

## A Single Centre Experience with Transposed Basalic Vein Arteriovenous Fistula as Hemodialysis access: An Evaluation of 43 Cases.

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### Abstract :

**Introduction:** For the patients with end stage renal disease hemodialysis venous access is required for repeated use, such that the site is readily available to use for repeated cannulation and the one that must achieve adequate flow rate for hemodialysis. Many such surgically created accesses have been described, most commonly being anastomosis between radial artery and adjacent vein. But when the fore-arm veins are not available then alternate access should be created. Here we have reviewed our experience with basilic vein transposition arteriovenous fistula done in our institute over last 3 years.

**Materials and Methods:** From January 2018 to December 2020, 45 such basilic vein transposition arteriovenous fistula were created but 2 patients were lost in follow. We have followed up the patient until their first successful haemodialysis through the created access.

**Results:** A total of 43 patients were reviewed, mean age being  $52.32 \pm 7.53$  years (Range 36 to 63 years). 53.5% were males and 46.5% were females. Their co-morbidities were as follows (expressed as percentage of total patients): 58.1% were diabetic, 74.41% were hypertensive, 32.5%, were with ischemic heart disease, 13.9%, were with peripheral vascular disease, 4.6% were with cerebrovascular disease and 60.04% were those with previous access failure. On table assessment after skin closure was done and bruit and thrill both were observed in 74.41% of all cases; mean time to maturation for these fistulas was  $41.87 \pm 6.65$  days. 16.27% of all patients only had audible bruit but no palpable thrill; mean time to maturation of these fistulas was  $45.71 \pm 4.92$  days. There was no statistical difference when comparing these two subsets in terms of days to maturation. But fistulas which had neither audible bruit nor palpable thrill took significant more time to mature ( $54.25 \pm 4.03$  days). The complication rates were low with only 3 re-interventions out of 43 patients.

**Discussion:** The results of a single centre experience with basilic vein transposition arteriovenous fistula is noted down here in terms of on table observation after fistula creation, days to maturation and complications.

**Keywords:** transposition fistula, haemodialysis access, basilic vein

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### I. Introduction

Chronic kidney disease (also labelled as “End stage renal disease” (ESRD)) patients are dependent entirely on dialysis lifelong or while on a wait list for renal transplantation. Temporary hemo-dialysis access catheters are placed through the femoral vein or internal jugular vein but while causing significant limitation in lifestyle, they are also more prone to infection and devastating complications like bleeding and catheter dislodgement. Hence the need for an alternate access for hemodialysis. For any hemodialysis vascular access to be successful a good flow rate is required on hemodialysis machine. In 1964 Scribner shunt was described. It was popularly called as ‘simplified’ or ‘poor-man’s’ shunt, because it was inserted by the renal senior house officer rather than the surgeon. It consisted of a simple loop of Teflon, which connected cannulas in the artery and vein. The haemodialysis machine was attached to the connecting segment of the two cannulas.<sup>1</sup>

Following the success of Scribner shunt and because of its high rate of complications, like thrombosis, infection and dislodgement, Cimino and Brescia described surgically created arteriovenous fistula between radial artery and superficial vein in 1966 and it remains to date the most commonly used vascular access<sup>2</sup>. But the problems like previously failed forearm access or unavailability of suitable vein in the fore-arm due to thrombosis, narrow caliber vein, complex anatomy (multiple branching) or previous injury to fore-arm, the creation of radio-cephalic arteriovenous fistula is difficult. In such cases, other options for creation of vascular haemodialysis access should be sought like brachio-cephalic fistula, transposed basilic vein arteriovenous fistula or interposition graft fistula in the upper limb.

For any such surgically created fistula to be successful, the new access site must mature adequately (to achieve a good flow rate for haemodialysis adequacy) and the site must be accessible to be re-cannulated for multiple dialysis sittings. Apart from these, it should be easy to maintain its patency with minimum intervention<sup>3</sup>. Here we have collected and presented the data of transposed basilic vein arteriovenous fistula done in our institute over a period of last 3 year.

