Updates on the cost effectiveness of glue and MOCA techniques vs thermal ablation

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London
Disclosures

• Grants:- NIHR, RCS, EVF, Circulation foundation, Stroke association.

• Commercial support:- Biolas, Vascular Insights, Urgo Labortoire, Acergy, Medtronic, Firstkind, Veniti.
<table>
<thead>
<tr>
<th>Study Authors</th>
<th>Sample Size</th>
<th>Duration</th>
<th>Occlusion</th>
<th>VCSS</th>
<th>Pain Scores (VAS 100mm or 10 Point)</th>
<th>Return to Normal Activities/Work</th>
<th>Major Adverse Events</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elias et al., 2013</td>
<td>29 patients 30</td>
<td>2 years</td>
<td>Immediate-100% 6 months- 96.7% 2 years – 96%</td>
<td>N/A</td>
<td>No complaints of pain</td>
<td>N/A</td>
<td>None</td>
</tr>
<tr>
<td>Ozen et al., 2014</td>
<td>63 patients 73</td>
<td>2 years</td>
<td>Immediate-98% 6 months- 94% 1 year- 95% 2 years- 95%</td>
<td>6 Months: -3.2 1 year: -1.2 2 years: -1.1</td>
<td>N/A</td>
<td>N/A</td>
<td>None</td>
</tr>
<tr>
<td>Boersma et al., 2012</td>
<td>50 patients</td>
<td>1 year</td>
<td>Immediate-100% 6 Week- 100% 1 Year- 94%</td>
<td>Baseline- 3.0 6 weeks- 1.0 1 year 1.0</td>
<td>2</td>
<td>N/A</td>
<td>None</td>
</tr>
<tr>
<td>Bootun et al., 2014</td>
<td>117 patients 119</td>
<td>1 month</td>
<td>92%</td>
<td>N/A</td>
<td>19.3 mm</td>
<td>3.5 days/ 5.3 days *patients in Great Britain historically take more time for recovery</td>
<td>None</td>
</tr>
<tr>
<td>Van Eekeren et al., 2014</td>
<td>92 patients 106</td>
<td>6 months</td>
<td>Immediate-100% 6 months- 93.2% 1 year- 88.2%</td>
<td>Baseline- 4.0 6 months- 1.0 1 year- 1.0</td>
<td>20 mm 14 days- 7.5mm</td>
<td>1 day/ 1 day</td>
<td>None</td>
</tr>
<tr>
<td>Bishawi et al., 2013</td>
<td>126 patients</td>
<td>6 months</td>
<td>Immediate-100% 6 months- 94%</td>
<td>Baseline- 9.0 1 week- 6.5 3 months- 4.0 6 months- 3.0</td>
<td>2 1 week- &gt;1</td>
<td>N/A</td>
<td>None</td>
</tr>
<tr>
<td>Van Eekeren et al., 2013</td>
<td>68 patients</td>
<td>6 weeks</td>
<td>N/A</td>
<td>Baseline- 3.0 6 weeks- 1.0</td>
<td>22 3 days- 6.2 14 days- 4.8</td>
<td>1 day/ 1 day</td>
<td>None</td>
</tr>
<tr>
<td>Van Eekeren et al., 2011</td>
<td>25 patients 30</td>
<td>6 weeks</td>
<td>Immediate-100%</td>
<td>Baseline 3.0 6 weeks 1.0</td>
<td>4 7 days- 2 mm</td>
<td>N/A</td>
<td>None</td>
</tr>
<tr>
<td>Van et al., 2014</td>
<td>127 patients 147</td>
<td>Immediate</td>
<td>91%</td>
<td>N/A</td>
<td>1</td>
<td>N/A</td>
<td>None</td>
</tr>
<tr>
<td>Study</td>
<td>Sample Size</td>
<td>Duration</td>
<td>Occlusion</td>
<td>VCSS</td>
<td>Patient Pain Scores (VAS 100mm or 10 point)</td>
<td>Return to Normal Activities/Work</td>
<td>Major Adverse Events</td>
</tr>
<tr>
<td>------------------</td>
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<td>----------------------------</td>
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<td>-------------------------------------------</td>
<td>----------------------------------</td>
<td>----------------------</td>
</tr>
<tr>
<td>1000 + cases</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>N/A</td>
<td>None</td>
</tr>
<tr>
<td>overall 95% + closure rate</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>N/A</td>
<td>None</td>
</tr>
<tr>
<td>Marked improvement in VCSS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>N/A</td>
<td>None</td>
</tr>
<tr>
<td>Safe</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>N/A</td>
<td>None</td>
</tr>
<tr>
<td>Rapid recovery</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>N/A</td>
<td>None</td>
</tr>
</tbody>
</table>

