

# Basilic Vein Mobilization for Brachio-Basilic Arterio-Venous Fistula in Dialysis

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## ABSTRACT

**Background:** The first and second choice for vascular access in patients with end stage renal disease (ESRD) is radio cephalic and brachio cephalic arteriovenous fistula (AVF). In patients with failed previous AVF or poorly visualized or impalpable cephalic veins, the basilic vein can be mobilized and superficialized to create an AVF with the brachial artery.

**Objective:** The aim of this study is to report our experience at the Vascular Surgery Department/ Surgical Specialty Hospital in brachio-basilic (BB) vascular access for hemodialysis.

**Methods:** From January 2006 to December 2009, 31 patients with ESRD whose cephalic veins were thrombosed or impalpable or had previous unsuccessful vascular access procedures were referred to the Vascular Surgery Department/Surgical Specialty Hospital for creation of vascular access. Brachio - basilic mobilization AVF was offered to them. There were 20 females and 11 males. Their ages ranged from 12 to 70 years with a mean of 40. Following a careful clinical assessment of the patients, particularly their upper limb superficial veins, Doppler study of both subclavian veins was done to all patients; those with a vein stenosis exceeding 40% were excluded from the study. All patients had mobilization of basilic vein under general anesthesia via a hooky racket incision on medial aspect of upper arm extending from the axilla to the antecubital fossa. The vein is tunneled subcutaneously and anastomosed end to side to brachial artery. The

postoperative condition was monitored looking for any complication. The follow up period lasted for 6 months.

**Results:** nineteen patients (61.3%) had left-sided operations. All fistulae except one functioned well primarily (a success rate of 96.8%). One patient had primary thrombosis of the fistula while another patient developed an aneurysm of the AVF 4 months after the operation. The remainder had a smooth non-complicated postoperative course. All fistulae matured and were ready for cannulation in 6 weeks and remained functioning during the 6 months of follow up.

**Conclusion:** Brachio-basilic AV fistula with anterior basilica vein mobilization is an acceptable option for dialysis with good success rate and fewer complications.

**Key word:** End stage renal disease, Arterio-venous fistula, Brachio-basilic AVF.

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**A** well functioning vascular access is a major necessity for adequate hemodialysis treatment. However, in the present dialysis population with various co-morbidities (like DM) it may be difficult to create an autogenous radial or brachial cephalic arteriovenous fistula.<sup>1</sup>

As an alternative, a second choice vascular access usually involves synthetic bridge grafts in the forearm or elbow and upper arm AVF, anastomosing the brachial artery to the cephalic or transposed basilic vein.<sup>2,3</sup>

With an inherent risk of synthetic graft infection, thrombosis and long term patency, a basilic vein mobilization -arterialization becomes a good option for long term dialysis.<sup>2,4</sup>

The basilic vein can be transposed or elevated subcutaneously, making it accessible for cannulation and hemodialysis. Both one stage and two stage basilic vein transposition procedures can be performed with generally good result.<sup>2,3</sup>

To elucidate these aspects, we retrospectively studied the performance of brachio-basilic AVF in our department.

**Methods:** From January 2006 to December 2009, 31 patients with ESRD and thrombosed or impalpable cephalic vein or failed previous vascular access procedures were referred to the Vascular Surgery Department/Surgical Specialty Hospital for creation of vascular access. Brachio - basilic mobilization AVF was offered to them. There were 20 females and 11 males. Their ages ranged from 12 to 70 years with a mean of 40. Following a careful clinical assessment of the patients particularly their upper limb superficial veins, Doppler study of both subclavian veins was done to all patients; those with a vein stenosis exceeding 40% were excluded from the study due to the anticipated high incidence of failure. All operations were done under general anesthesia using laryngeal mask technique.

The operations were carried out through hokey racket incision extending from near the axilla over the medial aspect of the upper arm and then curved laterally over the antecubital fossa (fig.1).



Indications	Unsuccessful previous op. = 19 (61.3%)	Thrombosed or impalpable cephalic v. = 12 (38.7%)
Virology studies	Normal=28 (90.3%)	HCV=2 (6.4%) HBV=1 (3.2%)
Side of ops.	L= 19 (61.3%)	R= 12 (38.7%)
Early results	Primary success= 30 (96.8%)	Primary failure (thrombosis) = 1 (3.2%) Management= thrombectomy.
Late results	Aneurysm 4 months postop. = 1 (3.2%)	Management= aneurysmectomy+ creation of BB AVF on opposite arm.
Time of cannulation of AVF	6 weeks.	
Rate of complications	2 (6.4%)	
Length of follow-up	6 months.	

We tried to dissect and mobilize 20 cm of basilic vein. The vein was then tunneled under the skin of the arm using a tunneler or a long hemostat taking care to avoid kinking of the vein. End of the vein to side of artery anastomosis was then done by 6/0 polypropylene suture. After securing homeostasis, suction drain was used in four patients only and the skin closure performed by subcuticular suturing technique.

**Results:** thirty one patients (20 females and 11 males) were studied. The female to male ratio was 1.8:1. The age ranged from 12 to 70 years with a mean of 40. Nineteen patients (61.3%) had unsuccessful vascular access operations prior to their referral while the remainder had unsuitable cephalic vein for creation of AVF (thrombosed or impalpable). The comorbidities were diabetes mellitus in 6 patients, hypertension in 7 and systemic lupus erythematosus in one. Virology studies done routinely preoperatively revealed HCV in 2 patients and HBV in one.

