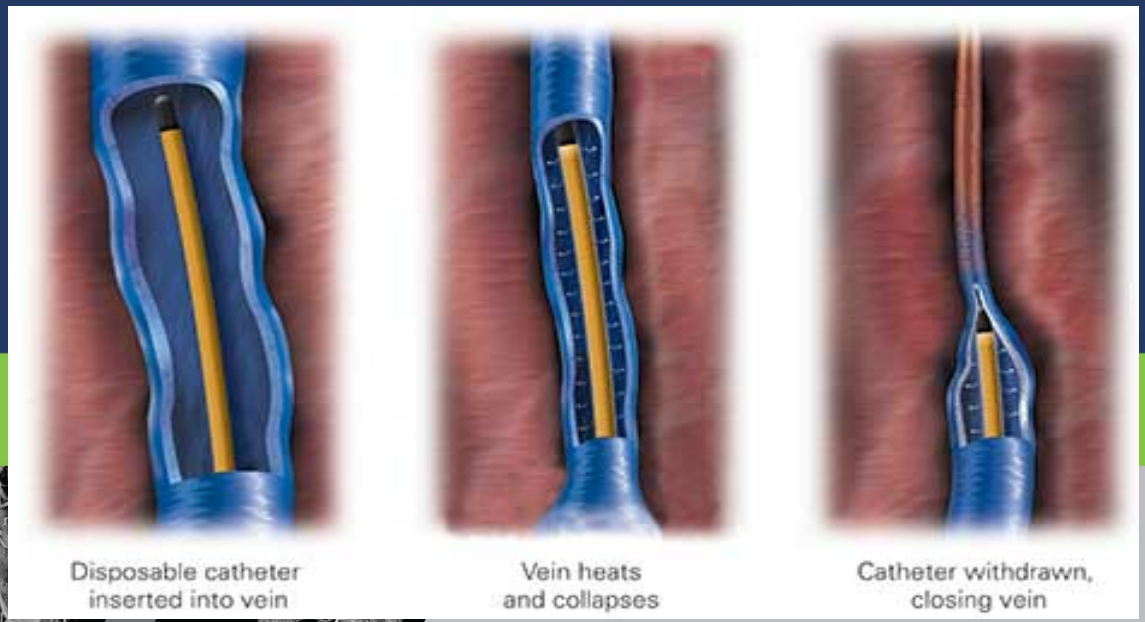
- **Thermal Tumescent (TT)**
  - Endovenous Laser Ablation (EVLA) - VenaCure
  - Endovenous Radiofrequency Ablation (RFA) - ClosureFast
  - Endovenous Steam Ablation (EVSA)
    - Under investigation in Oslo, Norway
    - ClinicalTrials.gov Identifier: NCT02046967
    - Not available in USA

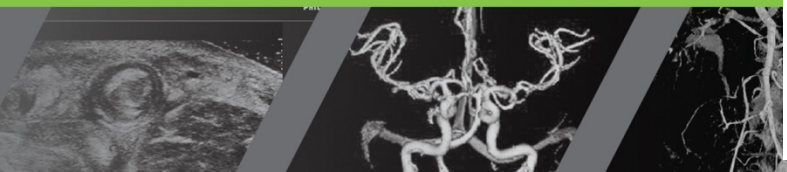
Thermal Tumescent (TT)

- Office based procedure
- Ultrasound guided vein access
- Sheath placement
- Catheter introduced and positioned 2-3cm proximal to SFJ/SPJ
- Injection of Tumescent
  - Mixture of saline, epinephrine, lidocaine and sodium bicarb

Thermal Tumescent (TT)

