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 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 patients the SSV terminates at the 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
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

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

- 4 important perforator groups
  - Upper thigh (Hunterian)
  - Lower thigh (Dodd’s)
  - Knee (Boyd’s)
  - Calf (Cockett’s)
Outline

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Treatment of Truncal Veins

Treatment Options

Surgical
- Vein Stripping
- High Ligation

Endovenous
- Thermal
- Non Thermal
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
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

Treatment Options

Surgical
- Vein Stripping
- High Ligation

Endovenous
- Thermal
- Non Thermal
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)
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

Treatment Options

Surgical
- Vein Stripping
- High Ligation

Endovenous
- Thermal
- Non Thermal
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
Conclusions:

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

Treatment Options

Surgical
- Vein Stripping
- High Ligation

Endovenous
- Thermal
- Non Thermal
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

• 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)

VenaSeal™
Closure system
CAC (Cyanoacrylate Closure)
CAC vs RFA

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

Gibson K¹, Morrison N², Kolluri R³, Vasquez M⁴, Weiss R⁵, Cher D⁶, Madsen M⁷, Jones A⁸.

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


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 N¹, Kolluri R², Vasquez M³, Madsen M⁴, Jones A⁵, Gibson K⁶.

• 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