do you really know where you are going?

L Parry, RS Kutty, C Sudarshan
Papworth Hospital
Mr L

• called in at 2010hrs to assist surgeon
• MVR and CABG x 3.
• challenges conduit harvest needing superficial thigh vein
• just about to give protamine when there is a sudden gush of arterial blood due to complete rupture of vein
Mr L cont’d

• back on bypass
• radial harvest on fully heparinised patient
• grafted onto ruptured venous graft territory
• prolonged haemostasis
• arrived on CCA at 0100hrs!
could problems related to conduit harvest have been avoided?
background to audit

• pilot study of 5 patients
• presented at one of the surgical meetings
• well received
• July 2014 - started audit
along came Mrs B

• 86F
• previous PCI with stents to LAD, circumflex
• Ca breast (radiotherapy bilateral mastectomy)

• planned op:
  • IHU CABG X 3 vein grafts only (due to previous radiotherapy to chest wall)
  • conduits - could not assess veins properly due to semi - recumbent position with IABP in situ
  • no obvious concerns identified
Mrs B cont'd

• while reviewing patient further patient remembered having bilateral vein stripping 50 years ago
  – understandably she had forgotten

• vein mapping by Doppler ultrasound confirmed absence of LSV and SSV in both legs

• the patient had no suitable conduit for CABG and was hence referred to the interventional cardiology service

• PCI done – RCA and LCX, BMS in place and rotablation with good results
vein mapping for surgical revascularisation

should it be standard of care?
vein mapping audit

• 87 patients due to be scanned were included in the audit, following 1 patient being removed from the data due to not being scanned at all
  – it must be noted that if this patient had been scanned it was determined that this would have resulted in a change of strategy

• 3 patients had their scanning stopped early so will only be included in some of the data

• any totals that do not add up to 87 will be due to blank replies or being not applicable
demographics

- female 26% (22/86)
- male 74% (64/86)
scanning events by surgeon

![Graph showing the number of scanning events by surgeon]
location of scanning

- Anaesthetic room: 57, 62%
- Recovery: 1, 1%
- Theatre: 20, 22%
- Ward: 14, 15%
### time taken to scan

<table>
<thead>
<tr>
<th>time taken to scan</th>
<th>average</th>
<th>median</th>
<th>minimum</th>
<th>maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>one leg</td>
<td>7</td>
<td>5</td>
<td>3</td>
<td>25</td>
</tr>
<tr>
<td>both legs</td>
<td>17</td>
<td>13.5</td>
<td>5</td>
<td>45</td>
</tr>
</tbody>
</table>

*3 patients were removed from this data as their scanning was not completed*
did scanning result in a change of strategy or aid the procedure in any way?

- No: 33, 37%
- Yes: 55, 63%
outcomes from using ultrasound
bridged leg
open leg
endoscopic vein harvest
Mr R

- 79 M
- CVA 2007
- type 2 diabetes
- chronic kidney disease
- right hip replacement
- varicose veins - left high tie and stripped 1960, bilateral high tie 1987
Mr R cont'd

- asked to review by surgeon had concerns regarding conduit
- if no suitable conduit seen on ultrasound plan to refer the patient to interventional cardiology service

ultrasound findings:
- 15cm LSV in right lower leg
- 12cm LSV at right thigh
- 10cm in left thigh
- SSV in right leg good calibre

- surgery done 26/2/2015 - CABG x 3

- LIMA - LAD, SVG - OM1, SVG - PDA
benefits

• non invasive
• cheap
• it tells where I need to cut
• it tells me where there is a tributary or a varicosity
• I can do it with patient standing or lying down
• patients are involved

• there is a learning curve
• but if I know where I am going, it certainly makes the journey quicker
conclusion

• assessing the vein using ultrasound benefits patients

• availability of equipment can be a problem but a vein mapping service can be provided locally given the appropriate resources, time and training
why settle for stargazing and a compass when you can use a sat nav?
thank you

contributors:
surgical care practitioner team
Catherine Sudarshan
Ramesh Kutty
### Amalgamated Data Analysis - June 14 - Sep 15

<table>
<thead>
<tr>
<th>Was the vein mapped?</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>5/135</td>
<td>4%</td>
</tr>
<tr>
<td>Yes</td>
<td>130/135</td>
<td>96%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Was this useful?</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>10/128</td>
<td>8%</td>
</tr>
<tr>
<td>Yes</td>
<td>118/128</td>
<td>92%</td>
</tr>
</tbody>
</table>

- All 10 were due to inexperience of SCP
- 11% (14/128) were deemed very useful
CT centres ultrasound used routinely

• Oxford - ultrasound used routinely

• Wythenshawe - ultrasound used routinely

• Brompton – ultrasound used routinely
CT centres ultrasound used intermittently

- Hammersmith - not done by SCPs, if any concerns pts are sent for formal venous mapping in vascular department
- Barts - ultrasound used when doing EVH
- Southampton – on request
- Blackpool
CT centres ultrasound not used