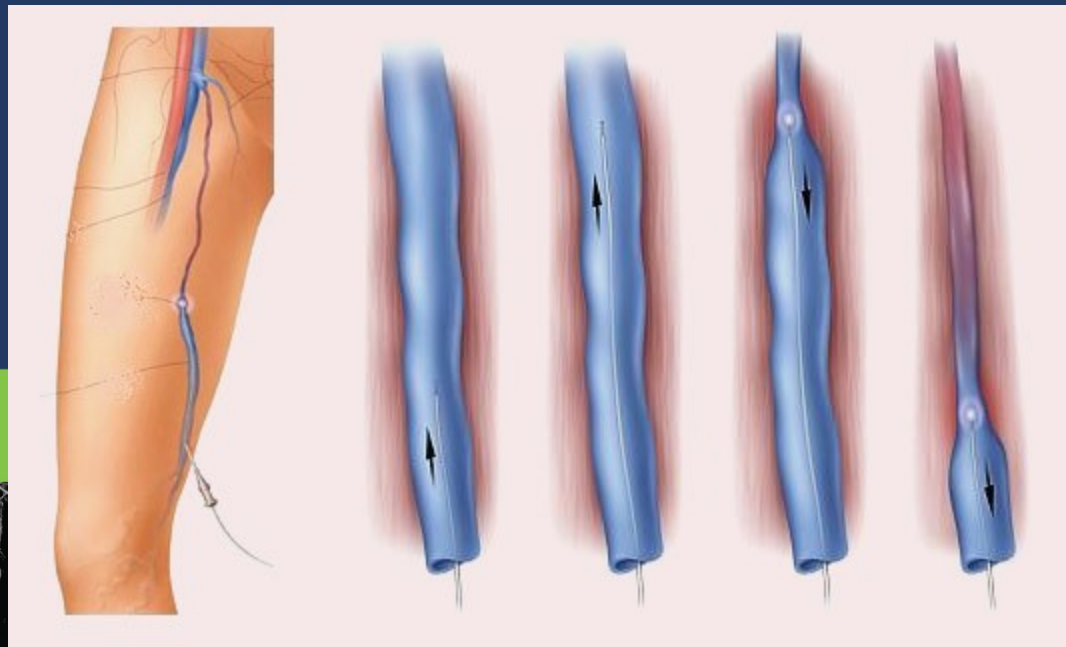
- **Mechanism**
  - RFA
    - Segmental (7cm) ablation
    - Denaturation of collagen matrix
    - Heat induced injury to vein
    - Fibrotic sealing of vessel lumen

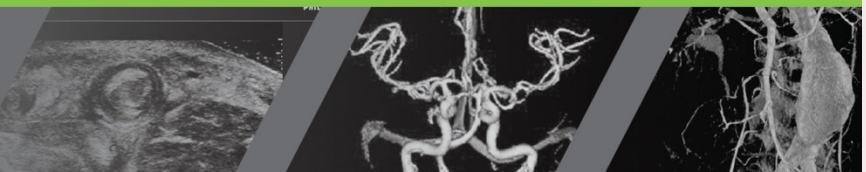




Thermal Tumescent (TT)

- **Mechanism**
  - EVLA
    - Continuous ablation
    - Formation of steam bubble to transmit heat to vein wall
    - Thrombosis of vein





EVLA/RFA vs Surgery

Eur J Vasc Endovasc Surg. 2012 Aug;44(2):214-23. doi: 10.1016/j.ejvs.2012.05.017. Epub 20

A systematic review and meta-analysis of randomised controlled trials comparing endovenous ablation and surgical intervention in patients with varicose vein.

Siribumrungwong B[1], Noorit P, Wilasrusmee C, Attia J, Thakkinstian A.

- Conclusion:
  - Similar success rate to surgery
  - Less post-operative pain
  - Less complication
  - Early return to work
  - Better quality of life

EVLA vs RFA

Ann Surg. 2011 Dec;254(6):876-81. doi: 10.1097/SLA.0b013e318230af5a.

A prospective double-blind randomized controlled trial of radiofrequency versus laser treatment of the great saphenous vein in patients with varicose veins.

