

# ARTERIOVENOUS FISTULA USING BASILIC VEIN TRANSPOSITION

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## ABSTRACT

**Objective:** To study the place of basilic vein transposition in providing long-term vascular access for patients needing long-term hemodialysis.

**Methods:** The brachial artery / transposed basilic vein arteriovenous fistulas have been used as a primary, secondary or tertiary procedure to provide long-term vascular access in 20 patients requiring hemodialysis.

**Results:** There were no technical failures, and all fistulas matured. One patient developed postoperative hematoma and another developed lymph leak. No infective complication occurred.

**Conclusion:** Arteriovenous fistula using transposed basilic vein is a suitable procedure that should be considered as one of the options for long-term vascular access in patients with chronic renal failure requiring hemodialysis.

**Key words:** Arteriovenous fistula, Basilic vein, Hemodialysis.

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## Introduction

A well-functioning vascular access is essential to achieve long-term survival and optimal quality of life for patients requiring hemodialysis. The radiocephalic fistula, fashioned at the nondominant arm is the first choice, followed by the brachiocephalic fistula at the elbow<sup>(1-3)</sup>.

In the absence of a suitable cephalic vein at the forearm and upper arm, an arteriovenous fistula (AVF) can be fashioned using a prosthetic graft or a transposed basilic vein<sup>(1,3)</sup>.

The basilic vein is well protected from venipuncture through its deep position in the subfascial plane (Fig. 1A). Because of its deep position and proximity to the neurovascular bundle, mobilization and anterolateral displacement of the basilic vein is necessary to achieve adequate and safe access.

Brachiobasilic transposition fistula was originally described as a tertiary procedure in the provision of long-term access<sup>(4,5)</sup>. Our unit has a large load of chronic renal failure patients, who need long-term hemodialysis due to the lack of an organized cadaveric transplant program. They, therefore, often need multiple access

procedures. Since early 1999 we have added basilic vein transposition (BVT) fistulae to our procedures in order to increase our choice for access in those unfortunate patients.

This paper will outline our experience with this procedure.

## Methods

Between March 1999 and January 2001, 20 arteriovenous brachiobasilic fistulae using transposed basilic veins were fashioned. Ten males and 10 females were included. Three of the males and one female were diabetic. Median age was 43 years range 9-78 years. Clinical examination revealed that none of those patients had a suitable superficial upper limb vein to create a radiocephalic or brachiocephalic arteriovenous fistula.

Patency of the central venous system was established clinically, in that, none of the patients had any signs of upper limb or neck edema or venous engorgement, and none had a problem of venous drainage where they had a functioning AVF previously. Neither venography nor duplex ultrasonography were thought to be necessary at this stage.

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Brachio basilic fistula was done as a primary procedure in 5 patients, and as a secondary procedure in 4 patients. The rest had had between 3 and 6 previous procedures to create an arteriovenous fistula. In one patient, an already existing brachio basilic fistula with a short venous segment was salvaged by bringing the rest of the basilic vein to a more suitable superficial position. Three of the adult patients were operated under local anesthesia as they were deemed unfit for general anesthesia. At each operation, a preoperative dose of 0.5 gram cefoxitin or ceftazidim was given intravenously. The basilic vein was exposed through multiple incisions or through one single incision over the medial aspect of the arm, starting at the elbow crease up to the axilla. The brachial artery was exposed through the distal incision (Fig. 1B). Where more venous length was felt to be necessary, extension of the wound a few centimeters down from the elbow crease was done in few patients. In dissecting the vein out, care was taken to ensure proper secure ligation of its tributaries and communications because a slipped ligature could cause troublesome bleeding. Injury to the accompanying medial cutaneous nerve of the forearm was avoided by the careful dissection and mobilization of the vein.

The basilic vein was ligated at the elbow, or distal to it, and divided after obtaining adequate length (> 20 centimeters). The vein was irrigated with heparinized saline to rule out proximal obstruction. A vascular clamp was applied to the basilic vein at the axilla and the vein was then filled with heparinized saline to rule out unligated tributaries, stenosis or venous injuries and to avoid torsion of the vein during tunneling. The basilic vein was tunneled subcutaneously utilizing two small incisions along the anterolateral aspect of the arm. The vein was then anastomosed end to side to the brachial artery distally in the antecubital fossa, using 6/0 Prolene (Fig. 1C). Two Penrose drains were placed, one at the site of the anastomosis and the other in the bed of the dissected basilic vein. The wound was closed in one layer by non-absorbable suture. The patients were admitted for one day. On the next day, the drains were removed and the patients were discharged. The fistula was allowed to be used for hemodialysis 5 weeks after surgery (Fig. 2).

The patients were followed up through regular visits in the clinic and in cooperation with the dialysis units.