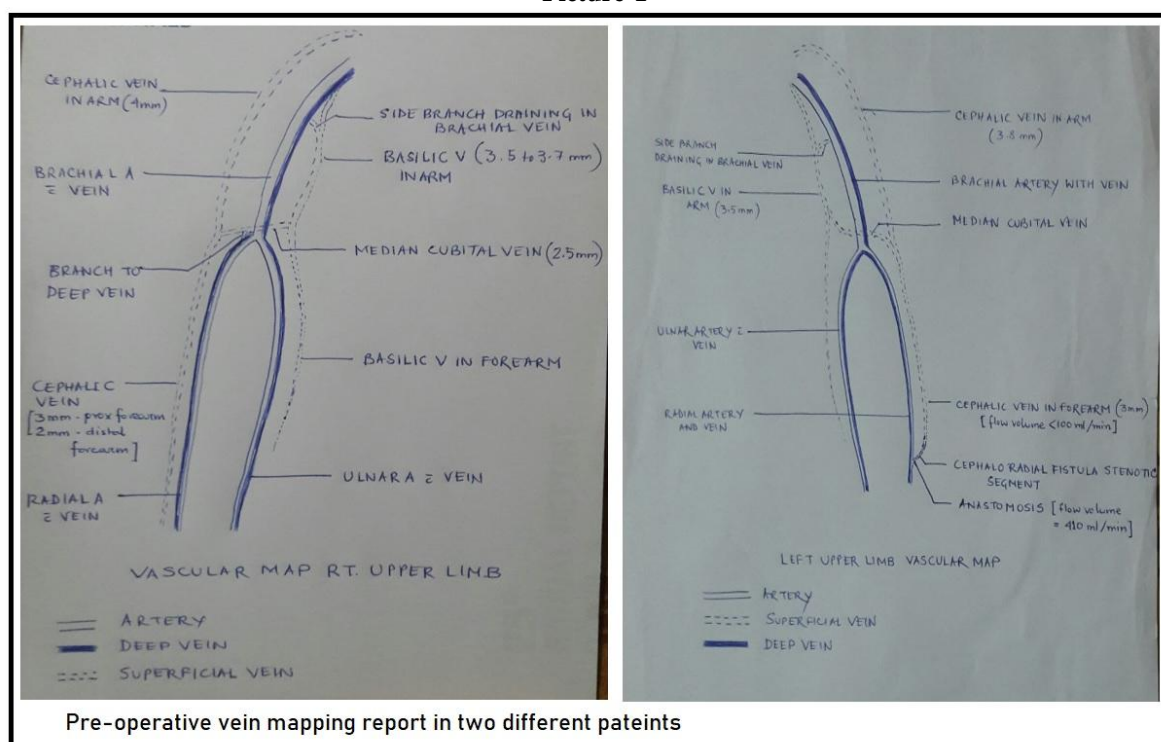
## II. Materials And Methods

In this study we have collected data of all ESRD patients who required transposition basilic vein arteriovenous fistula for varied reasons namely: previous failed access in fore-arm, non-suitable veins in forearm, non-suitable anatomy for brachio-cephalic arteriovenous fistula. Also, basilic vein arteriovenous transposition fistula was not attempted on the side where there was a subcutaneously tunneled catheter in place for dialysis. We had a total of 45 such patients over a period of 3 year (January 2018 to end of December 2020). 2 patients were lost in follow up and their data were not used for statistical calculations and reporting.

**EXCLUSION CRITERIA:** Those who required fore-arm arteriovenous or brachiocephalic fistula were excluded from the study. The side with central vein stenosis was excluded.

All patients underwent pre-operative vein mapping by doppler imaging by radiologist. (see picture 1)

**Picture-1**



Pre-operative vein mapping report in two different patients

### SURGERY:

After reviewing the venous mapping report, basilic vein was identified from axilla to elbow and was exposed. All branches were ligated and divided. An anastomosis was created using 7-0 prolene suture in continuous fashion between brachial artery and basilic vein just above the elbow. (see picture 2: A and B) The basilic vein was then transposed superficially after creating a subcutaneous flap. (see picture 2: C and D) Skin was approximated using simple sutures/ skin staplers. (see picture 3) Presence and absence of bruit and thrill over the transposed basilic vein was noted after skin suturing. Absence of bruit and thrill but presence of venous filling was deemed as appropriate arteriovenous anastomosis.

