Original Article

# BASILIC VEIN ELEVATION FOR BRACHIOBASILIC ARTERIOVANOUS FISTULAE - SINGLE OR TWO STAGE PROCEDURE

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## ABSTRACT

**OBJECTIVES:** To assess the difference in both procedures in terms of function, post operative complications and long term patency of fistulae.

**STUDY DESIGN**: Comparative observational study

**PLACE AND DURATION:** This study was carried out at department of Vascular Surgery, Combined Military Hospital LahorefromMarch 2012 to March 2013.

**PATIENTS AND METHODS:** 62 Brachiobasilicarteriovenous fistulae (BB AVF) were created. One stage procedure was performed in 23, and two stage in 39 patients. Data including age, sex, patency, time to mature and post op complications were noted.

**RESULTS:** Functional patency and long term patency of BB AVF was better in two stage BB AVF creation procedure. Postoperative complications especially haematoma formation and wound infection, were relatively less in two stage procedure. BB AVF patency was also better in patients who had their fistulae created before the haemodialysis was started.

**CONCLUSION**: Patency rate is better in two stage procedure for BB AVF creation and two stage procedure also has less post operative complications.

**KEYWORDS:** basilic vein elevation,fistula,patency

## INTRODUCTION:

First auto genousarteriovenous access was created by Caminio in 1966 by an end to side anastomosis of cephalic vein with brachial artery[1]. This led to significant decrease in morbidity and mortality of patients with end stage renal failure,and their survival was markedly improved[2,3].

In 1979, brachiobasilicarteriovenousfistula (BB AVF) was described to create vascular access for haemodialysis[4]. BB AVF is a valuable option if previous fistulae have failed or if cephalic vein is not suitable for fistula formation[5]. Dagher was the first to describe the use of basilic vein to create an AVF in the upper arm between the end of basilic vein and the side of the brachial artery to act as access for long term haemodialysis[6].

Initially the procedure was performed in one stage with three incisions under general anaesthesia. Basilic vein was mobilized, relocated through a subcutaneous tunnel and anastomosed end to side with brachial artery. This technique was known asbasilic vein transposition (BVT). Later on, this procedure was performed in two stages: in first stage only brachiobasilic anastomosis was performed, and transposition was completed in second stage when fistula became mature clinically and

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radiologically. The modification of procedure by elevating the basilic vein superficial to surgically re-approximated deep fascia and subcutaneous tissues of the arm instead of routing it through a tunnel is known as basilic vein elevation or superficialization (BVE).

BB AVFs can be created either byvein transposition or by vein elevation as one or two stage procedure. The single stage procedure provides a rapid vascular access, less theatre time and shorter total hospital stay. Two stage procedure require two operations, more hospital stay and obviously more costly.

BB AVFs provides better outcome and patency rate when compared with cephalic vein fistulae[7-11]. Although the current literature in the favour of two stage procedure for BB AVF creation, but still there are no national guidelines for performing the procedure in one or two stages. So we performed an observational study by creating BB AVFs as single or two stage procedures to evaluate the outcome in terms of patency and post op complications.

## METHODS:

All consecutive patients who had BB AVFs created at Combined Military Hospital Lahore from March 2012 to March 2013 were included in this study. Patients who died due to medical reasons and who cannot be followed up for a minimum of two years were excluded. A total of 62 BB AVFs were created. 23 were single stage BVEs and 39 were two stage BVEs.

Patient's baseline characteristics including age, gender, comorbid conditions like diabetes mellitus, hypertension, and cardiac disease were noted. Previous fistulae procedures, any revision procedures, dialysis status and date of starting haemodialysis were also noted.

All thepatients were assessed clinically as well as radiologically with duplex scan for suitability of fistula preoperatively. Only patients having patent basilic vein of at least 2.5 mm of diameter, patent deep venous system of upper limb, and brachial artery of a minimum of 3mm diameter were considered candidates for BB AVF. The vein diameter did not influence the decision. The decision to perform single or two stage procedure was based on operating time available, patients' clinical condition and urgency of fistulae required. Patients already on dialysis were offered a single stage fistula formation to meet the urgency.

All BB AVF created by basilic vein elevation in a single stage was performed as inpatient under local anaesthesia. In two staged procedure, the stage one was end to side anastomosis of basilic vein to brachial artery as a daycase procedure under local anaesthesia. In second stage of the procedure once the fistula became mature clinically and radiologically between 4-8 weeks; it was elevated and superficialized more anterolaterally for easy cannulation. The second stage of two stage procedure was carried out as inpatient under local anaesthesia and suction drains were placed selectively for next 24-48 hours.

All fistulae were assessed both clinically and radiologically for functional and long term patency. The fistula was considered functionally patent if at six weeks thereis palpable thrill and duplex scan show a minimum diameter of 5mm with a flow rate of 500ml/min.Long term patency was assessed at one and two years after the creation of fistula.