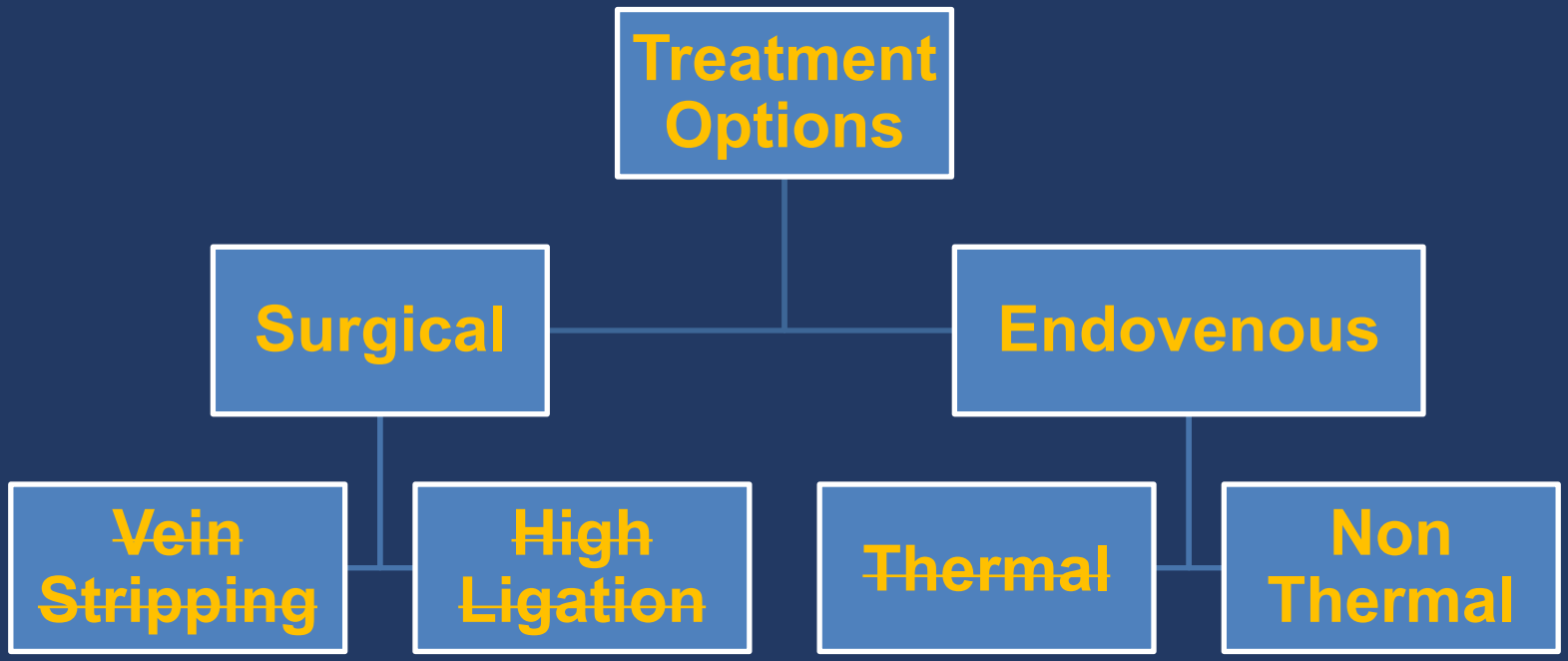
Nordon IM[1], Hinchliffe RJ, Brar R, Moxey P, Black SA, Thompson MM, Loftus IM.

- Conclusion:
  - RFA and EVLA offer comparable vein occlusion rates with neither modality proving superior
  - RFA associated with less post procedural pain, analgesic requirement and bruising

Thermal Tumescent (TT)

- **Limitations**
  - Risk of thermal injury
  - Need for multiple injections for tumescent
  - Post operative pain
  - Must wear compression post op (7-10 days)
  - Need for Generator ($$)

Treatment of Truncal Veins



Endovenous Treatment of Truncal Veins

- **Non-Thermal Non-Tumescent (NTNT)**
  - Mechanochemical Ablation (MOCA) - Clarivein
  - Cyanoacrylate Closure (CAC) – Venaseal
    - NT, NT, NS

