How to deal with the small saphenous vein network

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Disclosures

Current Research Grants
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Polidocanol and STS foam, as referred to in this presentation, may be considered “off-label” or not approved by FDA
SSV Physiologic Considerations

CW Doppler information wrong 10-25% time, even in the best hands
Must rely on duplex pre-op or intra-op to reliably identify SPJ
~10% of CVI patients have SSV involvement only
~20-30% of CVI patients have SSV reflux in addition to other reflux (depends on institutional bias)

higher in C5-C6 patients

SSV Physiologic Considerations

45%-75% of patients with SSV reflux also have Pop.v. or Fem.v. reflux
Usually resolves with SSV treatment

One-third of patients with GSV reflux also have SSV reflux

Lateral malleolar ulcers suggest SSV reflux

Giacomini vein incompetence more likely if SSV and GSV incompetent (odds ratio 11.99)

SSV Anatomic Considerations

SSV in fascial plane between gastroc bellies  
USG tumescence works well

Sural n. generally lateral to SSV

Common peroneal and posterior tibial nerves  
near cephalad portion of SSV

Termination of SSV variable

60%-75% join Pop.v. or Fem.v. near popliteal fossa
25% terminate in deep or superficial system  
cephalad to popliteal fossa

SSV rarely duplicated

The Vein Book – Chapter 32
SSV Anatomic Considerations

Popliteal Area Veins

Seen in 40% of cases

Single dilated varicose vein or cluster of veins arising lateral or central popliteal space

Termination at popliteal vein, or more frequently the SSV

May also merge with gastrocnemius v.

Popliteal Vein

often duplicated

Dodd H. Br J Surg 1965;52:350–4
SSV Anatomic Considerations

Gastrocnemius veins
join pop v or SSV

Giacomini vein – variable termination and often incompetent, esp. with GSV/SSV reflux

“The significant variability in the site of the saphenopopliteal junction [if existent] when combined with the potential for significant nerve injury may temper enthusiasm for surgical treatment.”

Small Saphenous Vein Surgical Technique

Pt in prone position with knees flexed
Flush ligation with deep vein mandatory
Transverse incision in popliteal fossa based on duplex exam
Stripping to mid calf only – minimize risk of sural n. damage

Small Saphenous Vein Stripping
Results

Recurrence:
52% at 3 years

Complications – not well-defined
DVT
Nerve damage
Both “undefined”

The Vein Book – Treatment of Small Saphenous Vein Reflux, Myers K, Clough A
Objectives:

incidence of common peroneal nerve (CPN) injury following short saphenous vein surgery (SSV)

Methods:

Retrospective review of sixty-four patients

Results:

Three patients (4.7%) developed a CPN injury
One patient recovered fully after 24 hrs
Two patients’ symptoms recovered within six months
All had a saphenopopliteal junction (SPJ) located above the popliteal skin crease

Conclusions:

CPN injury during SSV surgery occurs with an appreciable frequency
There is a need for a revised approach to the management of SSV disease, possibly incorporating less-invasive techniques such as endovenous ablation

Surgical Treatment of Truncal Reflux

“Older methods requiring inpatient care, general anesthesia, long operating time, radical avulsion of varicose veins, and stripping of varicose veins to the ankle can be largely abandoned”

J Bergan

Endovenous Thermal Ablation

Ultrasound-Guided Tumescent Anesthesia

Courtesy: Rob Min, MD
Endovenous Thermal Ablation

Tip of fiber/catheter inferior to SPJ
Endovenous Thermal Ablation

Local anesthetic injected anterior and posterior to fiber/catheter in SSV
SSV Thermal Ablation
Efficacy

Methods:
65 patients (68 limbs)
Varicosities due to primary or recurrent SPJ and SSV reflux underwent out-patient EVLA mid-calf to SPJ
AVVSS, time to return to normal activity, post-EVLA analgesic requirements, and complications

