

Basilic Vein - An Excellent Alternative Conduit for AV Access

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Abstract: *Basilic vein used as an alternative conduit for AV access*

Background: *The primary use of AV access for chronic hemodialysis is recommended by national kidney foundation. Many surgical methods have been described to create AV vascular access, one of which is B.B transposition. B.B transposition fistula provides an excellent access in difficult cases. The purpose of the study is to present and discuss the usefulness of basilic vein transposition as an alternative method to AV grafting.,*

Materials and Methods: *In this retrospective analysis, a total of 875 surgeries were done for AV access. Most of them had a central venous catheter. Of these 875, Basilic vein transposition were 27 and others were radiocephalic fistula 495, brachiocephalic 351, arteriovenous graft 2. Of the 27 cases of Basilic vein transposition, Basilic forearm transposition to radial artery were 19 patients, Basilic vein used as a forearm loop anastomosed to Brachial artery in 5 patients and basilica vein transposition in arm were 3 cases. Single stage procedure was done in 25 patients and a double stage procedure in 2 patients. 25 patients were operated due to secondary failure of avf and 2 patients were for primary basilica vein transposition.*

Results: *Clinical assessment and duplex assessment was done for flow rates at 2 weeks interval. The brachio basilic av fistulas attained maximum flow rate in 2-3 weeks time. Average flow was around 360 ml/minute. All fistulas were dialyzable. Maturity rate was 100%.*

Conclusion: *Basilic vein transposition is a good alternative to arterio venous graft with lesser number of complications and better patency, functional utility and cost effectiveness*

Key Word: *Basilic; arteriovenous; avf; Brachial.*

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I. Introduction

Since the development of hemodialysis in 1944, there has been a dramatic increase in both the availability of hemodialysis and long-term survival of patients with chronic renal failure¹. Because of the expanded life expectancy, patients often require multiple operations, and options for secondary or tertiary access procedures become increasingly limited². Since 1976, basilic vein transposition has been a well-known technique to create brachio-basilic arteriovenous fistula. In this study, we evaluated and discussed the technique of superficialization of the basilic vein in brachio-basilic arteriovenous fistula. We present early- and long-term results of 875 cases evaluated.

II. Material And Methods

This retrospective study was carried out on patients of Department of vascular surgery at Government Rajaji Hospital, Madurai, Tamil Nadu from January 2011 to November 2015. A total of 875 adult subjects (both male and females) of aged ≥ 18 , years were for in this study.

Study Design: retrospective study

Study Location: This was a tertiary care teaching hospital based study done in Department of Vascular Surgery, at Government Rajaji Hospital, Madurai, Tamil Nadu.

Study Duration: January 2011 to November 2015.

Sample size: 875 patients.

between January 2011 and November 2015, 875 arterio-venous fistulas were performed. Of 875 fistulas, 495 were radiocephalic, 361 brachiocephalic, basilic vein transposition 27, arteriovenous graft 2. (6.7%) failed in maturation and (93.3%) arteriovenous fistulas with superficialized basilic vein were used in hemodialysis. 394 (45%) patients were men, and 481 (55%) were women (Table I). Mean age was 52 (range 18-88) years. Left arm was preferred in 613 (70%) patients. The most associated diseases were hypertension in 420 (48%) and diabetes in 257 (54%) patients. Furthermore, peripheral vascular disease was in 263 (30%) and coronary artery disease in 184 (21%) patients. 158 (18%) patients were former smokers and 219 (25%) still smokers. Mean number of previous arteriovenous fistula was 0.5 (range, 0-5). Mean maturation time was 21 days (range, 15-75). Preoperative vein mapping is done in patients with no obviously useful superficial veins or in patients who

have previously undergone upper-arm fistula creation. Vein mapping was performed using ultrasound. The evaluation was performed and reviewed by radiologist and surgeon together. Superficial veins, such as cephalic and basilic veins, were evaluated from the distal forearm to the axilla region. Subclavian and jugular veins were also evaluated. Venography and multislice spiral computed tomography angiography were rarely required to demonstrate vena cava superior, innominate and subclavian vein stenosis, or occlusion. Hemodialysis nurses detected the thrill and found the superficialized basilic vein.

**Inclusion criteria: Artery size >2mm
Vein >3mm
Age>18 years**

Exclusion criteria: Age<18 years

Procedure methodology

Superficialization of the basilic vein procedure was performed under regional anesthesia. A 2 cm incision was made in antecubital fossa. Brachial artery and basilic vein were identified and exposed through this incision, and the incision extended for about (8-10 cm) was done to explore proximal part of the basilic vein. Side

branches of the basilic vein were carefully isolated and ligated. Median antebrachial cutaneous nerve and brachial plexus require considerable care during dissection. Side branches of the vein were marked by a marker before distal division to prevent torsion. The basilic vein divided distally at the level of the antecubital fossa was brought over the deep fascia under the skin. The vein is well mobilized and elongated, which provides anastomosis of the proximal side with a diameter larger than 3 mm. The vein was filled and dilated with heparinized saline. This maneuver provides enlargement of the vein. Anastomosis performed end-to-side with 6-0 prolene suture and parachute technique. Deep fascia was reapproximated with separated sutures beneath the vein. The skin was then closed. The patients were hospitalized for 24 hours in nephrology ward.

