Original Article
Pak Armed Forces Med J 2018; 68 (5): 1419-23

FASCIAL SLINGS: A NEW ADJUNCT TO BRACHIOBASILIC FISTULA ELEVATION

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ABSTRACT

Objective: To introduce a new technique of fascial slings created from fascia over biceps muscle as an adjunct to Brachiobasilic fistula elevation contributing in the ease of cannulation and position of arm for both nursing staff and the patient.

Study Design: Retrospective study.

Place and Duration of Study: This study was carried out in Combined Military Hospital Rawalpindi, form Jan 2016 to Apr 2017.

Patients and Methods: The demographic and outcome data of the patients, who underwent Brachiobasilic Elevation using fascial slings, were collected and analyzed retrospectively.

Results: A total of 89 (60 males, mean age 44.2 ± 14 years and 29 females mean age 42.6 ± 12 years) patients underwent brachiobasilic fistula elevation. The distance of fistula vein from skin incision at mid arm was found to be consistent from the per op measurement till the last assessment at 6 months. In our study it was 5 ± 0.7 cm. Slinged vein was found to be easy to cannulate in first prick as per dialysis nursing staff. Fistula maturation rate was 91%. A total of eight (9%) fistulae were never put on dialysis because of thrombosis. The mean maturation time was 40 ± 14 days. Fifteen (16%) patients had arm edema, and twelve (13%) had infections. Patients had similar ease of arm position as of brachiocephalic AVF during dialysis.

Conclusion: Considering the consistent post op distance of fistula vein from scar site, ease of cannulation for the dialysis staff and comfort of arm position for the patient during dialysis after fascial slings it is concluded that fascial slings are good adjunct to basilic vein elevation technique.

Keywords: Basilic vein transposition (BVT), Hemodialysis (HD), Fascial Slings.

INTRODUCTION

End-stage renal disease (ESRD) is a significant public health issue globally[1]. Number of the patients requiring hemodialysis has enormously increased during the past few decades. As per the recommendations of kidney disease outcome quality initiative (KDOQI), autologous radiocephalic or brachiocephalic AVFs are primary method of choice in HD patients[2], but vascular access becomes challenging in the patients with failed radio-cephalic (RC) or brachiocephalic (BC) fistulae and with smaller caliber superficial veins. Due to which, as a secondary option the basilic vein transposition (BVT) is recommended in these patients[3]. Basilic vein transposition (BVT) was first described in 1976 since then it has been widely accepted as secondary or tertiary vascular access option[4]. Basilic vein is generally free of puncture because of its deep location. It matures early and provides a longer conduit for HD because of its length, relatively large diameter, higher venous flow and higher patency rates[5]. Elevation of brachiobasilic fistula is an accepted variation of Basilic Vein transposition (BVT). It is a two staged procedure. In stage I, end to side Brachiobasilic fistula is fashioned at antecubital fossa then after four weeks stage II is performed through a long skin incision, incising the fascia over the vein and ligating its branches and bringing the basilic vein under the mobilized flap of arm skin but after superficialization the vein is notorious to fall underneath the long incision scar rendering the cannulation difficult for HD nurses. In our

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Received: 30 Sep 2018; revised received: 18 Oct 2018; accepted: 20 Oct 2018

institute we make fascial slings of the fascia over biceps muscle to keep the hold of superficialised basilic vein over the biceps muscle preventing it to fall under the scar. This study aimed to introduce the innovation of fascial slings as an adjunct contributing in ease of cannulation in superficialised Brachiobasilic AVF.

PATIENTS AND METHODS

This was a retrospective study including all the patients above 18 years of age of either gender undergoing BVT in Combined Military Hospital Rawalpindi, between 01 Jan 2016 and 30 Apr 2017. Non-probability consecutive sampling was used for data collection. The hospital record was checked for all the patients who underwent BVT during this period. A total of 89 patients were found and included in the study. The BVT was done in those patients who had either failed previous radiocephalic/brachiocephalic fistulae or patients with small caliber or thrombosed cephalic veins. The patients with failed previous BVT were not included in our study. Venous mapping of the upper limb was done for all patients before surgery by the surgeon doing operation using ultrasound machine 3mm vein diameter was taken up as a cutoff value to proceed for BVT. All the patients underwent surgery for Brachiobasilic AVF, in which a 3-cm horizontal incision was made in antecubital fossa to expose the brachial artery and basilic vein to make an end to side Brachiobasilic AVF under local anesthesia. After 4 weeks of first procedure the second procedure of elevation of fistula vein was carried out under local anesthesia/Axillary block, through a long skin incision over the fistula vein already marked by Doppler ultrasound/palpable thrill. The fascia over the vein was incised to isolate and ligate the side branches of the vein. The medial ante brachial cutaneous nerve was carefully mobilized and axially splitted