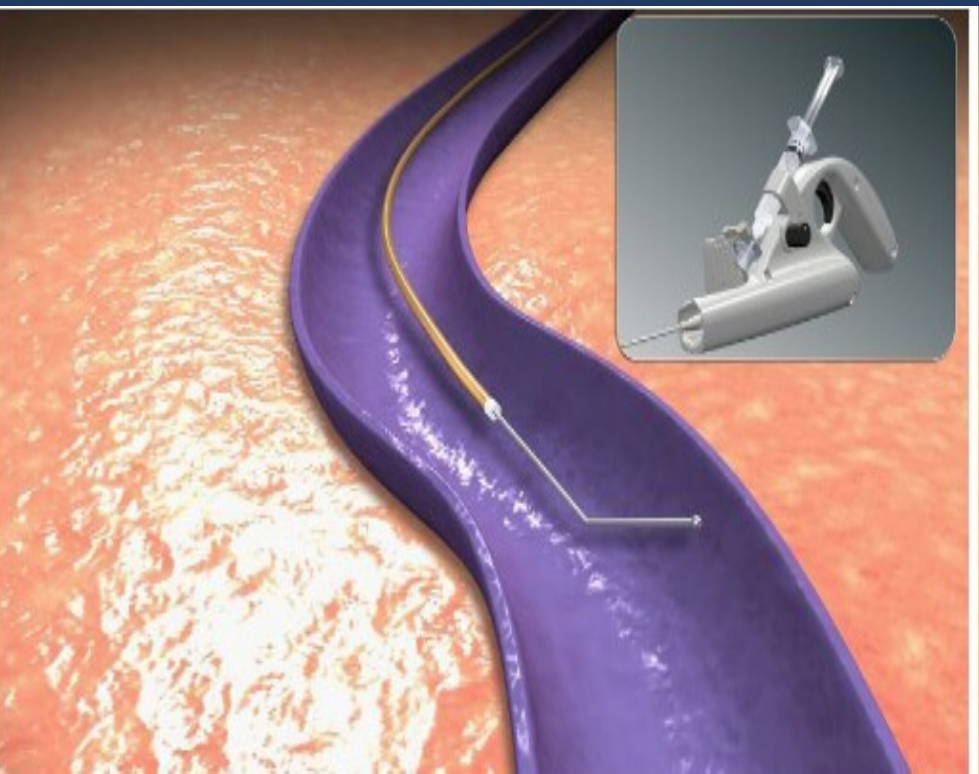
Non-Thermal Non-Tumescent (NTNT)

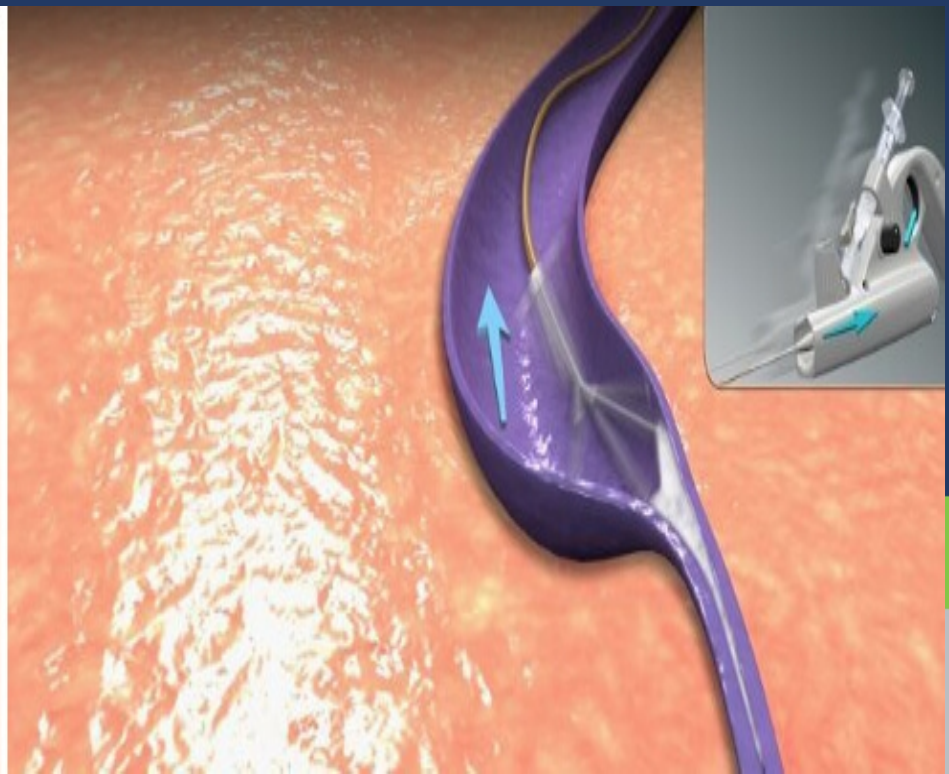
- **MOCA**
  - Office based procedure
  - Ultrasound guided vein access
  - Sheath placement
  - Catheter introduced and positioned proximal to SFJ/SPJ
  - Inject chemical sclerosant (Sotradecol) and cause mechanical abrasion
- NO TUMESCENT

