Endovenous Laser Ablation of Varicose Veins

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Disclaimer

This presentation and all research quoted is self funded.
You would recognise these.
Varicose veins may not be obvious
You might miss these VVs
Skin Lesion Presentation

Biopsy scar

Varicose eczema
Varicose Veins

- Common (40+ % of population)
- Many venous symptoms
- Underdiagnosed
- Poor cosmesis
- Long term - ulcers, haemorrhage, eczema
- Public Rx funding poor
Venous symptoms

- Aching
- Swelling
- Restless Legs Syndrome
- Cramps
- Burning sensation
- Itching, eczema
- Heaviness
- Tired legs
- Haemorrhage
- Ulceration

Worse with:
- standing
- menses
- hot weather
Vein symptoms do not correlate with vein size.
Clinical Signs of VVs

- Visible veins (not necessarily)
- Oedema
- Eczema
- Haemosiderin brown staining
- Ulcers, or scars from healed ulcers
- CVI – telangiectasias, cyanotic feet
- Lipodermatosclerosis
- Atrophie blanche
- Vulval aching / varices in pregnancy
- Pelvic congestion syndrome
High pressure/volume/flow deep system

Low pressure/volume/flow superficial system

Venous flow downwards, distending vein walls, venous hypertension, ...... CVI
### CEAP Classification

- **Class 1:** telangiectases and reticular veins
- **Class 2:** varicose veins
- **Class 3:** oedema
- **Class 4:** skin changes without ulceration, eg. eczema, pigmentation
- **Class 5:** healed ulcers
- **Class 6:** active ulcers

**GSV:** Great (long) Saphenous Vein

**SSV:** Small (short) Saphenous Vein

Varicose Veins - Costs

- Public health cost: 2% healthcare resources
  Ulcers dressings @ $185 for years
  Treat the cause of DVI.

- Personal cost:
  Sx: Poor self image, and discomfort:
  Telangiectasiae, eczema, ulcers, bleeding.
  ? wear shorts, togs, sandals.
  ? housebound.
### Historical Landmarks – Vein Rx

<table>
<thead>
<tr>
<th>Year</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>1845</td>
<td>1st hypodermic syringe- Rynd</td>
</tr>
<tr>
<td>1921</td>
<td>Hypertonic saline</td>
</tr>
<tr>
<td>1929</td>
<td>Tournay technique</td>
</tr>
<tr>
<td>1946</td>
<td>STD, STS, Fibrovein</td>
</tr>
<tr>
<td>1961</td>
<td>Polidocanol, Aethoxysclerol</td>
</tr>
<tr>
<td>1980’s</td>
<td>Echo guided sclerotherapy</td>
</tr>
<tr>
<td>1989</td>
<td>Published UGS</td>
</tr>
<tr>
<td>1993</td>
<td>Laser fibre guided coagulation</td>
</tr>
<tr>
<td>1993</td>
<td>JR Cabrera industrial “microfoam” CO2</td>
</tr>
<tr>
<td>1990s</td>
<td>RF ablation, VNUS</td>
</tr>
<tr>
<td>2001</td>
<td>Frullini- Cavezzi : duplex foam UGS</td>
</tr>
</tbody>
</table>
Treatment for VV’s

None - Ignore them

Compression – graduated class 2 hose

Surgery - ambulatory phlebectomy, stripping, flush ligation, stab avulsion, endoscopy, morcillation.

Sclerotherapy – blind injection

RF – VNUS

ELLE - Long catheter UGS

External Lasers - poor

UGS - foam ultrasound guided sclerotherapy

EVLA - endovenous laser ablation

Consider ... Efficacy, cost, recurrence rates, adverse outcomes
Assess fully

Medical & venous hx
FH or PH thrombophilia
Examine
CW Doppler
Duplex US map mandatory
? Thrombophilic screen
Reflux > 0.5 second
Duplex map pre EVLA

Red: incompetent, reflux
Blue: competent flow

Comments:
Deep Veins: Patent and competent
Superficial Veins: SFJ and LSJV incompetent. The LSJV lies within the fascial envelope the entire length of thigh. Large knee and calf visible bunches of varicose veins. Posterior arch vein renders distal SSV incompetent.
Perforators: No incompetent perforators detected