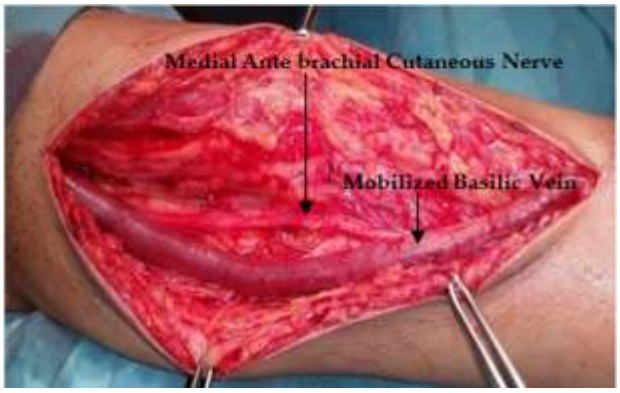

Figure-1: Mobilized Basilic Vein, brought over the medial ante brachial cutaneous nerve.

Figure-2: Lifting of Fascial Slings from the fascia over biceps muscle.

Figure-3: Fascial slings holding the elevated and lateralized basilic vein under the raised skin flap.

Figure-4: Superficialised and lateralized basilic vein after the procedure, the distance of fistula vein is 5cm from the incision in this case.

to pass the fistula vein under the nerve (fig-1). Skin flap of 5 to 6 mm thickness over the biceps muscle fascia on the anterior aspect of arm was raised according to the length of mobilized vein. Rectangular shaped slings of fascia over biceps muscle incised from 3 sides and attached on one side, perpendicular to the long axis of the biceps muscle, were made to accommodate the fistula vein in them. The length of the sling was triple of the diameter of fistula vein to avoid kink or external pressure using 3 x 2πr formula (fig-2). After passing vein under-neath the sling, the free sling edge is stitched to the opposite edge of fascia to hold the fistula vein in it (fig-3). The space from where the basilic vein was retrieved was closed with interrupted absorbable sutures. Skin closed in interrupted fashion. All the patients were evaluated for the distance of fistula vein from incision line with measuring tape at the mid arm level, immediately after skin closure, at 6 and 24 weeks (fig-4). The dialysis nursing staff was made the part of this study by recording their impression and level of satisfaction on a predesigned proforma. They were asked to document various factors including ease of finding vein, thrill, ease of cannulation, and number of pricks to make effective cannulation, number of times when call to senior sent for cannulation and patients comfort during dialysis.

Data Analysis

Demographics studied were age, gender and hospital registration number entered in pre designed Performa. All the data were recorded on the performa by the researcher. Comparison of data regarding distance of fistula from incision was done by specific tests on SPSS version 18.0. Quantitative data, like age and distance of incision from fistula was calculated in terms of mean and Standard Deviation (SD) by using descriptive statistics. Frequency and percentages were calculated for qualitative variables.

RESULTS

A total of 89 patients above the age of 18 years who underwent brachiobasilic fistula elevation in 16 months at our institute from 01 Jan 2016 to 30 Apr 2017, were included in the study. Sixty (67.4%) of them were males and 29 (32.6%) were females. Mean age was 46.86 ± 12.72 years. The mean age in males was 44.2 ± 14 years whereas mean age in females was 42.6 ± 12 years. The mean basilic vein diameter was 4.2 ± 0.75 mm. The other characteristics of the patients including mean age, duration of ESRD, co morbidities and diameter of the basilic vein are shown in table. The patients were followed for six months. None of the patients lost to follow up. The distance of fistula vein from skin incision at mid arm was found to be consistent from the first measurement till the last assessment at 6 months. In our study it was 5 ± 0.7 cm. Fistula maturation rate was 91% (81), eight (9%) fistulae were never put on dialysis because of thrombosis. The mean maturation time was 40 ± 14 days. Fifteen (16.9%) patients had arm edema, and twelve had infections (13%), which were treated with arm

