Best evidence topic - Coronary

Do coronary artery bypass grafts using cephalic veins have a satisfactory patency?

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Summary

A best evidence topic in cardiac surgery was written according to a structured protocol. The question addressed was whether using the cephalic vein from the arm for coronary artery bypass grafts achieves an adequate patency rate. Only 219 papers were identified on Medline using the reported search and hand-searching of reference lists. Fourteen papers represented the best evidence on the topic. The author, journal, date and country of publication, patient group studied, study type, relevant outcomes, results and study weaknesses were tabulated. The patency rate seems to be in the order of 50% at around three years for cephalic veins used for coronary bypass grafting, and this was variable. In addition, we identified only 181 cephalic veins used for coronary bypass grafting in the literature from seven papers. In lower extremity bypass procedures over 900 uses of the cephalic vein have been documented but again patency seems to be around 50% at three to five years. Arterialisation of the vein using an arteriovenous fistula, or angioscopy, have both been used as an attempt to improve patency. In addition, a large proportion of the reported cephalic veins for coronary grafting were used for sequential bypass grafting which may have affected patency rates. Thus, in summary, the patency of the cephalic vein used for coronary artery bypass grafting is around 50% at three years.

Keywords: Thoracic surgery; Cephalic vein; Upper extremity vein; Graft patency

1. Introduction

A best evidence topic was constructed according to the structured protocol. This protocol is fully described in the ICVTS [1].

2. Clinical scenario

You are referred a diabetic 78-year-old gentleman with left main stem disease and triple vessel disease. He has severe varicose veins in both his legs, but he has a large first diagonal artery and you would like to place four grafts. You would like to use the left internal mammary artery, and both radial arteries and you wonder whether you could also use a cephalic vein from his arm. You resolve to check the patency of these veins in the literature prior to proceeding.

3. Three-part question

In patients undergoing coronary artery bypass surgery, is the use of the cephalic vein associated with acceptable graft patency.

4. Search strategy

Medline 1966 to November 2006 using OVID interface, [exp Thoracic Surgery OR Thoracic Surgery.mp OR exp Thoracic Surgery] and [upper extremity vein$.mp OR arm vein$.mp OR cephalic vein$.mp]

5. Search outcome

A total of 219 papers were identified using the reported search. Seven papers documenting the patency of the cephalic vein for coronary bypass grafting and the largest series of cephalic veins for a lower extremity bypass were documented. In addition, another six papers on lower extremity grafting with cephalic veins were briefly reviewed but not tabulated (Table 1).

6. Results

Licht et al. [2] reported a series of 39 patients undergoing coronary artery bypass grafting (CABG) who had a cephalic vein. Eighteen had angiographic follow up (mean 31 months). Fifty-two percent of grafts were patent, 39% of all veins had intraluminal disease, and 19% were dilated.

Wijnberg et al. [3] compared a group of 28 patients who received a cephalic vein graft with a matched group who received saphenous vein grafts. At mean 4.6-year follow up, cephalic vein patency was 47% compared to 77%.

Stoney et al. [4] assessed the patency of 56 cephalic or basilic vein grafts from 28 patients. 32/56 (57%) grafts
### Table 1: Best Evidence Papers

