Loop Basilic Vein Brachial Artery Arteriovenous Access, an Option in the Forearm Before the use of Arm Veins in Hemodialysis

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ABSTRACT

A case series study aims to evaluate the forearm loop basilic vein to brachial artery arteriovenous fistula as an access for hemodialysis, to assess its advantages and disadvantages. 14 patients underwent forearm loop basilic brachial access and were evaluated and followed up for: patency (functioning arteriovenous fistula AVF), maturation period, complications (as regards edema, infection, hand ischemia, hematoma, venous hypertension and aneurysm formation), accessibility for dialysis and patient satisfaction. Fourteen patients were involved. All patients had failed radiocephalic AVF as a 1ry access and ten of them had also failed brachiocephalic AVF. In other 4 patients, the cephalic vein was unsuitable for the brachiocephalic access. Maturation of the fistula required a period between 6-10 weeks (average 7 weeks). Patency rate was 85% after 3 months of follow up and 64% after 9 months. We recommend loop basilic vein brachial artery fistula as an access option in the forearm before starting to use arm veins.

Keywords: loop, basilic vein, forearm, arteriovenous fistula.

INTRODUCTION

Arteriovenous fistulas are crucial for hemodialysis performance in patients with end-stage renal disease. Dialysis Outcomes Quality Initiative (DOQI) guidelines have focused on the use of native veins for the construction of (AVF) for hemodialysis rather than prosthetic arteriovenous grafts (AVG) to prevent the frequent secondary procedures necessary to maintain access for dialysis. A report from the US Renal Data System Dialysis Morbidity and Mortality Study has shown a 91% higher incidence of graft revisions (relative risk =1.91) versus autologous fistulae. The distal forearm is the site of first choice for creation of an arteriovenous fistula for hemodialysis. The primary radial-cephalic fistula as described by Brescia, yields excellent functional patency for many patients. An alternative to the radiocephalic fistula is to use the upper arm veins to create either a brachiocephalic fistula or a brachiobasilic fistula. The basilic vein in the upper arm generally lies under deep fascia, the use of this vein for an AV fistula requires the vein to be dissected and transposed into a more convenient subcutaneous position. The forearm basilic vein is rarely used for creating autogenous vascular access. Its use presents a valuable option when autogenous wrist radial-cephalic direct access cannot be created or failed, thus preserving the upper arm veins for future use.

Few studies reported the use of the forearm basilic vein as a hemodialysis access because the vessel is anatomically deep structure, the basilic vein is often not well developed, access to this vein for subsequent puncturing is difficult, and the arm position is uncomfortable because of its position on the medial side of the arm.

MATERIALS & METHODS

This study aimed to evaluate the forearm loop basilic vein to brachial artery arteriovenous fistula as an access for hemodialysis, advantages and disadvantages over the period between December 2008 and May 2010. It involved 14 patients. Three of them were females and 11 were males. Their age varied between 54 and 69 years. All of them had failed radiocephalic AVF as a 1ry access and ten of them had also failed brachiocephalic AVF. In other 4 patients, the cephalic vein was unsuitable for the brachiocephalic access. We assessed them clinically and they had preoperative duplex study.

Inclusion criteria were: (1) No accessible cephalic veins on either side. (2) Weak pulsation assessed clinically, by duplex study and history...
of bad inflow in radial artery in previous radiocephalic fistula. (3) The luminal diameter of the basilic vein in forearm is 3mm or more.

We carried the procedure under general or local anaesthesia. We marked the course of basilic vein in the forearm and the planned loop before the operation fig.(1). We dissected the basilic vein and ligated its tributaries. We created the tunnel, transposed the basilic vein to form u-shaped loop and anatomosed it to brachial artery.

We followed the patients weekly during maturation period (average 7 weeks) then after 3, 6, 9 months post operative. We considered the following in the follow up sheet: patency (functioning AVF), maturation period, complications (as regards edema, infection, hand ischemia, hematoma, venous hypertension and aneurysm formation), accessibility for dialysis and patient satisfaction.

RESULT

Fourteen patients were involved in this study, three women and 11 men. The mean age was 44.8 years.

All patients had failed radiocephalic AVF as a 1ry access and ten of them had also failed brachiocephalic AVF. In other 4 patients, the cephalic vein was unsuitable for the brachiocephalic access.

Comorbidities in the patients are presented in table (1).

All patients had patent AVF except three cases who developed early thrombosis at the first two weeks postoperative. A trial of thrombectomy was carried out and was successful in one patient but failed in two cases. One patient died after 4 months of follow up and the fistula was functioning. Three patients were lost at the 9th month follow up. One of them had occluded access at the 6th month follow up. The table (2) shows patency during follow up.