Table: Demographic characteristics of the patients

Variables	BVT(n=89)
Gender (M/F)	60 : 29
Gender Percentages	67.4% (Males) 32.6% (Females)
Mean Age in years	46.86 ± 12.72 years
Mean age in years (male: female)	44.2 ± 14 : 42.6 ± 12 years
ESRD duration	18 (±4) months
Hypertension	72 (81%)
Diabetes mellitus	58 (65%)
Peripheral Vascular Disease	15 (17%)
Mean basilic vein diameter (mm)	4.2 ± 0.75

elevation and antibiotics. There were eight (9%) patients who had lymphorrhea which completely stopped in a month with conservative management. Fourteen (15.7%) had forearm parasthesias. No bleeding, pseudo aneurysm, or rupture occurred in our patients. All the dialysis nursing staff was satisfied with ease of cannulation and location of palpable thrill. Moreover arm position of the patient during dialysis was comfortable for the patient and convenient for the HD staff to keep the needle under vision.

DISCUSSION

Conventional BVT has many modifications like one stage BVT, two staged BVT[6], brachiobasilic fistula elevation[7], brachiobasilic tunnel transposition[8], BVT using long conventional incision, BVT using multiple small interrupted incision[9] and basilic vein mobilization assisted with videoscopic dissection[10]. In our centre at CMH Rawalpindi, we have adopted the Brachiobasilic fistula elevation technique to address the needs of vascular access in the patients with no suitable superficial arm veins or failed Radiocephalic or Brachiocephalic fistulae, but elevated fistula vein is notorious to fall under the scar mark of second stage surgery making it difficult for cannulation, increasing the number of pricks resulting venous wall laceration, extravasations, hematoma and pseudo aneurysm formation. Although studies are available comparing different techniques of brachiobasilic fistula surgery[11] but no local or international data is found on literature search regarding this modification of fascial slings. Humphries *et al* reported the same observations[12]. Patients were moving their arms frequently during dialysis in the search of a more comfortable position leading to needle displacement. To keep the puncture site under close observation, dialysis nurses used to put the patient's arm in slight abduction and external rotation, which was difficult for most of the patient to tolerate for longer time. Because of the anterior location of the elevated vein, easier venipuncture and effective hemostasis, formation of hematoma was less frequent. Cannulation of an elevated fistula vein requires special skill, more time and practice by nursing staff. However elevation and lateralization of fistula vein secured with fascial slings have addressed these issues amicably in our series. Kakaei *et al* studied the results of Brachiobasilic AVF relocation in 27 patients. Their one month post surgery complications rate is comparable with our study results. Bleeding (7.4%), hematoma (7.4%) and distal parasthesias (11.1%). 85.2% fistulae were working efficiently post operatively. While in our study fistula maturation rate is 91%. Use of fascial sling is a good adjunct in superficialization of fistula and contributes in its maturation with acceptable complication rate[13]. Mauro *et al* compared the two techniques of second stage of brachiobasilic fistula superficialization[14]. All the patients (total number 80) underwent brachiobasilic fistula in stage 1, later on half the patients (40) had fistula elevation in a skin pocket with intact primary anastomosis while rest of the half (40) had transaction of vein and re anastomosis after superficialization of basilic vein. In our study we adopted the same technique as done in first half of this study group with addition of fascial slings. On the contrary to our study results, they concluded second technique to be superior in terms of ease of cannulation and complication rate. There was no statistical difference in terms of primary and assisted patencies in both techniques. According to our study conclusion, use of fascial slings can improve the rate of ease of cannulation with acceptable rate of complications in the first half of this study group as well, as evident from our study results. Sheldrake *et al* compared the fistula patency, survival time and complications rate between single and two stage brachiobasilic AVF[15]. They found two staged procedure superior in terms of patencies with equivocal complication rates. They did not specifically calculated rates of complications in different techniques of two staged procedure. In the light of our study results, the results of two staged surgery can be made further promising using the fascial slings. To find a less morbid option of Basilic vein transposition Jairath *et al* compared

minimal invasive BVT (30 patients) with conventional BVT (34 patients) in terms of post op morbidity. In their study, they concluded that minimal invasive technique showed better results in terms of post op infection (2 vs 6), arm hematoma (1 vs 4) and significantly low pain in minimal invasive group[16]. However they did not compare the ease of fistula vein cannulation in their study.

CONCLUSION

Fascial slings are good adjunct to basilic vein elevation technique providing ease in cannulation for Dialysis nursing staff and relaxation of position for the patient during dialysis with minimal complication rate as seen in this study. This technique should be popularized and used in all patients who are undergoing BVT due to non availability of suitable superficial arm veins required for AVF formation.

CONFLICT OF INTEREST

This study has no conflict of interest to declare by any author.

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