Collected data was analysed using statistical package for social sciences SPSS version 20. The variables in this study were patients' age, sex, functional patency at six weeks, long terms patency at one and two years. The numerical outcomes e.g. age was presented as mean. Patient's sex was recorded as frequency and percentage. Independent samples T test was applied to find the differences between the two groups. P value was considered statistically significant if the value was $\leq 0.05$.

## RESULTS:

Sixty two BB AVFs were created during the study period. The age range was from 24 to 64 years with mean age of 49.5 years. Of these 90.3 % (n=56) were males and 9.7% (n=6) were females.

Single stage BB AVF was created in 37.1% (n=23) patients. Of these; 12.9% (n=8) patients were new and 24.2% (n=15) patients has a previous fistula. 62.9% (n=39) patients had their BB AVF created as a two stage procedure. In this group; 33.8% (n=21) patients never had a fistula created in the past and 29% (n=18) patients had a past history of fistulae which have failed functionally.

Functional patency at six weeks in single stage fistulae was 60.8% (n=14)where as in two stage procedure it was 89.8 % (n=35). The difference was statistically significant with a P value of 0.006. Patency at one year was 43.5% (n=10) and 84.6% (n=33) in single stage and two stage procedure respectively. The difference was again statistically significant with a P value of 0.000. At two years, the patency was 21.8% (n=5) and 76.9% (n=30) in one stage and two stage procedures respectively with a P value of 0.000 (see Table 1).

26.1% (n=6) patients in single stage group and 7.7% (n=3) in two stage group required revision surgical procedures. 22 out of 25patients (88%) having their BB AVF created before the dialysis has been started, were patent at 6weeks; as compared with 29 out of 37 patients (78.4%) who were already on dialysis. Similarly the long term patency at 24 months in pre dialysisgroup was higher than post dialysis group (88:72.9%).

Post op haematoma formed in 21.7% (n=5) patientswho underwent single stage procedure and only in 5.1%(n=2) who underwent two stage procedure. Wound infection was 30.4% (n=7) in one stage and 10.3% (n=4) in two stage procedure.

**TABLE 1: Independent sample T test for equality of means showing functional and long term patency of BB AVF.**

| | t | Sig. (2-tailed) (P value) | Mean Difference | Standard Error Difference | 95% Confidence Interval | |
|---|---|---|---|---|---|---|
| | | | | | Upper | Lower |
| Functional Patency at 6 weeks | 2.825 | 0.006 | 0.289 | 0.102 | 0.084 | 0.493 |
| Long term Patency at 1 year | 4.069 | 0.000 | 0.437 | 0.107 | 0.222 | 0.652 |
| Long term Patency at 2 years | 4.939 | 0.000 | 0.552 | 0.112 | 0.328 | 0.775 |

## DISCUSSION:

Basilic vein elevation to create BB AVF is an important way of having vascular access for dialysis[12,14]. Zielinski et al. compared the two stage approach to all other AVF procedures including one stage BVT, radiocephalic and brachiocephalic fistulas and found that the patency rate at 1 year was superior in the two stage group[13]. Similarly, Renold et al. conducted a similar study on BB AVF creation in one and two stage procedure and found better functional patency rate at 12months and at 24 months in two stage procedure[15].

Hossnyin 2003 used different surgical techniques in creation of a BB-AVF andcompared patency rates and post op complications in 70 patients who underwent single stage and two stage procedures. Cumulative patency rates were better in two stage group at 1 year and 2 years[16].El-Mallahin 1998 compared outcomes in two groups; one stage BVT or two stage BVT. The difference in early patency rates was significant and favoured the 2-stage approach (60% of 1-stage vs. 90% of 2-stage, $P < 0.05$), as well as overall patency rates at the end of follow-up (50% of one stage vs. 80% of two stage, $P < 0.05$)[17]. The results of our study are comparable to the international literature as described above.

Studies regarding postop complications like infection and haematoma formation while creating BB AVFs are again in favour of two stage procedure[18,19]. Postoperative wound

infection rate was one third in two stage procedure when compared with one stage groups[17]. Our study also shows infection rate was one third in two stage procedure and hematoma formation was four times less in two stage procedure, when compared to one stage.

In summary, our study and the current literature is relatively in favour of two stage procedure for creating BB AVF, in terms of better patency rates and lesser port operative complications. However still no international guidelines are available regarding which procedure is better- single stage or two stage.

## CONCLUSION:

Although many studies like ours, favour two stage procedure for basilic vein elevation to create BB AVFs because of better patency and lesser complications. But still more evidence in the form of multicentre randomised control trials is required to take final decision about which procedure is better- single stage or two stage to create BB AVFs.

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Value of a man depends upon his courage; his veracity depends upon his self-respect and his chastity depends upon his sense of honor.

***Hazrat Ali (Karmulha Wajhay)***