III. Discussion

A radiocephalic fistula in the nondominant arm is the first choice for vascular access. When the vein is poor in the forearm, antecubital brachiocephalic arteriovenous fistula is a good alternative. When the antecubital cephalic vein diameter is less than 3 mm or the cephalic vein is thrombosed, brachiocephalic fistulas were not possible. In these patients, the choice of vascular access is between brachio-basilic native arteriovenous fistula and prosthetic graft.^{2,8} Well described advantages of using autogenous arteriovenous fistula include low incidence of infection, keeps the body free from foreign material, and longer patency rates than prosthetic grafts.^{6,9} In case of native fistula failure, subsequent use of prosthetic conduit at the same side is not precluded, whereas it is unlikely that the converse would be successful.

We performed brachio-basilic arteriovenous fistula when a distal native forearm fistula could not be created and cephalic vein system was poor in the upper arm. Prosthetic graft is our next choice after native brachio-basilic fistula. In 1976, Dagher et al. first described transposition of the basilic vein.¹⁰ This type of fistula is created by a long skin incision, wide-dissection, well-mobilization, and transposition of the basilic vein by rotating it anterolaterally through a subcutaneous tunnel in the arm. The operation is time consuming, technically challenging, and it has increased perioperative morbidity compared with creation of brachiocephalic arteriovenous fistula (AVF).^{6,11} The well-known major disadvantages of basilic vein transposition are the potential for vein injury during the required mobilization and wound complications associated with the extensive dissection, such as hematoma or injury to the median or cutaneous nerves.^{6,11} In 1979, Barnett et al. described a single-stage procedure

that elevated the basilic vein by reapproximating the deep fascia and subcutaneous tissue of the arm beneath the vein instead of routing it through a subcutaneous tunnel.¹² In 1986, Davis et al. first reported the outcomes of the basilic vein elevation technique in a series of 66 patients.¹³ Bronder et al. planned elevation technique as a single-stage or

a two-stage procedure.¹⁴ We performed anastomosis and elevation in single stage. Elevation provides a longer and straighter length of fistula, which is particularly beneficial in patients in whom the basilic vein caliber is marginally near the antecubital fossa because of branching or where the vein is short because of its low insertion into the brachial vein.¹⁴ However, in basilic vein transposition, diameter of the basilic vein should be at least 3 mm in antecubital region.¹⁵ Hossny compared outcomes of brachio-basilic AVF patients transposed through a separate tunnel with those in whom elevation technique as a single- or two-stage procedure was performed.¹⁶ He

reported that 20 patients underwent one- and two-stage elevation technique as compared with 30 patients who underwent basilic vein transposition technique. He concluded that the extravasation and hematoma formation were significantly higher in the elevated vein group because of difficult cannulation of the basilic vein in the inner aspect of the upper arm. Bronder et al. reported fistula elevation procedure including 295 cases.¹⁴ They did not note a difference in complications, such as needleside bleeding, hematoma, or arm edema in elevated fistulas, compared with fistulas transposed through a separate tunnel.¹⁴ We performed elevation with two small separated skin incisions instead of a long skin incision, which requires less dissection than basilic vein transposition. After dissection of the deep fascia, elevation of the basilic vein was performed at the same anatomic place. Position of the ligated side branches is helpful against torsion. Furthermore, filling of the vein with saline confirms the position

of the basilic vein. Transposition of the basilic vein technique requires dissection of the deep fascia, and additionally transposes the vein anterolaterally in the arm. Some investigators have shown that preoperative duplex ultrasound assessment might improve fistula outcome, particularly in terms of technical success.^{3,17} In our study, preoperative vein mapping is done whenever clinically indicated, such as in patients with no obviously useful superficial veins or patients who have previously undergone upper-arm fistula creation. Duplex assessment of the radial, ulnar, brachial arteries, subclavian, basilic, and cephalic veins was determined to plan the best surgical option, which is recommended by the National Kidney Foundation-Dialysis Outcomes Quality Initiative guidelines.^{7,18} Venography and multislice spiral computed tomography angiography were rarely required to determine vena cava superior, innominate, and subclavian veins.

IV. Conclusion

In conclusion, superficialization technique of the basilic vein is a logical alternative in patients with a poor cephalic vein in forearm and upper arm. This technique provides appropriate length for fistula cannulation if the superficialized vein is long. Postoperative complications are reasonable. Long-term primary and secondary patency rates are good. Superficialization of the basilic vein results in a fistula that lies on the inner aspect of the upper arm. This disadvantage is offset by the fact that the overlying cicatrix guides the nurses to precisely locate the fistula. If the scar tissue caused difficult cannulation, the procedure could easily be done near the scar tissue.

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