**Elias et al., 2013**<sup>11</sup>
- 29 patients
- 30 limbs
- 2 years
- Immediate-100%
- 6 months - 96.7%
- 2 years - 96%
- N/A
- No complaints of pain
- N/A
- None

**Ozden et al., 2014**
- 15 patients
- 63 limbs
- 2 years
- Immediate - 98%
- 6 months - 94%
- 1 year - 95%
- 2 years - 95%
- 6 Months: 3.2
- 1 year: 1.2
- 2 years: 1.1
- N/A
- N/A
- None

**Boersma et al., 2012**
- 12 patients
- 50 limbs
- 1 year
- Immediate - 100%
- 6 Week - 100%
- 1 Year - 94%
- Baseline: 3.0
- 6 weeks - 1.0
- 1 year: 1.0
- N/A
- None

**Böttun et al., 2014**
- 6 patients
- 117 limbs
- 59 ClariVein limbs
- 1 month
- 92%
- N/A
- 19.3 mm
- 3.5 days/ 5.3 days
- Patients in Great Britain historically take more time for recovery
- None

**Vaneekeren et al., 2014**
- 8 patients
- 92 patients
- 106 limbs
- Immediate - 100%
- 6 months - 93.2%
- 1 year - 88.2%
- Baseline: 4.0
- 6 months: 1.0
- 1 year: 1.0
- 20 mm
- 14 days - 7.5 mm
- 1 day/ 1 day
- None

**Vaneekeren et al., 2013**<sup>13</sup>
- 9 patients
- 68 patients
- 34 ClariVein
- 6 weeks
- N/A
- Baseline: 3.0
- 6 weeks: 1.0
- 22 days
- 3 days: 6.2
- 14 days: 4.8
- 1 day/ 1 day
- None

**Van et al., 2011**<sup>13</sup>
- 13 patients
- 25 patients
- 30 limbs
- 6 weeks
- Immediate - 100%
- Baseline: 3.0
- 6 weeks: 1.0
- 4 days
- 7 days: 2 mm
- N/A
- None

**Vin et al., 2014**<sup>7</sup>
- 127 patients
- 147 limbs
- 57 ClariVein limbs
- Immediate
- 91%
- N/A
- 1
- N/A
- None
Clinical Studies with VenaSeal™ System

**Feasibility Study**
- 38 Patients, enrollment completed Aug. 2011
- 1, 3, 6, 12, 24 and 36 month follow-ups
- Primary endpoint: Safety: rate of serious adverse events, Efficacy: vein closure during follow-up

**eSCoPE (European multicenter study)**
- 70 patients, enrollment completed Sept. 2012
- 2 day, 1, 3, 6, 12, 24 and 36 month follow-ups
- Primary endpoint: closure w/o use of sedation, tumescent anesthesia or compression stockings

**VeClose (U.S. pivotal trial)**
- 242 patients, enrollment completed Sept. 2013
- 3 day, 1, 3, 6, 12 months & 2, 3 year follow-ups
- Primary endpoint: non-inferior to RFA in GSV closure
- Secondary endpoint: superiority in reduction of post procedural pain and bruising
Clinical Studies with VenaSeal™ System

Feasibility Study
- 38 Patients, enrollment completed Aug. 2011
- 1, 3, 6, 12, 24 and 36 month follow-ups
- Primary endpoint: Safety: rate of serious adverse events, Efficacy: vein closure during follow-up

SCOPE (multi-center study)
- 70 patients, enrollment completed Sept. 2012
- Venaseal equivalent initial clinical results to Venefit (compression stockings)

VeClose (U.S. pivotal trial)
- 242 patients, enrollment completed Sept. 2013
- 3 day, 1, 3, 6, 12 months & 2, 3 year follow-ups
- Primary endpoint: non-inferior to RFA in GSV closure
- Secondary endpoint: superiority in reduction of post procedural pain and bruising
<table>
<thead>
<tr>
<th>PROS</th>
<th>CONS</th>
</tr>
</thead>
</table>

# Quality of life & occlusion rates @ 1 year

<table>
<thead>
<tr>
<th>Technique</th>
<th>Quality of life improvement</th>
<th>Occlusion rate greater than 90%</th>
</tr>
</thead>
<tbody>
<tr>
<td>RFA</td>
<td>+++</td>
<td>√√</td>
</tr>
<tr>
<td>Laser</td>
<td>+++</td>
<td>√√</td>
</tr>
<tr>
<td>Foam</td>
<td>++ (+)</td>
<td>XX</td>
</tr>
<tr>
<td>Steam</td>
<td>??</td>
<td>X</td>
</tr>
<tr>
<td>MOCA</td>
<td>+++</td>
<td>√√</td>
</tr>
<tr>
<td>Glue</td>
<td>+++</td>
<td>√√</td>
</tr>
</tbody>
</table>
Endovenous mechanochemical ablation for varicose veins