Scanned by: Angela Braver, DRUG(DTH), DMU(NZ)
Verified by: Dr Kim Stephen MSc(Medical) FRANZCR
Non Surgical Options

EVLA and UGS

- Popular
- Cheaper
- Quicker – procedure, time off work
- Safer - low VTE risks, no GAs, no nerve damage, no scars
- Ambulant stat
- 1st choice most Western countries
- Repeatable
Sclerotherapy - UGS

Foreign substance

vessel lumen

endothelial damage

thrombosis

TOTAL FIBROSIS.
Endothelial Effects

- **Endothelial cells** - swell, slough, spasm stat.

- **Red thrombus forms** - vessel wall reaction in 2 hrs, thrombus fills entire lumen within 15hrs.

- **Spontaneous thrombolysis** - endogenous / exogenous, and leucocyte migration, phagocytosis.

- **Organising “thrombus”** - Capillaries & fibroblasts develop, granulation, starts 24 hrs, lasts for 2-3 wks.

- **Endofibrosis** - with scarring, partial or complete (6 weeks). Some segments completely resorbed.
Foam Ultrasound Guided Sclerotherapy is well established, not a “new” treatment.

European Consensus Meeting 2003
(25 international experts)
Before/after UGS

3yrs post
Note prior surgical scars

6 months post UGS
Endovenous Laser Ablation (EVLA)
Seldinger Technique with US guidance

- Minimally invasive
- J guide-wire to below junction (SFJ, SPJ)
- Catheter over guide-wire
- Tumescent local anaesthesia
- Laser fibre tip placed 2 cm distal to junction
- Position: US, transillumination, saline flush.
- Relaxed warm patient ideal
Mark vein to be treated

Iodine skin prep
19g vascular access needle

J wire
Vein Access

Aspirate blood
J wire inserted into access needle
J wire removed & laser fibre inserted
Tumescent Anaesthesia

1. Local anaesthesia/analgesia
2. Displaces perivenous tissues
3. Heat sink for thermal energy
4. Vein compression to empty vessel
Saphenous (Egyptian) Eye

- CFV
- Saphenous Fascia
- GSV
- Deep Fascia
Laser fibre in GSV

Tumescent LA

Saphenous Fascia

Needle in fascial compartment
EVLAS

Fibre withdrawal  HeNe aiming laser
Procedure Data

- **Klein formula TA**
  
  \[
  \text{Lignocaine 0.08\%} + 10\text{mls of NaBicarb 8.4\%} + 1\text{ml of Adrenaline 1:1000 per litre}
  \]

- Infiltrate volume 100-450ml
- Power 5-7 watts continuous
- Automated pullback 0.5 -1mm/second
Combined with foam UGS

- Distal trunks and tributaries
- Repeat as required days later
- Air/sclerosant (Fibrovein 3%) ratio 3:1
- Cavezzi-Tessari foam technique
- Clexane SC if thrombophilic risk
Post EVLA Rx

- Class 2 compression
- Ambulate stat, exercise daily
- Avoid straining, long haul flights
- Serial duplex US surveillance (objective)
- Annual patient assessment (subjective)
Vaporisation Effect

- High temperatures
- Threshold reached (2.4kJ/cm2)
- Water to steam, expands
- Micro-explosions
- Vaporisation + coagulation
- Causes collagen shrinkage
Figure 5 - Absorption of light by major skin pigments

- Hb
- Melanin
- HbO2
- Water

Absorbance (cm⁻¹)

Wavelength (nm)

1320nm
Endovenous Laser Ablation

- Intra/extra fascial veins treated
- Excellent for SSV (surgery difficult)
- Minimum 2-3 mm diameter VV’s
- Patient friendly
- Safe
Competent SFJ 1 mth after EVLA
EVLA – 68yrs, Ca Prostate, CVI +++, 1° VVs.
Same High Risk Patient - EVLA

Pre Rx

6 mths

2 yrs

SKIN & VEIN CLINIC
53 yr farmer, ulcer present 2 yrs. No previous VV Rx.
32 yr woman attends 3 day scout camp same day
Bilateral EVLA – before/6mths post
53 yr active female
VV surgery 25 yrs prior

