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### RESEARCH ARTICLE

#### TRANSPOSITION OF BRACHIOBASILIC VEIN AV FISTULA - A CASE SERIES.

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#### Abstract

Renal failure patients demanding AV access creation for Dialysis has been growing in huge numbers and the life expectancy has also been improved by the present treatment facilities. We performed transposed brachiobasilicartero-venous fistula (TBBAVF) in single stage on 28 patients from July 2016 to June 2017. The operative time was 90–120 minutes. All patients had edema of the upper extremity that lasted for 3 to 4 weeks and 6 patients had wound complications but of less severity. Major complications were not seen. The primary patency rates at 6 months and 1 year were 100 % and 89.3% respectively. TBBAVF has good primary patency with less severe complications.

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#### Introduction:-

In the NKF-K/DOQI Clinical Practice Guidelines for Vascular Access (NKF-K/DOQI: The National Kidney Foundation Kidney Disease Outcomes Quality Initiative), transposed brachiobasilicartero-venous fistula (TBBAVF), an autologous arteriovenous fistula, is the third arteriovenous fistula (AVF) recommended for cases with multiple failed AV access. However, TBBAVF is not widely practised. This method has been used at our hospital, Rajiv Gandhi Govt General Hospital, Chennai. We did Brachiobasilic AV fistula with primary transposition in single stage on 28 patients from July 2016 to June 2017. This case series describes the advantages of using autogenous vein for AV access creation and reduced infection risk and financial burden associated with AV graft access creation includes a literature review, focusing on the surgical procedure.

#### Aim and objectives:-

To assess the effectiveness of transposed brachiobasilic AV fistula, an autogenous vein access in patients with renal failure for want of dialysis access, by way of its primary patency and infectious complications.

#### Type of study:-

prospective study.

#### Inclusion criteria:-

1. Renal failure patients in need of AV access creation for dialysis purpose with exhausted forearm and arm cephalic vein or unsuitable cephalic vein for access creation.
2. Arm basilic vein caliber of 2.5mm and above by doppler scan.

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**Exclusion criteria:-**

1. Renal failure patients with innominate vein stenosis of the ipsilateral side
2. Arm basilic vein of <2.5mm
3. Subclavian / brachial artery disease on the ipsilateral side.

**Sample Size:-**28

**Material and Methods:-**

There were 28 patients who underwent brachiobasilic fistula with transposition in single stage in the 16-month period from July 2016 to June 2017. They included 17 men and 11 women. All these patients were done doppler scan 2 weeks before and a day before the scheduled procedure date. Basilic vein was marked under dopplerguidance. Procedure was done under regional anesthesia. Postoperatively checkdoppler scan was done on post op day 1 and 4 weeks.

**Baseline characters:-**

Male	17 (60.7%)
Female	11 (39.3%)
Death on follow up	2 (7.1%)
Superficial wound infection	2 (7.1%)
Deep wound infection	0 (0%)
Lymphorrhoea	2 (7.1%)
Lymphocoele	2 (7.1%)
Fistula thrombosis before 6months	0 (0%)
Fistula thrombosis after 6months	3(10.7%)

**Operative Procedure Details:-**

Under sterile precautions, under regional anesthesia, a continuous skin incision was made over the basilic vein from proximal forearm to axilla, and the basilic vein was completely isolated. Lymphatics were divided betweenbetween ligature. All basilic vein tributaries were carefully ligated with 4-0 silk suture and divided. It was beneficial for transposition to isolate the distal aspect over as great a length as possible. The proximal aspect was dissected till the union with brachial vein. After dissection, the area near the drainage area was occluded using bulldog clamps. Heparinized saline was used to increase pressure in the basilic vein and to dilate it. Marking was made using gentian violet preoperatively to make sure no twisting of the vein occurred during transposition(Fig 1). Through the previous incision, cubital segment of the brachial artery exposed and control taken. Absence of twisting was confirmed as the basilic vein was allowed to course from the axilla over the biceps brachii muscle. The basilic vein was guided to the wound of the dissected brachial artery. If subcutaneous fat was thick, it was difficult to palpate and puncture the vein. Thus, the vein needed to pass subcutaneously more superficially. It was very important to confirm the absence of twisting in the area of the transposed basilic vein drainage into the brachial vein (Fig 2). After transposition and superficialization, heparinized saline was injected again and the vein was dilated. Subsequently, it was confirmed that the vein had no twisting, easily palpable, and could be punctured. If superficialization was no problematic, end-to-side anastomosis with the brachial artery was performed (Fig 3). Two-layer suturing for wound closure was used, involving the subcutaneous and dermal layers and absorbable interrupted sutures. Puncture was performed 4 weeks or more after surgery.