Interventional procedure guidance
Published: 25 May 2016
nice.org.uk/guidance/ipg557

1 Recommendations

1.1 Current evidence on the safety and efficacy of endovenous mechanochemical ablation for varicose veins appears adequate to support the use of this procedure provided that standard arrangements are in place for consent, audit and clinical governance. Clinicians are encouraged to collect longer-term follow-up data.
Cost-effectiveness of traditional and endovenous treatments for varicose veins

M. S. Gohel1, D. M. Epstein2 and A. H. Davies1

1Imperial Vascular Unit, Charing Cross Hospital, London, and 2Centre for Health Economics, University of York, York, UK

Correspondence to: Professor A. H. Davies, Imperial Vascular Unit, Charing Cross Hospital, Fulham Palace Road, London W6 8RF, UK
(e-mail: a.h.davies@imperial.ac.uk)

A Cost-effectiveness Analysis of Surgery, Endothermal Ablation, Ultrasound-guided Foam Sclerotherapy and Compression Stockings for Symptomatic Varicose Veins

G. Marsden a,b, M. Perry a, A. Bradbury b, N. Hickey c, K. Kelley d, H. Trender d, D. Wonderling e, A. H. Davies a

a National Clinical Guideline Centre, Royal College of Physicians, London, UK
b University Department of Vascular Surgery, University of Birmingham, Solihull, UK
c Worcestershire Royal Hospital, Worcester, UK
d Sheffield Vascular Institute, Sheffield Teaching Hospital Foundation Trust, Sheffield, UK
e Department of Surgery & Cancer, Imperial College & Imperial College NHS Trust, Charing Cross Hospital, London, UK

COST-EFFECTIVENESS OF RADIOFREQUENCY ABLATION VERSUS LASER FOR VARICOSE VEINS

Amanda C. Shepherd, Mauro Ortega-Ortega, Manj S. Gohel

Amanda C. Shepherd
Academic Section of Vascular Surgery, Imperial College School of Medicine, Charing Cross Hospital
Mauro Ortega-Ortega
Department of Applied Economics, University of Granada
Manj S. Gohel
Academic Section of Vascular Surgery, Imperial College School of Medicine, Charing Cross Hospital
and Department of Vascular Surgery, Addenbrooke’s Hospital Cambridge

Cost-effectiveness of ultrasound-guided foam sclerotherapy, endovenous laser ablation or surgery as treatment for primary varicose veins from the randomized CLASS trial

E. Tassie1, G. Scotland1,2, J. Brittenden3, S. C. Cotton2, A. Elders2, M. K. Campbell2, B. Campbell4, M. Gough1, J. M. Burr6 and C. R. Ramsay2 on behalf of the CLASS study team

1 Health Economics Research Unit, 2 Health Services Research Unit and 3 Division of Applied Medicine, University of Aberdeen, Aberdeen, 4 Royal Devon and Exeter Hospital and University of Exeter Medical School, Exeter, 5 Vascular Surgery, Vascular Laboratory, St James’s University Hospital, Leeds, and 6 School of Medicine, Medical and Biological Sciences, University of St Andrews, St Andrews, UK

Correspondence to: Ms E. Tassie, Health Economics Research Unit, University of Aberdeen, Foresterhill, Aberdeen AB25 2ZD, UK
(e-mail: e.tassie@abdn.ac.uk)
Treatment options

Surgery

Laser

Radiofrequency

Sclerotherapy
How to measure outcomes in venous disease?
How to measure outcomes in venous disease?

Suggest key outcome:

Re-intervention
Aims

1. Systematic review of the literature with particular emphasis on MOCA and cyanoacrylate

2. Determine the cost-effectiveness of the newer non-thermal interventions
Methods

• Systematic review of the literature to determine the relative effectiveness of each intervention (RFA, EVLA, Surgery, MOCA, CAE and Conservative care)
  – Protocol on PROSPERO: CRD42015029618

• Cost-effectiveness of each intervention
Results

- 33 RCTs included
- Further 10 non-RCTs evaluating MOCA and CAE
- Intervention on truncal vein re-intervention available from 16 studies (13 RCTs and 3 non-RCTs)
- 1 non-RCT of re-intervention post-MOCA and no studies on re-intervention post-CAE
Prisma Diagram

Identification

Records identified through database searching (n = 3,513)

Additional records identified through other sources (n = 70)