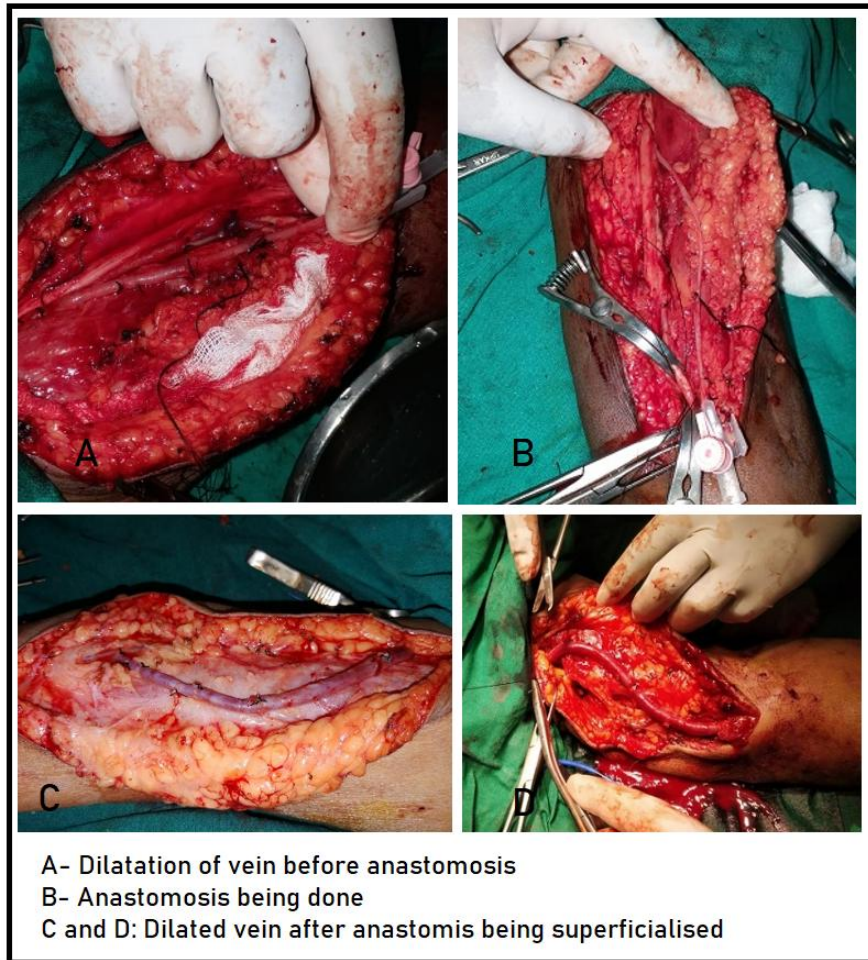
All patients were started with Ecosprin 75mg from day 1 for one month post-operatively apart from routine care and antibiotics.

Each patient was followed up to their 1st haemodialysis using the basilic vein (transposed) fistula.

Baseline data of patients, their co-morbidities, presence or absence of on table bruit/thrill and days to maturation of the fistula (first clinically assessed by dialysis technician/ nurse and then confirmed by flow rate of more than 250ml/min on haemodialysis machine) were noted. Also, complications were noted and all data was statistically analysed.

Due permission was taken from hospital ethical committee for this study.

**Picture-2**



**Picture -3**



### **III. Results**

In this study (from January 2018 to December 2020) all patients undergoing basilic vein transposition arteriovenous fistula were enrolled and followed up to their 1st haemodialysis through the same access. A total of 45 patients were enrolled but 2 patients did not come for follow-up, so data of 43 patients are presented here. There were 23 males and 20 females and the mean age of the patients were  $52.32 \pm 7.53$  years (Range 36 to 63 years). The demography and co morbities are presented in table 1

