SHORT REPORT

Use of Deep Forearm Veins as an Outflow for Arteriovenous Graft Access

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Introduction

An adequate strategy for selecting venous outflow for repeated vascular access plays a major role in determining the long term survival of patients in a haemodialysis programme. Since the first description of the method for creating an arteriovenous (AV) fistula by Brescia et al., numerous techniques and materials have been tried in order to achieve better patency rates. However, failure of vascular access continues to be the main cause of hospital admission in haemodialysis patients.

Although surgery for vascular access is commonly performed by most vascular surgeons, the search for a suitable venous outflow is often hampered by the progressive exhausting of superficial veins, due to repeated punctures or failure of previously fashioned access conduits.

An AV graft constructed in a loop fashion, between the brachial artery and the superficial forearm veins, is the usual technique in most centres. However, the use of deep forearm veins as an outflow for an AV, and their role as an alternative choice after a previously failed fistula, has scarcely been analysed. In this short report, a description of the procedure and preliminary results are discussed.

Patients and Technique

Between March and September 2001, seven patients with a previously failed autologous fistula in the forearm were considered for an AV graft in the upper extremity. At least one suitable brachial vein was identified in five of them (4 men and 1 woman, mean age 56 years). An AV graft loop, using this vein as an outflow and the brachial artery as an in-flow, was performed in these cases. In the two other patients, a straight AV graft was constructed between the brachial artery and the axillary vein.

Briefly: an oblique incision was performed in the elbow crease, immediately above the approach used for the previously failed fistula. After incising the bicipital aponeurosis, the brachial artery and its two venae comitantes were exposed and controlled with vessel-loops. The larger of the veins was selected for the venous anastomosis. A 6 mm ringed PTFE graft (W.L. Gore and Associates, Inc., Flagstaff, Arizona) was subcutaneously tunnelled in a loop fashion, using two complementary incisions. An end-to-side and side-to-end anastomosis with a 6/0 PTFE suture were performed in the brachial artery and vein, respectively (Fig. 1).

The interval between the procedure and the first use of the graft for haemodialysis was about 4 weeks. All the patients were systematically followed and reviewed for usual complications such as oedema, digital ischaemia or postural compression at the elbow joint.

Primary patency has been maintained in three cases: one patient died at 8 months with a patent graft and two are alive and their grafts are patent 17 and 14 months after the procedure, respectively. One graft occluded at 13 months. Secondary patency was achieved in another patient who survived 2 months...
after thrombectomy and proximal extension of the venous anastomosis performed 6 months after the primary operation. Only one patient developed a complication related to the procedure, consisting of moderate oedema during haemodialysis.

**Discussion**

Based on their patency rates, AV graft access is considered to be a second choice procedure as compared with autologous fistula (54% vs. 85%, respectively, at 1 year, in one study). However, exhausting of suitable superficial veins raises the need to create vascular access by interposing fabric grafts between the arterial and the superficial or deep venous system. Usual designs include interposition grafts between the brachial artery and the superficial forearm or axillary veins and different configurations between the femoral artery and vein.

Utility of the deep forearm veins as an outflow for AV grafts was suggested in 1996 by Benedetti et al. However, experience with this technique has not been further analysed, except for the communication by Skandalos et al. of a series of six AV grafts between the radial artery and deep forearm veins. Only one graft occluded at 6 months, the remaining five being patent at the time of its publication (at 3, 11, 15, 19 and 24 months).

Unsuitability of deep forearm veins as an outflow for AV grafting is probably due to their small diameter and potential damage to the venous drainage of the upper extremity. In this series, five out of seven patients showed at least one brachial vein acceptable for the technique. This can be partially explained by the previous existence of an AV shunt at the elbow that could contribute to their dilatation.

Patency rates at 6 months (100%) and at 1 year (60%) are quite similar to those carried out using other techniques (Table 1). These results, together with the absence of major complications, suggest that deep forearm veins are suitable as an outflow for AV graft access. A loop graft between the brachial artery and deep forearm veins should be considered after other autologous or graft forearm fistulae have failed. This strategy introduces a new step before considering the use of a more proximal approach in the upper limb or the lower extremity.

**References**


**Table 1. Results of AV grafts for haemodialysis**

<table>
<thead>
<tr>
<th>Author</th>
<th>Patients</th>
<th>Outflow vein</th>
<th>Patency rate</th>
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<tbody>
<tr>
<td>Lemaitre, 1978</td>
<td>35</td>
<td>Forearm (superficial)</td>
<td>71% at 18 months</td>
</tr>
<tr>
<td>Swedberg, 1989</td>
<td>66</td>
<td>Forearm (superficial)</td>
<td>16 months (mean)</td>
</tr>
<tr>
<td>Kaufman, 1997</td>
<td>131</td>
<td>Forearm (superficial)</td>
<td>45% at 1 year</td>
</tr>
<tr>
<td>Benedetti, 1996</td>
<td>12</td>
<td>Forearm (deep)</td>
<td>Not stated</td>
</tr>
<tr>
<td>Skandalos, 2000</td>
<td>6</td>
<td>Forearm (deep)</td>
<td>3, 11, 15, 19, 24 months one occlusion at 6 months</td>
</tr>
</tbody>
</table>
Deep Forearm Veins for AV Grafts


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