Non-Thermal Non-Tumescent (NTNT)

- **Mechanochemical Ablation (MOCA)**
- First report in 2012
- Hybrid system
  - Infusing liquid sclerosant
  - Rotating wire within vein lumen at 3500 rpm
    - Causing intimal abrasion to allow better efficacy of sclerosant
- Pull down rate of 1-2mm/sec

MOCA





MOCA vs RFA

Trials. 2014 Apr 11;15:121. doi: 10.1186/1745-6215-15-121.

full text at BMC | PMC Full text

Mechanochemical endovenous Ablation versus RADiOfrequeNcy Ablation in the treatment of primary great saphenous vein incompetence (MARADONA): study protocol for a randomized controlled trial.

van Eekeren RR, Boersma D, Holewijn S, Vahl A, de Vries JP, Zeebregts CJ, Reijnen MM[1].

- Conclusion:
  - MOCA has an equal anatomic and clinical success rate compared to RFA at 1 year
  - MOCA causes less post procedural pain
  - MOCA showed earlier return to work and daily activities

MOCA

- **Benefits**
  - No thermal injury
  - No need for tumescent
  - Faster procedure
- **Limitations**
  - Lack of high quality long term data

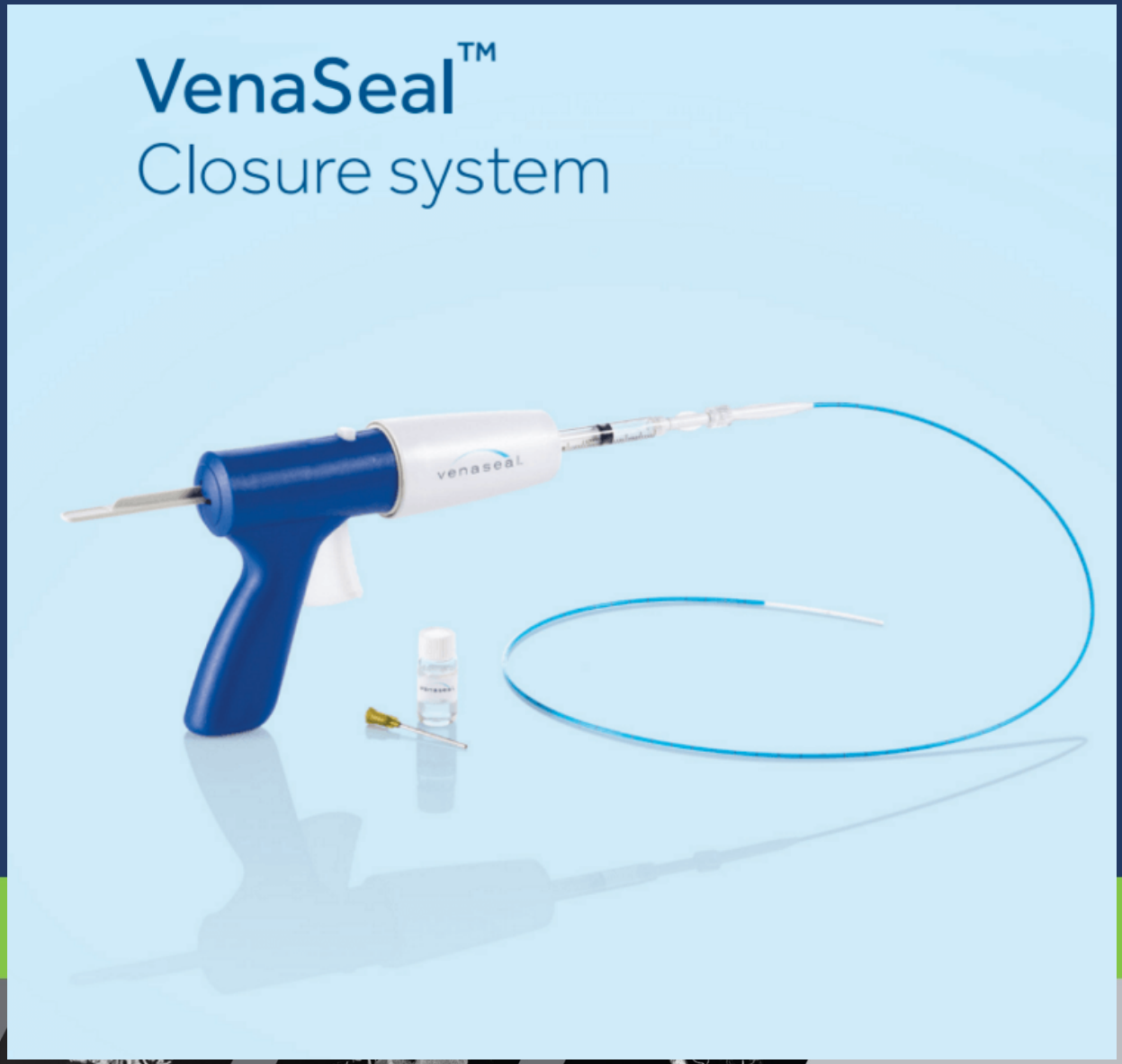
Non-Thermal Non-Tumescent (NTNT)