**Table-1**

Gender	Males	Females
Total 43 patients	23 (53.5%)	20 (46.5%)
Mean Age		
52.32 ±7.53 years (Range 36 to63 years)		
Co-morbidities		
	Number (Percentage)	
Diabetes	25 (58.1%)	
Hypertension	32 (74.41%)	
Ischemic heart disease	14 (32.5%)	
Peripheral vascular disease	06 (13.9%)	
Cerebrovascular disease	02 (4.6%)	
With previous access failure	26 (60.04%)	

After completion of the surgery, on table assessment showed 9.30% (4 out of 43 patients) were not having palpable thrill or audible bruit over the vein but had good venous filling and engorgement. Thrill was present in 74.41% (32 out of 43 patients). Only Bruit was present with no thrill in 16.27% (7 out of 43 patients). Days to maturation was noted to be as follows: Mean of 41.87 ±6.65 days for patients with on table thrill and bruit, mean of 45.71 ±4.92 days for patients with only bruit on table and mean of 54.25 ±4.03 days for patients who had no bruit or thrill on table, but bruit could be heard within 3 hours of surgery.

The p-value was < 0.05 for mean days to maturation when comparing “no bruit or thrill on table” group patients to the other groups. No significant statistical difference was observed when comparing Bruit+Thrill on table group to patients with only Bruit on table group in terms of days to maturation. (See Table-2).

**Table-2**

On table assessment and days to maturation		
On table observation	Number (Percentage)	Mean days to maturation
Thrill + Bruit + venous filling	32 (74.41%)	41.87 ± 6.65 days
Bruit + venous filling	07 (16.27%)	45.71 ± 4.92 days
Only venous filling (+ Bruit within 6 hours)	04 (09.30%)	54.25 ± 4.03 days
Total	43 (100%)	43.65 ± 7.14 days

- p-value was < 0.5 for mean days to maturation when comparing no “bruit or thrill” on table group to the other groups
- whether there was only audible bruit or along with palpable thrill did not significantly affect mean time to maturation

Complication rates were noted as follows:

2 patients had signs skin necrosis and infection; managed conservatively (no intervention was required) but 3 patients had to be re-intervened; 2 patients for major bleed and one for inadequate superficialization (when bruit was not present until 6 hours post operatively). Also 5 patients developed distal limb edema but it subsided in all patients with conservative management. See table-3

**Table-3**

Complications

Failure	0	
Infection/ skin necrosis	2 (4.65%)	
Pseudoaneurysm	0	
Re-intervention	Major bleed	2 (4.65%)
	Inadequate superficialization	1 (2.32%)
Distal limb edema	5 (11.62%)	
Vein Thrombosis	0	

#### IV. Discussion

In this study we followed up with patients undergoing basilicvein transposition fistula in the upper-arm. Only those patients in whom radio-cephalic or brachio-cephalic access was not possible or a failure, were included in the study.

Transposition basilic vein upper arm arteriovenousfistula has a lower primary failure rate. In our study it was 0%. Similarly, a study by Hakaim et al. <sup>4</sup> with diabetic ESRD patients reported 0% non-maturation rate with transposed fistulas. Also, a study by Oliver MJ et al. <sup>5</sup> the primary failure rate for transposed basilic vein arteriovenousfistula was lower than brachiocephalic fistula. Finally, Silva et. al <sup>6,7</sup> reported significantly lower primary failure rate of transposed fistulas in comparison to non-transposed fistulas.Lesser primary failure cannot be attributed to diameter of vein or artery <sup>8</sup>. Most likely explanation is superficialization of vein and ligating all the branches of basilic vein. On the other hand, arteriovenous graft fistula has a higher rate of infection than brachiobasilic fistula. <sup>8</sup>

Given the superiority over graft fistula, we decided to go ahead with transposed fistula. Another observation was that the time for maturation was significantly longer when the bruit was absent after skin closure compared to when thrill and/or bruit was present on table.

We had very low rate of complications with only 3 patients (6.9%) requiring re-intervention.

Limitations of this study were a smaller number of patients and less duration of follow up. Also,categorization of patients based on anatomy and vascular diameter was not done.

**CONFLICTS OF INTEREST:** The authors declare no conflicts of interest.

**FUNDING:** No funding received.

**COMPLIANCE WITH ETHICAL STANDARD:** Permission taken from ethical committee of the institute.

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