Records after duplicates removed (n = 3,053)

Screening

Records screened (n = 3,053)

Records excluded (n = 3,003)

Eligibility

Full-text articles assessed for eligibility (n = 48)

Full-text articles excluded (n = 16)

Articles Excluded:
- Different vein treated = 1
- Treatment used not being investigated = 8
- Review = 2
- Not-RCT = 5

Studies included in qualitative synthesis (n = 32)

Studies included in quantitative synthesis (meta-analysis) (n = 0)

Included
# Truncal Vein Re-intervention

## Study Results

<table>
<thead>
<tr>
<th>ID</th>
<th>Study</th>
<th>Year</th>
<th>OR (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td><strong>favour first treatment</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>0.13 (0.03, 0.61)</td>
</tr>
<tr>
<td>35</td>
<td>Sell et al.</td>
<td>2014</td>
<td>2.18 (0.77, 6.18)</td>
</tr>
<tr>
<td>18</td>
<td>Christenson et al.</td>
<td>2010</td>
<td>0.18 (0.02, 1.53)</td>
</tr>
<tr>
<td>29</td>
<td>Rasmussen et al.</td>
<td>2013</td>
<td>1.18 (0.53, 2.61)</td>
</tr>
<tr>
<td>39</td>
<td>van der Velden et al</td>
<td>2015</td>
<td>1.30 (0.48, 3.54)</td>
</tr>
<tr>
<td>42</td>
<td>Brittenden et al. A</td>
<td>2015</td>
<td>1.11 (0.58, 2.11)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>3.60 (1.84, 7.05)</td>
</tr>
<tr>
<td>21</td>
<td>Shadid et al.</td>
<td>2012</td>
<td>9.75 (1.24, 76.77)</td>
</tr>
<tr>
<td>28</td>
<td>Biemans et al.</td>
<td>2013</td>
<td>4.36 (1.79, 10.61)</td>
</tr>
<tr>
<td>38</td>
<td>Brittenden et al. B</td>
<td>2015</td>
<td>3.36 (1.46, 7.75)</td>
</tr>
<tr>
<td>42</td>
<td>Brittenden et al. A</td>
<td>2015</td>
<td>3.31 (1.36, 8.02)</td>
</tr>
</tbody>
</table>

**NOTE:** Weights are from random effects analysis.
Network Meta-Analysis

Comparison | Odds Ratio | 95% CI
---|---|---
HL v CONS | 0.14 | (0.02, 0.79)
EVLA v CONS | 0.13 | (0.02, 0.82)
EVLA v HL | 0.96 | (0.57, 1.63)
RFA v CONS | 0.05 | (0.00, 0.66)
RFA v HL | 0.35 | (0.05, 2.47)
RFA v EVLA | 0.36 | (0.06, 2.39)
UGFS v CONS | 0.47 | (0.08, 2.98)
UGFS v HL | 3.44 | (1.90, 6.23)
UGFS v EVLA | 3.56 | (1.95, 6.51)
UGFS v RFA | 9.80 | (1.36, 70.69)
Re-intervention

1.2 per 100 patient-years

MOCA
# Generic Quality of Life – EQ-5D

## Table: Comparison of Treatments

<table>
<thead>
<tr>
<th>ID</th>
<th>Study</th>
<th>Week</th>
<th>ES (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>EVLA v HL</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>Carradice et al.</td>
<td>1</td>
<td>-0.00 (-0.05, 0.04)</td>
</tr>
<tr>
<td>42</td>
<td>Brittenden et al. A</td>
<td>6</td>
<td>0.03 (-0.01, 0.07)</td>
</tr>
<tr>
<td></td>
<td>Subtotal (I-squared = 38.2%, p = 0.203)</td>
<td></td>
<td>0.01 (-0.02, 0.05)</td>
</tr>
<tr>
<td>RFA v EVLA</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>Nordon et al.</td>
<td>13</td>
<td>-0.03 (-0.12, 0.06)</td>
</tr>
<tr>
<td></td>
<td>Subtotal (I-squared = .%, p = .)</td>
<td></td>
<td>-0.03 (-0.12, 0.06)</td>
</tr>
<tr>
<td>MOCA v RFA</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>31</td>
<td>Bootn</td>
<td>4</td>
<td>0.06 (-0.01, 0.13)</td>
</tr>
<tr>
<td></td>
<td>Subtotal (I-squared = .%, p = .)</td>
<td></td>
<td>0.06 (-0.01, 0.13)</td>
</tr>
<tr>
<td>UGFS v HL</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>38</td>
<td>Brittenden et al. B</td>
<td>6</td>
<td>-0.02 (-0.05, 0.01)</td>
</tr>
<tr>
<td>42</td>
<td>Brittenden et al. A</td>
<td>6</td>
<td>-0.01 (-0.05, 0.03)</td>
</tr>
<tr>
<td></td>
<td>Subtotal (I-squared = 0.0%, p = 0.681)</td>
<td></td>
<td>-0.02 (-0.04, 0.01)</td>
</tr>
<tr>
<td>CAE v RFA</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>40</td>
<td>Morrison et al.</td>
<td>13</td>
<td>0.00 (-0.02, 0.03)</td>
</tr>
<tr>
<td></td>
<td>Subtotal (I-squared = .%, p = .)</td>
<td></td>
<td>0.00 (-0.02, 0.03)</td>
</tr>
<tr>
<td>UGFS v EVLA</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>42</td>
<td>Brittenden et al. A</td>
<td>6</td>
<td>-0.04 (-0.07, -0.01)</td>
</tr>
<tr>
<td></td>
<td>Subtotal (I-squared = .%, p = .)</td>
<td></td>
<td>-0.04 (-0.07, -0.01)</td>
</tr>
</tbody>
</table>