Results:
Duplex ultrasound follow-up (median 6-months) confirmed abolition of SPJ/SSV reflux in all limbs
AVVSS improved at three months (p < 0.001)
Median time to normal activity was 0 days (65% returned to normal daily activity immediately)
No instances of skin burns or DVT
3 patients (4.4%) developed transient cutaneous numbness (sural nerve)
SSV Endovenous Thermal Ablation

Retrospective review
- all consecutive EVLA over a 39-month period at three centers
- 810- or 980-nm diode laser in continuous mode sparing the deep, most cephalad segment of the SSV
- EVLA for 67 incompetent SSVs in 63 patients

Follow-up
- patient symptoms, physical examination, and duplex ultrasound

Results:
- Immediate technical success and occlusion of the treated vein at 1–2 weeks was 100%.
- Duplex exam 243 ± 65 days
- Clinical follow-up (243 ± 66 days) showed symptomatic improvement in 66 (99%) of 67 patients
- One patient had recanalization with recurrent reflux by ultrasound (2%)

Complications
- one case of paresthesias lasting beyond 1 month (2%)
- three cases of superficial phlebitis (4%)
- no deep vein thrombosis, skin burns, or other complications

Discussion:
- Although ablation involved only the superficial portion of the SSV and spared its deep segment in the popliteal fossa, SSV occlusion typically extended up to the saphenopopliteal junction or to a gastrocnemial collateral, without popliteal vein involvement

Conclusion:
- EVLA of the SSV is safe and effective when the saphenopopliteal junction and popliteal fossa are avoided

d’Othe’e BJ, et al. Cardiovasc Intervent Radiol 2010
SSV Endovenous Thermal Ablation

Objective:
Assess efficacy and complications of endovenous laser treatment (EVLT) of short saphenous vein (SSV)

Methods:
17-month period, 210 SSVs (187 patients) treated with EVLT (980-nm) Duplex ultrasound examinations within the first week, and 2 to 11 months after the procedure (mean follow-up, 4 months).
Clinical examinations at 2 weeks and 6 weeks.
Patients assessed for DVT, nerve injury, and symptom resolution.

Results:
All procedures were technically successful
126 patients (60%) completed final follow-up scanning
96% of SSVs closed

Complications:
3 pts (1.6%) numbness at the lateral malleolus at 6-week follow-up
DVT (tail of thrombus protruding into the popliteal vein) noted in 12 limbs (5.7%) at the 1-week follow-up examination.
Treated with 3 days to 3 months of fractionated heparin and Coumadin
No DVT extensions or pulmonary emboli
Pts with SPJ and no thigh extension was positive predictor for DVT

Conclusions:
Intermediate-term results of EVLT of the SSV demonstrate efficacy at eliminating SSV reflux and affording symptomatic relief
Incidence of nerve injury is low
Incidence of DVT is higher than reported for the great saphenous vein

Endovenous Laser Ablation of the Saphenous Veins: Bilateral Versus Unilateral Single-session Procedures

PURPOSE:
Feasibility of bilateral endovenous laser ablation (EVLA) of saphenous veins in a single session

MATERIALS AND METHODS:
122 consecutive EVLA procedures
75 unilateral procedures (n = 67) and 47 bilateral interventions (n = 45).
Tumescent anesthesia 0.1% lidocaine for unilateral procedures versus 0.05% for bilateral
lidocaine dose <4.5 mg/kg body weight
outcomes compared at 3–6-month

RESULTS:
Bilateral procedures performed successfully with low lidocaine dilutions with a similar success rate (96%) as unilateral procedures (100%)
No significant variation in systolic and diastolic blood pressure and heart rate between groups
No signs of lidocaine toxicity

CONCLUSIONS: Bilateral saphenous vein ablation in a single session appears safe and effective

SSV Foam Sclerotherapy (patient prone)
SSV Foam Sclerotherapy
Efficacy

Literature sparse

Darke:

23 SSVs treated
Duplex @ 6wks
All had “complete occlusion”

Coleridge-Smith (GSV/SSV)
# not specified for results
82% “obliterated” @ 6 mos or longer