- **Cyanoacrylate Closure (CAC)**
  - Office based procedure
  - Ultrasound guided vein access
  - Sheath placement
  - Catheter introduced and positioned proximal to SFJ/SPJ
  - Inject cyanoacrylate and use external compression
- NO TUMESCENT

Non-Thermal Non-Tumescent (NTNT)

- **Cyanoacrylate Closure (CAC)**
  - Advance delivery catheter tip 5cm distal to SFJ
  - Proximal end of GSV is compressed with ultrasound probe
  - Inject glue and hold compression for 3 min
  - Then repeat injections with 30 seconds of compression for every 3 cm distally
  - Sheath and catheter removed and band-aid applied

CAC (Cyanoacrylate Closure)



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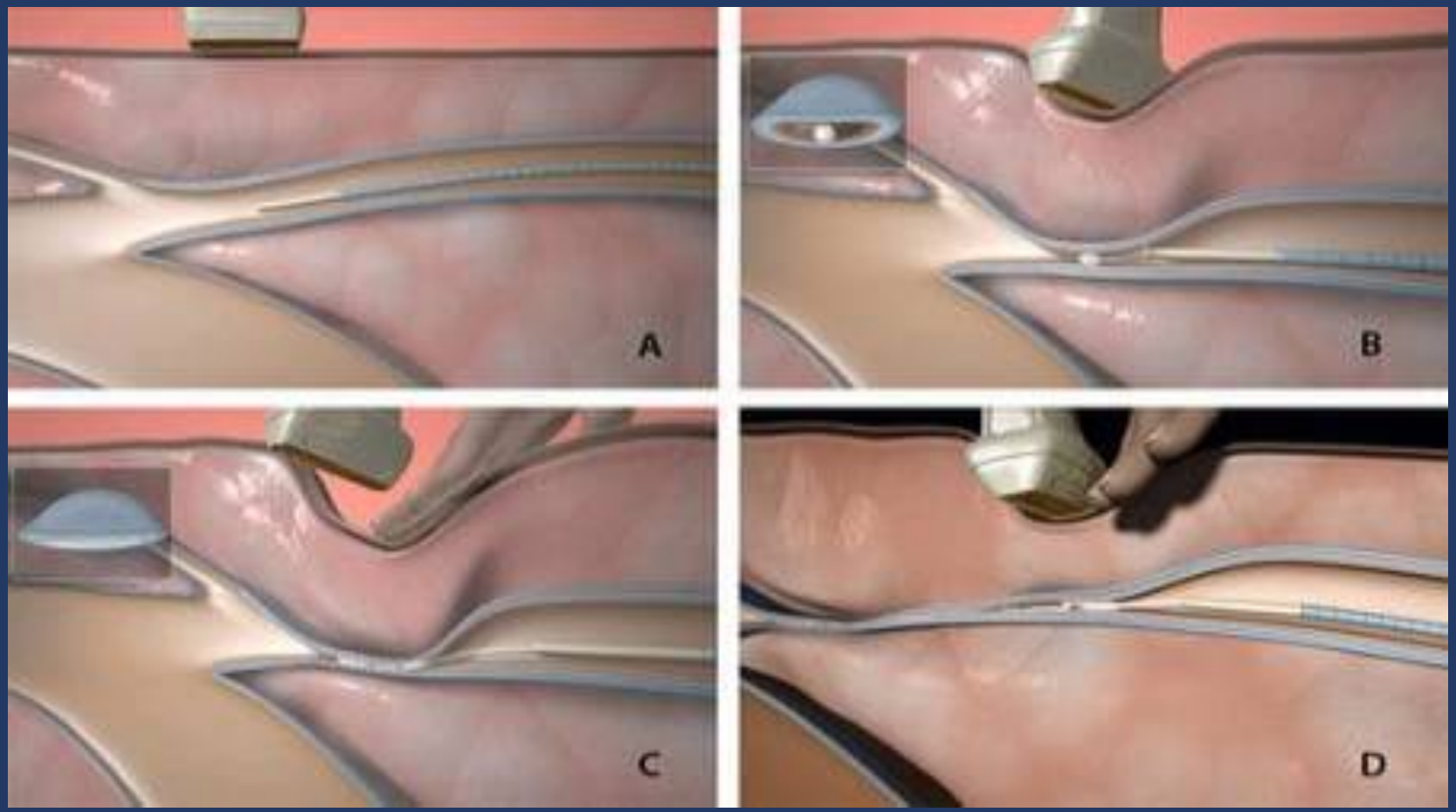

CAC vs RFA

J Vasc Surg Venous Lymphat Disord. 2018 Sep;6(5):606-613. doi: 10.1016/j.jvsv.2018.04.009. Epub 2018 Jun 15.

Twenty-four month results from a randomized trial of cyanoacrylate closure versus radiofrequency ablation for the treatment of incompetent great saphenous veins.

Gibson K[1], Morrison N[2], Kolluri R[3], Vasquez M[4], Weiss R[5], Cher D[6], Madsen M[7], Jones A[8].

- Conclusion:
  - Both CAC and RFA were effective in closure of the target GSV, resulting in similar and significant improvements in the patient's quality of life through 24 months