**NOTE:** Weights are from random effects analysis

---

**EQ-5D-3L index**
### Disease-Specific QoL - AVVQ

**Aberdeen Venous Vein Score**

<table>
<thead>
<tr>
<th>ID</th>
<th>Study</th>
<th>Week</th>
<th>ES (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>EVLA v HL</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Rasmussen et al.</td>
<td>13</td>
<td>-1.30 (-11.80, 9.20)</td>
</tr>
<tr>
<td>11</td>
<td>Rasmussen et al.</td>
<td>13</td>
<td>1.00 (-1.71, 3.71)</td>
</tr>
<tr>
<td>17</td>
<td>Carradice et al 1</td>
<td>10</td>
<td>0.10 (-1.66, 1.86)</td>
</tr>
<tr>
<td>20</td>
<td>Rasmussen et al.</td>
<td>4</td>
<td>1.00 (-3.77, 5.77)</td>
</tr>
<tr>
<td>37</td>
<td>Mozafar et al</td>
<td>13</td>
<td>-0.43 (-1.45, 0.59)</td>
</tr>
<tr>
<td>42</td>
<td>Brittenden et al. A</td>
<td>6</td>
<td>-0.40 (-2.25, 1.45)</td>
</tr>
<tr>
<td></td>
<td>Subtotal (I-squared = 0.0%, p = 0.926)</td>
<td></td>
<td>-0.19 (-0.94, 0.57)</td>
</tr>
<tr>
<td>RFA v EVLA</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Shepherd et al.</td>
<td>6</td>
<td>0.10 (-3.21, 3.41)</td>
</tr>
<tr>
<td>19</td>
<td>Nordon et al.</td>
<td>13</td>
<td>0.30 (-1.70, 2.30)</td>
</tr>
<tr>
<td>20</td>
<td>Rasmussen et al.</td>
<td>4</td>
<td>-2.00 (-7.14, 3.14)</td>
</tr>
<tr>
<td></td>
<td>Subtotal (I-squared = 0.0%, p = 0.715)</td>
<td></td>
<td>0.02 (-1.60, 1.65)</td>
</tr>
<tr>
<td>RFA v HL</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>Rasmussen et al.</td>
<td>4</td>
<td>-1.00 (-6.20, 4.20)</td>
</tr>
<tr>
<td>14</td>
<td>Subramonia et al.</td>
<td>5</td>
<td>-0.88 (-3.59, 1.83)</td>
</tr>
<tr>
<td></td>
<td>Subtotal (I-squared = 0.0%, p = 0.968)</td>
<td></td>
<td>-0.91 (-3.31, 1.50)</td>
</tr>
<tr>
<td>UGFS v HL</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>Rasmussen et al.</td>
<td>4</td>
<td>0.00 (-4.66, 4.66)</td>
</tr>
<tr>
<td>38</td>
<td>Brittenden et al. B</td>
<td>6</td>
<td>1.60 (-0.04, 3.24)</td>
</tr>
<tr>
<td>42</td>
<td>Brittenden et al. A</td>
<td>6</td>
<td>0.85 (-1.06, 2.66)</td>
</tr>
<tr>
<td></td>
<td>Subtotal (I-squared = 0.0%, p = 0.720)</td>
<td></td>
<td>1.17 (-0.02, 2.36)</td>
</tr>
<tr>
<td>UGFS v EVLA</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>Rasmussen et al.</td>
<td>4</td>
<td>-1.00 (-5.60, 3.60)</td>
</tr>
<tr>
<td>23</td>
<td>Lattimer et al</td>
<td>13</td>
<td>6.60 (2.58, 10.62)</td>
</tr>
<tr>
<td>42</td>
<td>Brittenden et al. A</td>
<td>6</td>
<td>1.20 (-0.55, 2.95)</td>
</tr>
<tr>
<td></td>
<td>Subtotal (I-squared = 72.8%, p = 0.025)</td>
<td></td>
<td>2.24 (-1.51, 5.98)</td>
</tr>
<tr>
<td>UGFS v RFA</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>Rasmussen et al.</td>
<td>4</td>
<td>1.00 (-4.04, 6.04)</td>
</tr>
<tr>
<td></td>
<td>Subtotal (I-squared = .%, p = .)</td>
<td></td>
<td>1.00 (-4.04, 6.04)</td>
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<tr>
<td>MOCA v RFA</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>25</td>
<td>Van Eekeren</td>
<td>6</td>
<td>0.50 (-2.28, 3.28)</td>
</tr>
<tr>
<td>31</td>
<td>Bootun</td>
<td>4</td>
<td>-2.80 (-6.97, 1.37)</td>
</tr>
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<td></td>
<td>Subtotal (I-squared = 40.0%, p = 0.197)</td>
<td></td>
<td>-0.77 (-3.91, 2.38)</td>
</tr>
<tr>
<td>CAE v RFA</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>40</td>
<td>Morrison et al.</td>
<td>13</td>
<td>0.90 (-1.27, 3.07)</td>
</tr>
</tbody>
</table>