**Fig 1:-**Schematic Representation Of Marking Of Basilic Vein And Superficialisation Site.



**Fig 2:-**schematic representation of basilic vein proximal superficialisation



**Fig 3:-**schematic representation of brachio-basilic fistula anastomosis site.

### **Result:-**

we did totally 28 brachio-basilic AV fistulas with primary transposition in the 16-month period from July 2016 to June 2017, at Rajiv Gandhi Government General Hospital, Institute of Vascular Surgery. Amongst these, 17 were men (60.7%) and 11 were women (39.3%). These patients had either multiple failed AV access or poor caliber arm and forearm cephalic vein for AV access creation. Doppler scan was done before subjecting them for surgery. Regional anesthesia was used in all these patients. The operative time was 90–120 minutes (mean duration: 107 minutes) for surgery requiring brachio-basilic fistula with transposition in single stage. Complications included edema of the upper arm in all patients (100%), but it resolved spontaneously in all cases in approximately 3–4 weeks. Thus, edema did not become a hindrance to puncturing. Superficial wound infection occurred in two patients (7.1%) managed with daily dressing under suitable antibiotic coverage. None of them had venous hypertension or deep wound infection. Lymphorrhoea (7.1%) and lymphocele (7.1%) occurred in 2 patients, managed conservatively with repeat aspiration of lymph fluid under Doppler guidance in the latter group. Two patients died in the follow-up period but they both had functioning brachio-basilic AV access. Results of these patients were examined both clinically and by Doppler scan at post-op day 1, after 4 weeks, 3 months, 6 months and at 1 yr. The primary patency rate at 3 months, 6 months and 1 yr were 100%, 100% and 89.3%. None of these patients had gone through major wound complications.

### **Discussion:-**

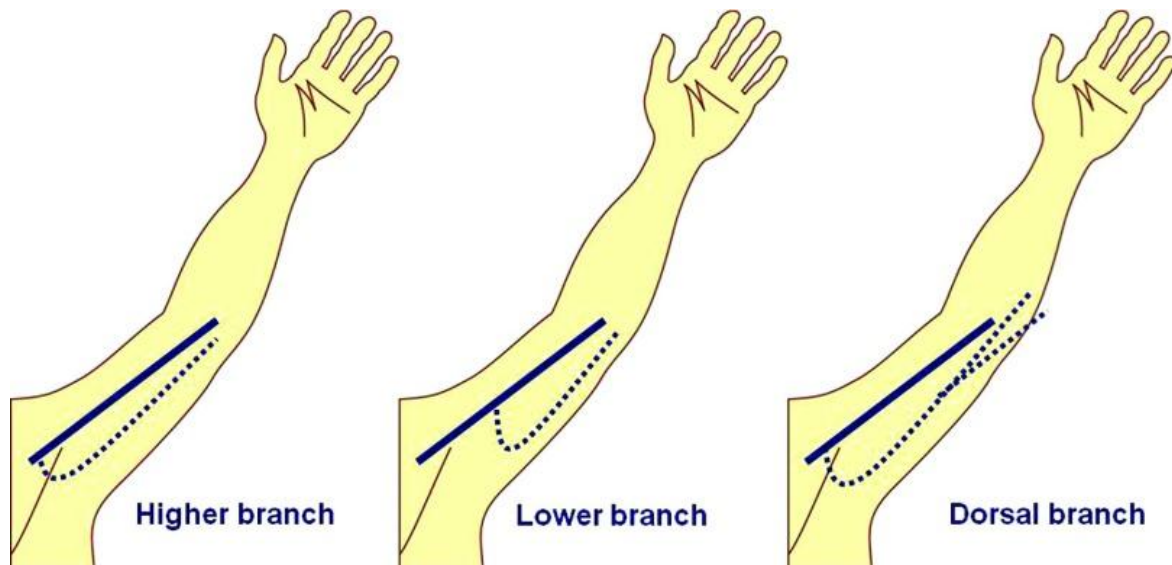
In our institute at Rajiv Gandhi Government General Hospital, we do almost 800 AV fistulae a year for renal failure patients as an access for Dialysis. With improved life expectancy among renal failure patients and long waiting time for renal transplant, the need for AV access creation is growing in huge numbers, some of these patients have either poor caliber cephalic veins of arm and forearm or they are exhausted of radiocephalic and brachiocephalic accesses. Though the other option would be the use of AV graft for dialysis access, the limiting factors are it carries significant infectious complications owing to their immunocompromised state, and financial constraints. The U.S. vascular access guidelines (a) reflect the large increase in the use of AVG in the 1990s and a high incidence of its complications, resulting in high medical expenses. Specifically, the guidelines discourage the use of AVG and strongly recommend the creation of AVF using an autologous vein. In particular, the usefulness of

brachio-basilic fistula with transposition has been recognized as an internal shunt that can replace AVG in patients in whom AVF creation is difficult in the forearm and elbow. we have chosen basilic vein with caliber of 2.5mm and above as the critical diameter for access creation(b).