• Stoke on Trent
• Basildon
evidence
• incision length mapped (M): 16.8cm
• control (C): 24.1cm
• difference: 7.3cm ($p$ – value 0.005)

• measurement of vein diameter
• correlation coefficient: 0.87
• accuracy of anatomy 100%

• time of harvest
• M: 36 min, C: 47min
• difference: 11min, ($p$ – value 0.04)
Venous segments examined (464)
- normal: 281 (60.6%)
- abnormal: 183 (39.4%)

Limbs examined (116)
- normal: 45 (38.8%)
- abnormal: 71 (61.2%)

Type of abnormality
- small: 70 (38.3%)
- dilated: 4 (2.2%)
- discontinued: 109 (59.6%)

### Table 1. Abnormal Vein Segment Distribution

<table>
<thead>
<tr>
<th>Site</th>
<th>Diameter</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thigh Proximal</td>
<td>Normal</td>
<td>94</td>
</tr>
<tr>
<td>Thigh Proximal</td>
<td>Discontinuous</td>
<td>19</td>
</tr>
<tr>
<td>Thigh Proximal</td>
<td>Dilated</td>
<td>2</td>
</tr>
<tr>
<td>Thigh Proximal</td>
<td>Small</td>
<td>4</td>
</tr>
<tr>
<td>Thigh Distal</td>
<td>Normal</td>
<td>89</td>
</tr>
<tr>
<td>Thigh Distal</td>
<td>Discontinuous</td>
<td>24</td>
</tr>
<tr>
<td>Thigh Distal</td>
<td>Dilated</td>
<td>2</td>
</tr>
<tr>
<td>Thigh Distal</td>
<td>Small</td>
<td>5</td>
</tr>
<tr>
<td>Calf Proximal</td>
<td>Normal</td>
<td>61</td>
</tr>
<tr>
<td>Calf Proximal</td>
<td>Discontinuous</td>
<td>44</td>
</tr>
<tr>
<td>Calf Proximal</td>
<td>Dilated</td>
<td>0</td>
</tr>
<tr>
<td>Calf Proximal</td>
<td>Small</td>
<td>34</td>
</tr>
<tr>
<td>Calf Distal</td>
<td>Normal</td>
<td>80</td>
</tr>
<tr>
<td>Calf Distal</td>
<td>Discontinuous</td>
<td>22</td>
</tr>
<tr>
<td>Calf Distal</td>
<td>Dilated</td>
<td>0</td>
</tr>
<tr>
<td>Calf Distal</td>
<td>Small</td>
<td>27</td>
</tr>
</tbody>
</table>

### Table 2. Normal Limb Vein Sites

<table>
<thead>
<tr>
<th>Site</th>
<th>Right n = 58</th>
<th>Left n = 58</th>
<th>Both n = 116</th>
<th>Percent Normal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thigh Normal</td>
<td>41</td>
<td>44</td>
<td>85</td>
<td>73.3</td>
</tr>
<tr>
<td>Calf Normal</td>
<td>32</td>
<td>25</td>
<td>57</td>
<td>49.1</td>
</tr>
</tbody>
</table>

Values record normal vein segments in both the proximal and distal thigh and proximal and distal calf. A normal occurrence for the thigh is recorded if the proximal and distal thigh segments in the same limb are both normal. A total of 116 limbs were examined.
Preoperative Vein Mapping for Coronary Artery Bypass Operations
Harold D. Head, MD, and Marion F. Brown, MD

- mapped vein: 3.57mm
- in situ vein: 3.82mm
- distended vein: 5.25mm
- major branches identified: 11 pts
- venous disease: 13 patients
- change to surgical plan: 13 times

Fig 3. Comparison of mean diameters of greater saphenous veins obtained by preoperative ultrasonographic imaging (Mapped), operative measurement before manipulation (“In Situ”), and measurement after excision and preparation (Distended). Vein diameters are displayed at defined locations in the leg and are shown to increase progressively from ankle to upper thigh. Mapped diameters correlate closely with those measured in situ, and the distended vein diameters are generally 1.5 mm greater than the mapped and in situ diameters.
Best Evidence Topic

32 abstracts identified

5 represent the best evidence to answer the clinical question

- one paper found that it could not reliably identify fibrotic vein wall changes
- overall the findings showed that, in all but one case, ultrasound mapping was of benefit in identifying unusable segments of LSV

Could routine saphenous vein ultrasound mapping reduce leg wound complications in patients undergoing coronary artery bypass grafting?*

Jonathan David Broughton*, Sanjay Asopa*, Andrew Timothy Goodwin* and Sue Gildersleeve*

Interactive CardioVascular and Thoracic Surgery 16 (2013) 75–78