<table>
<thead>
<tr>
<th>Author, date and country</th>
<th>Patient group</th>
<th>Outcomes</th>
<th>Key results</th>
<th>Comments</th>
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</thead>
<tbody>
<tr>
<td><strong>Licht et al., 1996, Eur J Cardio Thorac Surg, Denmark, [2]</strong></td>
<td>39 patients had cephalic veins used for coronary artery bypass grafting in a 10-year period</td>
<td>Patency by distal anastomoses at median 30 months</td>
<td>Patency by distal anastomoses 46%</td>
<td>Small case-series Eight patients died during follow up</td>
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<tr>
<td>Case series (level 4)</td>
<td>43 distal anastomoses</td>
<td></td>
<td>In addition, Intraluminal disease 39% (12/31) Mild dilatation 19% (6 grafts)</td>
<td>Only 18 of 39 cephalic veins had patency assessment</td>
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<td>18 had an angiographic follow up programme</td>
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<td>Follow up 30 months (17–87 months)</td>
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<td>IMA patency by angiography</td>
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<tr>
<td><strong>Wijnberg et al., 1990, Eur J Cardio Thorac Surg, Holland, [3]</strong></td>
<td>40 cephalic veins in 28 patients used for coronary artery bypass grafts. (over 10 previous years)</td>
<td>Five-year patency by digital subtraction angiography</td>
<td>Cephalic vein 8/17 (47%) Saphenous vein 17/22 (77%) (P=0.051)</td>
<td>Indication for needing arm vein 22 varicose veins five prior use one dwarfism</td>
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<tr>
<td>Case control study (level 3b)</td>
<td>77 distal anastomoses</td>
<td>Symptoms</td>
<td>Symptomatically no difference, arm vein pts were on more anti-anginal medication (74% vs. 39%)</td>
<td>Mean follow up 4.6 years All patients were anticoagulated postoperatively</td>
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<td></td>
<td>28 matched patients who had saphenous veins harvested were also compared</td>
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<td><strong>Stoney et al., 1984, J Thorac Cardiovasc Surg, USA, [4]</strong></td>
<td>56 cephalic veins from 1974 to 1982 in 28 patients used for coronary artery bypass grafts. Basilic vein from upper arm also occasionally used</td>
<td>Patency by angiography (Mean delay 25 months range two months to nine years)</td>
<td>32/56 (57%) patency of cephalic vein at two years Seven patent grafts had localised stenoses</td>
<td>Poor unmatched comparison group with angiograms at a different time interval</td>
</tr>
<tr>
<td>Case control study (level 3b)</td>
<td>Separate group of 28 patients who had saphenous vein grafts used for comparison</td>
<td>LIMA patency in same patients</td>
<td>45/57 (79%) patency of saphenous vein at mean 44 months</td>
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<td></td>
<td>15/16 (93%)</td>
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<td><strong>Jarvinen et al., 1984, J Thorac Cardiovasc Surg, Finland, [5]</strong></td>
<td>16 cephalic vein grafts for coronary artery bypass grafts in 15 patients, performing 34 distal anastomoses</td>
<td>Patency by angiography at mean 1.4 years post-op</td>
<td>27/31(87%) for cephalic veins 100% LIMA patency</td>
<td>Four patients also had coronary endarterectomy Three short saphenous veins were patent</td>
</tr>
<tr>
<td>Case series (level 4)</td>
<td>Eight male, seven females 46–77 years Indication 13 Varicose two Prior use</td>
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<tr>
<td><strong>Prieto et al., 1984, Ann Thorac Surg, Canada, [6]</strong></td>
<td>13 patients 34–66 years</td>
<td>Patency by angiography</td>
<td>24 grafts 10 patients studied six patients at &lt;9 month 9/10(90%) grafts patent four patients at one year 5/8 (62%) grafts patent but additional two had gross stenosis</td>
<td>Small case-series No aspirin or anticoagulation, beta blockers in half of patients</td>
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<tr>
<td>Case series (level 4)</td>
<td>Indication 13 stripping</td>
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Table 1 (Continued)

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<tr>
<td>Seifert et al., 17 patients, 35 grafts</td>
<td>Patency by angiography</td>
<td>0.3–2.1 year mean 0.7 year patency 23/35 66%</td>
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<tr>
<td>Case series (level 4)</td>
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<td>Fairies et al., 520 patients who had a lower extremity bypass graft using an arm vein from 1990 to 1998</td>
<td>Cephalic vein patency measured by continuous vein Doppler</td>
<td>30-day = 97.0% ± 0.7%, 1-year = 80.2% ± 2.1%, 3-year = 68.9% ± 3.6%, 5-year = 54.5% ± 6.6%</td>
<td>Lower limb revascularisation</td>
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<tr>
<td>Cohort study (level 2b)</td>
<td>Intraoperative vein angioscopy was performed to identify and lyse valves Fem-pop bypass grafts (33%) Popliteal-tibial (28%) 98% of operations were for limb salvage 70% single arm vein, 30% spliced composite veins</td>
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<td>Mehta et al., Case study. 69-year-old lady had an arteriovenous fistula angiography in 1986 formed 2 weeks prior and one patent in July 1990</td>
<td>Vein patency</td>
<td>Both cephalic vein patent on angiography in 1986 and one patent in July 1990</td>
<td>Case report only</td>
<td></td>
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</tbody>
</table>

were patent at mean 25 months while 7 (12.5%) of the patent grafts had localised stenoses.