## Results

All basilic vein transposition fistulae were carried out with no technical problems. Time needed for surgery for basilic vein transposition fistula ranged between 45-75 minutes. No deaths were associated with the procedures. One patient developed hematoma which was evacuated the following day. Another patient developed lymphatic discharge around the elbow. He was treated with dressings and antibiotics, and resolved in two weeks. The skin wounds healed with no infection. All of the fistulae matured well and were ready to be used

after five weeks for regular hemodialysis. One fistula occluded after being used for three months due to a post-dialysis compressing hematoma that presented too late for salvage. One diabetic patient died of sepsis secondary to calciphylaxis seven months after formation of the fistula. Another, also diabetic, sustained a fatal myocardial infarction 14 months postoperatively. A third patient passed out due to a cerebrovascular accident 16 months post surgery. All three died with functioning fistulae. Two patients received a successful kidney transplant 11 and 13 months after formation of the fistula and had no further use for their access for dialysis. The rest of the patients (14) are still using their fistulae 18 months post formation. None had required secondary intervention to maintain patency so far.

## Discussion

Our results of a 95% primary patency rate compare favorably with the published literature concerning this procedure<sup>(2,3,4,6,7)</sup>.

With improved medical care and hemodialysis efficiency, and in the absence of a cadaveric transplant program, more patients require secondary and tertiary vascular access procedures. Primary AV fistulae are the preferred vascular access. The radiocephalic fistula of Brescia and Cimino is well established as the operation of first choice and has a good long-term patency and rarely develops complications<sup>(1-3)</sup>.

Primary fistulae between the brachial artery and cephalic vein are the second choice for long-term access. They provide good access to the circulation and are easy to cannulate<sup>(1-3)</sup>.

In the absence of suitable superficial veins due to previous fistula formation or repeated cannulation, the choice of vascular access is generally between prosthetic graft and basilic vein transposition<sup>(3)</sup>. Prosthetic grafts, usually polytetrafluoroethylene grafts, can be cannulated earlier than autologous veins, but are associated with a higher complication rate, including infection, thrombosis, and require frequent reoperations to maintain patency<sup>(3,4)</sup>.

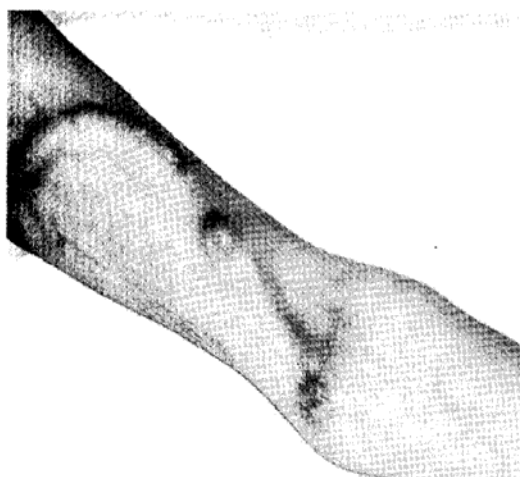
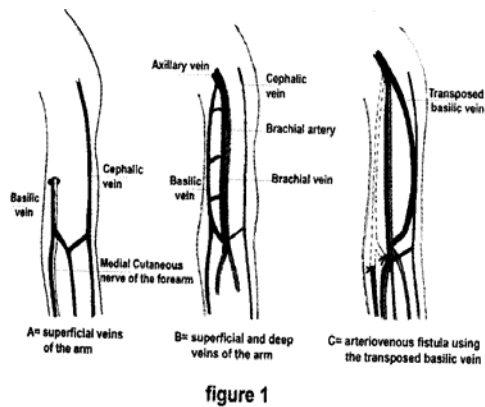
The basilic vein is usually of good caliber and well protected in its deep subfascial position and therefore acts as a hidden resource of vein material. Brachio basilic fistulae were first described in 1976 by Dagher<sup>(5)</sup>, where the basilic vein dissection and brachio basilic anastomosis were performed in one session. El Mallah and Zielinski advised a staged procedure, where the arteriovenous anastomosis was done first and dissection of the vein was delayed 2-4 weeks later. This allows easier dissection of an arterialized vein<sup>(6,8)</sup>.

To avoid a long incision along the arm, endoscopic and video-assisted mobilization of the basilic vein out of its bed have been reported<sup>(9,10)</sup>. Since the introduction of this procedure only limited studies have been conducted to confirm the place of this operation in providing vascular access. All of the studies have shown that the

use of a transposed autologous basilic vein has several advantages over placing a prosthetic graft<sup>(3,4,11)</sup>. Transposed basilic vein fistulae have better long-term patency, lower incidence of infection and thrombosis, are less expensive and preserve the venous outflow tract after AVF thrombosis for a future prosthetic AVF operation. The surgeon needs to perform only one anastomosis<sup>(3,4,11,12)</sup>. Despite all these advantages, BVT is still an underused procedure<sup>(7,13)</sup>.

The correct type of procedure depends on a careful preoperative assessment of the arterial inflow and venous drainage. The long-term patency rate reflects multiple factors including the type of access, the surgical technique, expertise of the dialysis staff and multiple patient-dependent factors (age, sex, peripheral vascular disease and diabetes)<sup>(13,14)</sup>.

In conclusion, vascular access procedures using autogenous veins have better patency rates and a lower incidence of infection. Basilic vein transposition is one of these options.



**Fig. 2.** Arteriovenous fistula using basilic vein transposition

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