  - These results suggest that CAC of the GSV is safe and durable out to 2 years

CAC vs RFA

Phlebology. 2018 Nov 7:268355518810259. doi: 10.1177/0268355518810259. [Epub ahead of print]

Comparison of cyanoacrylate closure and radiofrequency ablation for the treatment of incompetent great saphenous veins: 36-Month outcomes of the VeClose randomized controlled trial.

Morrison N[1], Kolluri R[2], Vasquez M[3], Madsen M[4], Jones A[5], Gibson K[6].

- Conclusion:
  - Safety and efficacy of cyanoacrylate closure (CAC) is equivalent to RFA at 36 months
  - The QOL outcomes were also sustained and similar between CAC and RFA

CAC

- **Benefits**
  - No thermal injury
  - No need for tumescent
  - Faster procedure
  - No need for compression post op
  - Return to work same day
- **Limitations**
  - Only approved by Medicare

Summary

- Surgical Treatment for Truncal Veins
  - No indication for vein stripping
  - High ligation and division still plays a role
- Endovenous Treatment for Truncal Veins
  - EVLA & RFA are the standard of care for now as they have proven safety and efficacy
  - MOCA & CAC are the “new kids” on the block
  - MOCA has limited long term data
  - In the future CAC may become standard of care

Thank You


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