Jarvinen et al. [5] reported the patency of 16 cephalic veins in 15 patients. At a mean follow up of 1.4 years (1–42 months), 87% (27/31 distal anastomoses) were patent angiographically although three veins also had aneurysmal dilatation.

Prieto et al. [6] examined 10 patients at different intervals. The early patency of arm vein grafts in six patients studied less than nine months after operation was 9 out of 10 grafts (90%). Four patients were followed for more than one year, after which time five out of eight grafts (63%) were patent, two of them with gross abnormalities.

Seifert et al. [7] studied 17 patients at eight months follow up, out of 35 grafts only 23 (66%) were patent. There were attempts to address the issue of delicate thin wall and poor handling of arm veins by creating arteriovenous fistulae to arterialise the vein before using it for bypass grafting.

Faries et al. [8] reported the cephalic vein graft patency of 520 lower limb bypass procedures up to 1998. Patency was assessed regularly using Doppler ultrasound and interestingly on harvesting, half of the veins had an angioscopy performed and luminal integrity was assessed, resulting in 30% of veins being spliced to resect an abnormal section. The three-year patency was 69%, and the five-year patency was 55%.

Mehta et al. [9] reported a case where two cephalic arterialised veins were used. One vein lasted at least seven years and the other was patent at 11 years.

We identified several other studies that documented the use of the cephalic vein for lower extremity bypass. We did not tabulate these but the patency was: Schulman [10] in 64 patients, five-year patency 31% for femoropopliteal bypass and 15% for femorotibial bypass; Holzenbein [11] in 250 cephalic vein grafts, three-year patency 52%; Harris [12] in 67 patients, 68% at five years; Brochado-Neto [13] in 35 cephalic veins: 42% two-year patency; Harward [14]
in 43 patients, 49% at three years; Seston [15] in 34 patients 40% three-year patency.

7. Clinical bottom line

The patency rate seems to be in the order of 50% at around three years for cephalic veins used for coronary bypass grafting, and this was variable. In addition, we identified only 181 cephalic veins used for coronary bypass grafting in the literature. In lower extremity bypass procedures over 900 uses of the cephalic vein have been documented but again patency seems to be around 50% at three to five years. Arterialisation of the vein using an arteriovenous fistula, and angioscopy have both been used as an attempt to improve patency in some papers. In addition, a large proportion of the reported cephalic veins for coronary grafting were used for sequential bypass grafting which may have affected patency rates. Thus, in summary the patency of the cephalic vein used for coronary arterial bypass grafting is around 50% at three years.

References

[6] Prieto I, Basile F, Abdulnour E. Upper extremity vein graft for aorto-coro-


ICVTS on-line discussion A

Title: And the conclusion is?
Author: Russell W.J. Milliner, Blackpool Victoria Hospital, Whitney Hey’s Road, Blackpool, FY3 8NR, UK
doi:10.1510/icvts.2006.149104A
eComment: No! - unless you are desperate! [1].

Reference


ICVTS on-line discussion B

Title: It depends on clinical situations
Author: Chung-Dann Kan, Department of Surgery, National Cheng Kung University Hospital, Tainan, Taiwan
doi:10.1510/icvts.2006.149104B
eComment: In routine coronary artery bypass grafting operations, as well as the knowledge of radial artery and great saphenous vein grafts have been extensively used with good results for bypass grafting materials. However, we have also experienced that for people who have severe atherosclerosis with radial arteries totally occluded combined with bilateral leg varicos, the only choice is cephalic veins. Those patients still have good results in clinical follow-up. We believe they can have more benefits from using cephalic vein than from diseased arteries and saphenous vein. So maybe we should seek more strategies to improve the patency rate of cephalic vein grafts [1].

Reference