NOTE: Weights are from random effects analysis.
## Duration of Procedure

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Difference in Operative Time (minutes)</th>
<th>SE</th>
<th>z</th>
<th>P value</th>
<th>Confidence Interval</th>
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</thead>
<tbody>
<tr>
<td>EVLA</td>
<td>6.0</td>
<td>6.4</td>
<td>0.9</td>
<td>0.346</td>
<td>-6.5 to 18.6</td>
</tr>
<tr>
<td>RFA</td>
<td>5.2</td>
<td>6.5</td>
<td>0.8</td>
<td>0.428</td>
<td>-7.6 to 18.0</td>
</tr>
<tr>
<td>UGFS</td>
<td>-24.8</td>
<td>8.7</td>
<td>-2.9</td>
<td>0.004</td>
<td>-41.9 to -7.7</td>
</tr>
<tr>
<td>MOCA</td>
<td>-5.5</td>
<td>11.3</td>
<td>-0.5</td>
<td>0.628</td>
<td>-27.6 to 16.6</td>
</tr>
<tr>
<td>CAE</td>
<td>10.2</td>
<td>16.2</td>
<td>0.6</td>
<td>0.531</td>
<td>-21.6 to 41.9</td>
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</table>
Procedure Times
## Procedure Cost

<table>
<thead>
<tr>
<th>Source</th>
<th>HL/S</th>
<th>EVLA</th>
<th>RFA</th>
<th>UGFS</th>
<th>MOCA</th>
<th>CAE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Cost theatre (£)</strong></td>
<td>529</td>
<td>338</td>
<td>333</td>
<td>143</td>
<td>270</td>
<td>362</td>
</tr>
<tr>
<td>Theatre time (min)</td>
<td>a 52</td>
<td>58</td>
<td>57</td>
<td>27</td>
<td>46</td>
<td>62</td>
</tr>
<tr>
<td>Cost per min, theatre (£)</td>
<td>b 10.27</td>
<td>5.87</td>
<td>5.87</td>
<td>5.35</td>
<td>5.87</td>
<td>5.87</td>
</tr>
<tr>
<td><strong>Kit and equipment (£)</strong></td>
<td>150</td>
<td>322</td>
<td>346</td>
<td>50</td>
<td>441</td>
<td>866</td>
</tr>
<tr>
<td>Kit (£)</td>
<td>c 256</td>
<td>280</td>
<td>280</td>
<td>375</td>
<td>800</td>
<td></td>
</tr>
<tr>
<td>Consumables &amp; anaesthetic (£)</td>
<td>b 150</td>
<td>66</td>
<td>66</td>
<td>50</td>
<td>66</td>
<td>66</td>
</tr>
<tr>
<td><strong>Other Costs (£)</strong></td>
<td>257</td>
<td>72</td>
<td>72</td>
<td>42</td>
<td>72</td>
<td>72</td>
</tr>
<tr>
<td>Preparation (£)</td>
<td>b 29</td>
<td>29</td>
<td>29</td>
<td>28</td>
<td>29</td>
<td>29</td>
</tr>
<tr>
<td>Recovery (£)</td>
<td>b 74</td>
<td>32</td>
<td>32</td>
<td>4</td>
<td>32</td>
<td>32</td>
</tr>
<tr>
<td>Equipment (£)</td>
<td>b 4</td>
<td>11</td>
<td>11</td>
<td>10</td>
<td>11</td>
<td>11</td>
</tr>
<tr>
<td><strong>Total Cost (£)</strong></td>
<td>786</td>
<td>732</td>
<td>751</td>
<td>235</td>
<td>783</td>
<td>1300</td>
</tr>
</tbody>
</table>

a. Network Meta-analysis; b. From Brittenden et al. (2015); c. Manufacturer’s list price and Rautio et al. (2002)
Model used for comparison