Nineteen patients (61.3%) had left-sided operations. The early results were very good. All fistulae except one functioned well. Early failure (thrombosis of AVF) occurred in one patient only (3.2%). It was managed by thrombectomy without success. In another patient, the AVF ceased to function after 4 months due to development of an aneurysm. Aneurysmectomy with creation of abrachio-basilic AVF on the opposite side was performed. The remaining patients had a smooth postoperative course without complications like hematoma, limb oedema and wound infection. The AVF e matured and were used successfully for dialysis in 6 weeks period. The duration of follow up in the dialysis unit reached 6 months without late complications like stenosis, late failure or steal syndrome.

The patients' characteristics are shown in table-1.

Table -1-	Patients' characteristics			
Number	31			
Gender	Females	20 (64.5%)	Males	11(35.5%)
Age	Range= 12-70 yrs		Mean= 40 yrs	
Co-morbidities	DM= 6	HT= 7	SLE=1	

**Discussion.** Cephalic vein at wrist and elbow has always been the best option to create an AVF for dialyzing patients with chronic renal failure ,synthetic loop polytetrafluoroethylene (PTFE) graft in the forearm and the arm is another option, but had many problems ( infection , aneurysm, and clotting associated with stenosis and intimal hyperplasia).<sup>5-8</sup>

An excellent option available all the time was the basilic vein in the arm, the problem here lies in the anatomical position of being deep and posteromedial in the arm making cannulation difficult during dialysis.<sup>3,5</sup>

Brachio- basilic AVF was first described by Dagher et al in 1976.<sup>5,9</sup> The advantage of such type of fistula is using a native vein with one anastomosis with low risk of infection seen in synthetic loops.<sup>2,5,6</sup>

In this study, all patients were assessed preoperatively by Doppler to exclude central vein stenosis, however, Omar N. Zoubi from Jordan in his series of 20 patients to whom brachial artery-transposed basilic vein AVF e were offered, thought that neither Doppler nor venography were necessary at the preoperative stage.<sup>9</sup> Alternatively, patency of the central venous system in his patients was established clinically as none of them had signs of upper limb or neck oedema or venous engorgement and none had a problem of venous drainage where they had a functioning AVF previously.<sup>9</sup>

The issue of virology tests to dialysis patients deserves a careful look. Regardless the method of vascular access, chronic kidney disease and dialysis patients are at increased risk of acquiring viral hepatitis B and C due to frequent contact with blood products and frequent cannulation during the process of hemodialysis. Thus they can have inadvertent needle stick injuries which transmit HBV infection to them from infected people or they can infect others similarly if they were already infected.<sup>10</sup>

Hepatitis B virus (HBV) is very efficiently transmitted in the setting of a per-cutaneous injury that involves an instrument coated with or containing HBV-infected blood. The risk of acquiring HBV from a needle stick injury ranges from 1% to 6% (source patient HBsAg-positive, HBeAg-negative) to 22%-

40% (source patient HBs Ag-positive, HBe Ag-positive). The risk of HCV transmission with a comparable exposure is much lower (3%-10%).<sup>10</sup>

On the other hand, healthcare workers, particularly those working in dialysis are also at risk of getting infected with HBV. Epidemiological studies in the United States in the 1970s demonstrated that healthcare workers had a seroprevalence rate of HBV infection that was 5 to 10 times higher than the general population. Physicians and dialysis workers are at a higher risk of acquiring HBV.<sup>10</sup>

Hepatitis B vaccine should be given to all adult people with chronic kidney disease, kidney dialysis patients as well as people whose jobs expose them to human blood or other body fluids.<sup>11</sup>

In this study, 2 patients had HB and 1 had HC viral infections (9.7%). The healthcare workers dealing with these patients should have been already vaccinated. Their immune status should be checked even if they were already vaccinated by checking their antibody titer. When a needle stick injury occurs, the HCW should receive HBIG as soon as possible (within a week period) together with a new series of HB vaccine. The efficacy of the combination of HBIG and HBV in reducing the rate of HBV infection acquired through occupational exposure is thought to be 85-95%.<sup>11</sup>

Drainage was used occasionally in this series (4 patients). Other patients did not require a drain due to adequate hemostasis. In the Jordanian study, the author placed 2 Penrose drains; one at the site of anastomosis and the other in the bed of the dissected basilica vein.<sup>9</sup> Despite this measure, one out of the 20 patients (5%) developed an early hematoma, one developed late hematoma and one had a lymphatic leak.<sup>9</sup> Compared to this series none of our patients had such complications though drainage was not a routine.

In this series, we used one stage procedure as it was originally described by Dagher in 1976.<sup>9</sup> However, El Mallah and Zieliniski advised a staged procedure, where the arteriovenous anastomosis is done first and dissection of the vein is delayed 2-4 weeks later to allow easier dissection of the arterialized vein.<sup>9</sup> To avoid a long incision along the arm, endoscopic and video-assisted mobilization of the basilic vein out of its bed has been reported.<sup>4,9</sup>

All the studies conducted on the use of a transposed autologous basilic vein have shown several advantages like the need to perform only one anastomosis, better long term patency, lower incidence of infection and thrombosis and being less expensive in comparison with synthetic grafts. Despite all these advantages, brachio-basilic AVF is still an underused procedure.<sup>9</sup> Our results of 96.8% primary patency rate compare favorably with the published literature concerning this procedure.<sup>9</sup>

We conclude that in our practice, brachio-basilic AVF seems to be trouble free and this agrees with the results of other studies<sup>5, 6, 9</sup> It had solved the problem of achieving a permanent access in certain patients who otherwise prove to be an everlasting challenge to the vascular surgeon as well as nephrologists.

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