Maturation of the fistula required a period between 6-10 weeks of average 7 weeks.

Complications of the procedure are shown in table (3).

As regard accessibility for hemodialysis and patient satisfaction, all patients reported difficulties in puncture at the start, but later adaptation and improved satisfaction were recorded.

Table (1): Comorbidities in patients with loop BBAVF

<table>
<thead>
<tr>
<th>Comorbidity</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diabetes Mellitus</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>Hypertension</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Ischemic cardiac disease</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Peripheral arterial obstructive disease</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Cerebrovascular disease</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

Table (2): Patency during follow up.

<table>
<thead>
<tr>
<th>Date</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 wks</td>
<td>11/14</td>
<td>78 (1rypatency)</td>
</tr>
<tr>
<td></td>
<td>12/14</td>
<td>85 (2rypatency)</td>
</tr>
<tr>
<td>3 months</td>
<td>12/14</td>
<td>85</td>
</tr>
<tr>
<td>6 months</td>
<td>10/14</td>
<td>71.4</td>
</tr>
<tr>
<td>9 months</td>
<td>9/14</td>
<td>64</td>
</tr>
</tbody>
</table>

Table (3): Complications of the fistula

<table>
<thead>
<tr>
<th>Complication</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Edema</td>
<td>2/14</td>
<td>14</td>
</tr>
<tr>
<td>Hematoma</td>
<td>1/14</td>
<td>7</td>
</tr>
<tr>
<td>Aneurysm formation</td>
<td>1/14</td>
<td>7</td>
</tr>
<tr>
<td>Infection</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Hand ischemia</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Venous hypertension</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>
DISCUSSION

The National Kidney Foundation's DOQI recommend that 50% of all new access procedures and 40% of currently used dialysis accesses be autologous 2. These widely acknowledged guidelines have focused on improving the quality of care of the dialysis patient to reduce morbidity.9

The use of autologous veins requires careful selection to create a well functioning access with preservation of other veins10. As the dialysis population becomes older, the need for 2ry and 3ry access will grow if the current access develops any complications during dialysis like infection, thrombosis or any other complications requiring another access.11

A little attention has been given in the literature to the utilization of the basilic vein in the forearm to preserve the arm veins for another setting. Moris and Kinnaert12 and Elcheroth et al.13 reported their experience with the brachial artery forearm vein fistula. Gefen et al. mentioned similar technique as a 1ry access for diabetic patients.4

In our study, 14 patients with a mean age 44.8 years were involved while Gefen et al,4 reported 16 patients with mean age 69 years, while Moris and Kinnaert,12 reported 50 years and in Elcheroth et al. study,13 59% of patients were above 50 years. This different age group may affect the outcome and may also affect the decision of the site of access.

The younger the age the more distal access will be available. In the elderly, it is more
difficult to find distal artery healthy especially with the associated comorbidities.

Maturation of the fistula required a period between 6-10 weeks with an average 7 weeks. Gefen et al.4 reported 8 weeks for maturation of this fistula. This time is considered longer than that required to radiocephalic or even transposition of basilic vein in arm. The size of the basilic vein in forearm is smaller than in arm and the flow in the loop fistula differs from that of straight fistula.

Patency rate differs in 3 months than that after 9 months. In 3 months follow up it was 85% but after 9 months it was 64%. It was 64% in Gefen et al. study4, 63% in Moris and Kinnaert study,12 and 62% in Elcheroth et al. study.13

In our study, all patients had failed radiocephalic fistula before our procedure, they also had weak radial pulse, as an indication to proceed for brachial artery for the next access and excluding the ulnar artery and the ulnar-basilic choice.

We assessed this flow clinically and by duplex study. Gefen et al.4 mentioned that proposals for minimum acceptable diameter of the radial artery lumen range from 1.7 to 2.0mm. Malovrh14 described another approach by measuring flow volume with duplex.

In this study, our patients reported some difficulties in accessibility during dialysis. However, these difficulties were improved by time and adaptation. This is because the basilic vein is anatomically deep, not well developed, and access to this vein for subsequent puncturing is difficult. The arm position is uncomfortable because of its position on the medial side of the arm.15

There are some technical difficulties like long incision in the forearm to ligate the tributaries and to harvest the vein. This may be done under local anaesthesia. Another difficulty is the tunnel and creation of a loop without twisting the vein.

In conclusion,

We recommend loop basilic vein brachial artery fistula as an access option in the forearm before starting to use arm veins.

REFERENCES