The surgical procedure is based on that reported by Dagher(c) and LoGerfo(d). In the original methods, an incision was made on the skin with skip lesions, but our method uses a continuous skin incision on the medial upper arm, which allows better visualization of lymphatics, preservation of medial cutaneous nerve, reduces risk of lymphorrhoea and lymphocele formation.

For the procedure of the present report, significant postoperative complications were postoperative pain and edema of the upper limb, managed with analgesics for a few days after surgery. Edema of the upper limb was observed in almost all patients, but spontaneously resolved 3 to 4 weeks after surgery. we had 2 patients with superficial wound infection (7.1%) but none of them had deep wound infection . Two patients developed lymphorrhoea (7.1%) and two patients developed lymphocele(7.1%), these could be avoided by dividing the lymphatics between ligatures . None of them had neurological deficit in the post operative period, no steal syndrome was noted among these patients. Coburn, et al(f) performed a retrospective study in which patients were divided into a group with polytetrafluoroethylene (PTFE) graft use and a group with transposed brachio-basilic AV fistula, they reported the incidence of infection to be one in five patients in the PTFE group. In a review paper, Dix, et al(e) reported that TBBAVF had higher patency rates than synthetic AVG. The primary patency rates of TBBAVF were 72% at one year and 60.4% at two years, and the secondary patency rates were 74.6% at one year and 67.5% at two years. In our hospital, transposed brachio-basilic AV fistula also had high patency rates with primary patency rates of 100% at 6 months and 89.3% at 1 year. The causes of occlusion can be thrombotic occlusion and stenosis. In the present study, three patients had fistula thrombosis , one was due to puncture site stenosis(e) and the other two were likely associated with an aggravated systemic illness. For stenosis, Rivers, et al(g). reported the most common site of stenosis to be the junction between the basilic vein and the brachial vein. In our hospital, none of the patients had stenosis at this site. When the basilic vein is superficialized at this site, careful surgical manipulation is necessary because twisting can occur easily. In our experience, we have not observed any complications at the anastomotic site.

One advantage of TBBAVF is that the basilic vein in the upper arm remains healthy because there is less risk of phlebitis or injury when puncturing. Another advantage is that superficialization of the basilic vein enables long and straight access, facilitating puncturing. When the venous diameter was at least 2.5 mm in the preoperative evaluation, uniform and satisfactory dilatation was obtained in all patients at our hospital. The course of the basilic vein in the upper arm is shown in **Fig. 4**.



**Fig 4:-**Schematic Representation Of Variations In The Course Of Basilic Vein.

There are anatomical differences among individuals. The basilic vein often drains into the brachial vein near the axilla. In rare cases, confluence is observed more proximal or distal to this area. If the confluence is more proximal, a longer length of the basilic vein can be isolated, which is beneficial in superficialization. However, if the confluence is more distal, the effective length of the basilic vein is shorter. In such cases, when transposition and superficialization are performed, there is a smaller effective area for puncturing because the straight vessel is short. Thus, it might be difficult to obtain two access routes. There were some in whom the basilic vein branched in an area more dorsal to the cubital region. In such cases, a skin incision needs to be extended dorsally to the forearm to isolate the basilic vein. Otherwise, the effective length might not be obtained. Therefore, preoperative evaluation and surgical planning are important. An important point of the surgical procedure is the design of how to superficialize the basilic vein. Puncturing is difficult if subcutaneous fat is thick when the basilic vein is superficialized over the biceps brachii muscle. Thus, careful consideration is needed when this procedure is applied to obese patients.

### **Conclusion:-**

Creation of AV access in renal failure patients with exhausted arm and forearm cephalic veins is a challenging task to surgeons and to patients, for safer, infection free access creation. Though TBBAVF is a somewhat complex procedure, it results in high patency rate and significantly reduced infectious complications. Thus, it would be a procedure worth considering in patients in whom other accesses are exhausted or access creation is difficult.

### **Disclosure Statement:-**

No conflict of interest.

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