Figure 1. Structure of model. Residual varicosities are re-treated at 6 weeks and re-interventions can occur up to 5 years after index procedure.
## Probability of Re-intervention

<table>
<thead>
<tr>
<th>Strategy</th>
<th>Probability of re-treatment for varicosity (6 weeks)</th>
<th>Probability of truncal vein re-intervention during 5 years</th>
<th>Discounted QALY (5 years)</th>
<th>Discounted Total Mean Cost (5 years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CONS</td>
<td>0.36</td>
<td>0.72</td>
<td>4.47</td>
<td>197</td>
</tr>
<tr>
<td>UGFS</td>
<td>0.36</td>
<td>0.56</td>
<td>4.48</td>
<td>394</td>
</tr>
<tr>
<td>RFA</td>
<td>0.04</td>
<td>0.26</td>
<td>4.50</td>
<td>745</td>
</tr>
<tr>
<td>MOCA</td>
<td>0.04</td>
<td>0.26</td>
<td>4.50</td>
<td>822 (highlighted)</td>
</tr>
<tr>
<td>EVLA</td>
<td>0.04</td>
<td>0.26</td>
<td>4.50</td>
<td>824</td>
</tr>
<tr>
<td>HL</td>
<td>0.04</td>
<td>0.27</td>
<td>4.50</td>
<td>828</td>
</tr>
<tr>
<td>CAE</td>
<td>0.04</td>
<td>0.26</td>
<td>4.50</td>
<td>1392 (highlighted)</td>
</tr>
</tbody>
</table>
QALY at 5 year time horizon
Conclusion

• Surgery, EVLA and RFA have lower re-intervention rates compared to UGFS and conservative care

• Re-intervention rate for MOCA appear similar to the endothermal methods and surgery

• No re-intervention data available for CAE

• Insufficient evidence for CAE at present to properly evaluate their cost-effectiveness
Thank You!
Cost-effectiveness

- **EVLA**: 0.316
- **RFA**: 0.265
- **CONS**: 0.170
- **UGFS**: 0.136
- **MOCA**: 0.111
- **HL/S**: 0.002
- **CAE**: 0.000
### Re-intervention Comparison