Darke SG, Baker SJ. Br J Surg 2006;93:969–74
Coleridge P. Eur J Vasc Endovasc Surg 2006;32:577–83
Patient Reported Outcomes

296 pts – GSV/SSV
69% responded at 1 year
HRQOL measured:
  AVVSS
  SF-12

Conclusion:

Ultrasound-guided foam sclerotherapy for great and small saphenous varicose veins leads to significant improvements in generic and disease-specific HRQOL for at least 12 months after treatment

Objective:

Establish efficacy of ultrasound-guided foam sclerotherapy in producing occlusion of incompetent small saphenous veins

Methods:

105 incompetent SSVs
Duplex – SSV reflux >0.5 sec
Previous GSV Endovenous Ablation – 62%
Previous AP – 47%
1% Poli foam (4:1)
30-40mmHg compression – 3 weeks

SSV Foam Sclerotherapy
Efficacy

Results:

82/105 SSVs = 78%

Mean 3.2cc foamed sclerosant

Mean 1.9 injection sessions

Mean follow up duplex – 7.5 mos
Results:

10 SSVs initially occluded found to be partially patent at later scan.

Mean: 21.4 weeks

All 10 retreated with mean 1.3 sessions, and 9/10 closed again.
Post Treatment Care

Compression:
Immediate, prior to ambulation
30-40mm Hg thigh/panty (? 2 pair)
? Short stretch wraps
? Duration (1-3 wks)
? Days only

Activity
Immediate/continued ambulation
Return to aerobic exercise
Endovenous Saphenous Ablation

Post-Op Complications
(In descending order)

<table>
<thead>
<tr>
<th>Complication</th>
<th>Range</th>
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<tbody>
<tr>
<td>DVT</td>
<td>0% - 16%</td>
</tr>
<tr>
<td>Paresthesia</td>
<td>0% - 16%</td>
</tr>
<tr>
<td>Phlebitis</td>
<td>0% - 6%</td>
</tr>
<tr>
<td>Lymphedema</td>
<td>0% - .5%</td>
</tr>
<tr>
<td>Skin burn</td>
<td>0% - .1%</td>
</tr>
<tr>
<td>Infection</td>
<td>0% - &lt;.1%</td>
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Endovenous Saphenous Ablation

Post-Op Complications

DVT

- ~1%
- Most calf - ? Clinical significance
- Proximal – aggressive Rx – IR – pharmacomechanical therapy
  +/- anticoagulation

The Vein Book – Thrombotic Risk Assessment: A Hybrid Approach, Caprini J
Venous thromboembolism Prophylaxis in the General Surgical Patient, Caprini J, Arcelus JI
Incomplete Ablation

Identification of incomplete ablation is dependent on the sensitivity of the ultrasound equipment used for postoperative examination, the expertise of the sonographer, and the vigor and independence with which the examination is conducted.
Incomplete Ablation

Treatment Failures

What to do?

Follow-up ultrasound-guided foam sclerotherapy to patent segment of great saphenous vein at the time identified.

Repeat treatment for persistent incomplete ablation.

High ligation and repeat ultrasound-guided foam sclerotherapy for incomplete ablation after second endovenous thermoablation.
Incomplete Ablation

Theivacumar

27 pts GSV recanalized post laser ablation

No further Rx – duplex at one year

11/27 (41%) reflux
16/27 (59) competent

The popliteal fossa demonstrates a complex anatomical and pathophysiological problem. Surgeons need to be aware of the close interrelationships of important nerve structures to the saphenopopliteal junction. Injury to the nerves in the popliteal fossa can result in significant disability. Endovenous thermal ablation does not eliminate risk of nerve injury.

Conclusions

Small Saphenous ablation is generally safe

Intraoperative and postoperative complications are infrequent and generally are less frequently seen with endovenous ablation than with more traditional surgical procedures
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Thank you for your kind attention