Before

+ 6 months
Note improved quads and tan
EVLA 3yr prospective study
2nd prize poster ACP, Tucson, Arizona, USA 2007

309 patients
459 limbs
499 vessels - 356 GSV 71.3 %
100 SSV 20 %
43 AASV 8.6 %

Follow up attendance rate 83%

Updated June 2008
## Results Patient Self Assessment

<table>
<thead>
<tr>
<th>POST EVLA</th>
<th>Year 1</th>
<th>Year 2</th>
<th>Year 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Improvement in symptoms &amp; appearance</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>Would undergo again if necessary</td>
<td>97%</td>
<td>96%</td>
<td>100%</td>
</tr>
<tr>
<td>Would have preferred to have surgery</td>
<td>1%</td>
<td>2%</td>
<td>0%</td>
</tr>
<tr>
<td>Would recommend to friends</td>
<td>95%</td>
<td>96%</td>
<td>100%</td>
</tr>
<tr>
<td>Rated EVLA a successful treatment</td>
<td>96%</td>
<td>98%</td>
<td>100%</td>
</tr>
<tr>
<td>Any pain</td>
<td>16%</td>
<td>14%</td>
<td>6%</td>
</tr>
</tbody>
</table>
Sapheno-Femoral Junction - Year 3

- Closed: EVLA 18, UGS 27
- Open, competent: EVLA 55, UGS 37
- Open, incompetent: EVLA 23, UGS 35
Great Saphenous Vein - Year 3

- EVLA
- UGS

- Closed: 86%
- Open, competent: 58%
- Open, incompetent: 36%

SKIN & VEIN CLINIC
Sapheno-Popliteal Junction - Year 3

- EVLA
- UGS

<table>
<thead>
<tr>
<th>Condition</th>
<th>EVLA</th>
<th>UGS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Closed</td>
<td>50</td>
<td>45</td>
</tr>
<tr>
<td>Open, competent</td>
<td>50</td>
<td>15</td>
</tr>
<tr>
<td>Open, incompetent</td>
<td>0</td>
<td>40</td>
</tr>
</tbody>
</table>
Small Saphenous Vein - Year 3

EVLA  UGS

Closed

Open, competent

Open, incompetent
## Complications of EVLA

**n = 459 limbs**

*Note * = caused by UGS

<table>
<thead>
<tr>
<th>Complication</th>
<th>%</th>
<th>N numbers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pain</td>
<td>2.6%</td>
<td>12</td>
</tr>
<tr>
<td>STP *</td>
<td>5.2%</td>
<td>24*</td>
</tr>
<tr>
<td>Haemosiderin staining *</td>
<td>6.5%</td>
<td>30*</td>
</tr>
<tr>
<td>Swelling</td>
<td>2.4%</td>
<td>11</td>
</tr>
<tr>
<td>BK deep vein sclerosis *</td>
<td>0.65%</td>
<td>3*</td>
</tr>
<tr>
<td>Tongue of thrombus</td>
<td>0.87%</td>
<td>4</td>
</tr>
<tr>
<td>Ulceration *</td>
<td>0.2%</td>
<td>1*</td>
</tr>
<tr>
<td>Sepsis</td>
<td>0.4%</td>
<td>2</td>
</tr>
<tr>
<td>Transient hypoaesthesia *</td>
<td>0.65%</td>
<td>3*</td>
</tr>
<tr>
<td>PE</td>
<td>0.2%</td>
<td>1</td>
</tr>
<tr>
<td>DVT, death</td>
<td>zero</td>
<td>0</td>
</tr>
</tbody>
</table>
Disadvantages

- Laser cost
- User and patient laser risks
- Disposable costs (NZD approx. $650/case)
- Cost UGS < EVLA < Surgery
- Day stay theatre cost
- More trained staff
Benefits

- Physiologic result
- High efficacy and safety
- No upper size limit veins treatable
- Popular with patients
- No scars, no downtime
- 1320nm ... less power, less side effects
Combined EVLA and UGS

- Safe effective treatment for incompetent varicose vein trunks and tributaries
- Junctions reduce diameter to function physiologically
- Need long term efficacy results
No point just treating what is visible
Thanks

www.skinandvein.co.nz

References available on request.