<table>
<thead>
<tr>
<th>ID</th>
<th>Study</th>
<th>Year</th>
<th>OR (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>HL v CONS</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>35</td>
<td>Sell et al.</td>
<td>2014</td>
<td>0.13 (0.03, 0.61)</td>
</tr>
<tr>
<td></td>
<td>Subtotal (I-squared = .%, p = .)</td>
<td></td>
<td>0.13 (0.03, 0.61)</td>
</tr>
<tr>
<td></td>
<td><strong>EVLA v HL</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Rasmussen et al.</td>
<td>2010</td>
<td>2.18 (0.77, 6.18)</td>
</tr>
<tr>
<td>9</td>
<td>Christenson et al.</td>
<td>2010</td>
<td>8.43 (0.44, 161.54)</td>
</tr>
<tr>
<td>18</td>
<td>Carradice et al 2</td>
<td>2011</td>
<td>0.18 (0.02, 1.53)</td>
</tr>
<tr>
<td>22</td>
<td>Rass et al</td>
<td>2012</td>
<td>0.53 (0.27, 1.05)</td>
</tr>
<tr>
<td>29</td>
<td>Rasmussen et al.</td>
<td>2013</td>
<td>1.18 (0.53, 2.61)</td>
</tr>
<tr>
<td>28</td>
<td>Biemans et al.</td>
<td>2013</td>
<td>0.57 (0.09, 3.52)</td>
</tr>
<tr>
<td>39</td>
<td>van der Velden et al</td>
<td>2015</td>
<td>1.30 (0.48, 3.54)</td>
</tr>
<tr>
<td>42</td>
<td>Brittenden et al. A</td>
<td>2015</td>
<td>14.61 (0.82, 259.60)</td>
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<tr>
<td></td>
<td>Subtotal (I-squared = 50.1%, p = 0.050)</td>
<td></td>
<td>1.11 (0.58, 2.11)</td>
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<tr>
<td></td>
<td><strong>RFA v EVLA</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Shepherd et al.</td>
<td>2015</td>
<td>0.36 (0.07, 1.94)</td>
</tr>
<tr>
<td></td>
<td>Subtotal (I-squared = .%, p = .)</td>
<td></td>
<td>0.36 (0.07, 1.94)</td>
</tr>
<tr>
<td></td>
<td><strong>UGFS v HL</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>21</td>
<td>Shadid et al.</td>
<td>2012</td>
<td>3.60 (1.84, 7.05)</td>
</tr>
<tr>
<td>28</td>
<td>Biemans et al.</td>
<td>2013</td>
<td>1.83 (0.44, 7.62)</td>
</tr>
<tr>
<td>38</td>
<td>Brittenden et al. B</td>
<td>2015</td>
<td>9.75 (1.24, 76.77)</td>
</tr>
<tr>
<td>42</td>
<td>Brittenden et al. A</td>
<td>2015</td>
<td>17.79 (1.02, 309.28)</td>
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<tr>
<td>39</td>
<td>van der Velden et al</td>
<td>2015</td>
<td>4.36 (1.79, 10.61)</td>
</tr>
<tr>
<td></td>
<td>Subtotal (I-squared = 0.0%, p = 0.552)</td>
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<td>3.89 (2.41, 6.30)</td>
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<tr>
<td></td>
<td><strong>UGFS v EVLA</strong></td>
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</tr>
<tr>
<td>23</td>
<td>Lattimer et al.</td>
<td>2012</td>
<td>11.34 (3.11, 41.43)</td>
</tr>
<tr>
<td>28</td>
<td>Biemans et al.</td>
<td>2013</td>
<td>3.21 (0.63, 16.43)</td>
</tr>
<tr>
<td>42</td>
<td>Brittenden et al. A</td>
<td>2015</td>
<td>1.22 (0.44, 3.35)</td>
</tr>
<tr>
<td>39</td>
<td>van der Velden et al</td>
<td>2015</td>
<td>3.36 (1.46, 7.75)</td>
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<tr>
<td></td>
<td>Subtotal (I-squared = 58.2%, p = 0.067)</td>
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<td>3.31 (1.36, 8.02)</td>
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</tbody>
</table>

**NOTE:** Weights are from random effects analysis.
Cost of index procedure

Table 1. Cost of index procedure

<table>
<thead>
<tr>
<th></th>
<th>Source</th>
<th>HL</th>
<th>EVLA</th>
<th>RFA</th>
<th>UGFS</th>
<th>MOCA</th>
<th>CAE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Theatre time, min</td>
<td>a</td>
<td>52</td>
<td>58</td>
<td>57</td>
<td>27</td>
<td>46</td>
<td>62</td>
</tr>
<tr>
<td>Cost per min, theatre, £</td>
<td>b</td>
<td>10.27</td>
<td>5.87</td>
<td>5.87</td>
<td>5.35</td>
<td>5.87</td>
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<td>Cost theatre, £</td>
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<td>143</td>
<td>270</td>
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<td>Kit, £</td>
<td>c</td>
<td>256</td>
<td>280</td>
<td>375</td>
<td>800</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Consumables and anaesthetic, £</td>
<td>b</td>
<td>150</td>
<td>66</td>
<td>66</td>
<td>50</td>
<td>66</td>
<td>66</td>
</tr>
<tr>
<td>Kit and equipment, £</td>
<td></td>
<td>150</td>
<td>322</td>
<td>346</td>
<td>50</td>
<td>441</td>
<td>866</td>
</tr>
<tr>
<td>Preparation, £</td>
<td>b</td>
<td>29</td>
<td>29</td>
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<td>29</td>
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<td>Recovery, £</td>
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<td>4</td>
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<td>32</td>
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<tr>
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<td>11</td>
<td>11</td>
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<td>11</td>
<td>11</td>
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<td>Cost, other, £</td>
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<td>72</td>
<td>72</td>
<td>42</td>
<td>72</td>
<td>72</td>
</tr>
<tr>
<td>Total cost, £</td>
<td></td>
<td>786</td>
<td>732</td>
<td>751</td>
<td>235</td>
<td>783</td>
<td>1300</td>
</tr>
</tbody>
</table>
Cost effectiveness

Figure 4. Cost-effectiveness acceptability curves for each treatment option. The curve shows the probability that a given treatment obtains the highest net benefit at different thresholds for cost-effectiveness.
Mean cost and QALY 5 year horizon

Figure 3. Total mean cost and mean QALY per person over 5 years for each strategy.
“That's all Folks!”