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Brachiobasilic Fistula at Manmohan Center: A Retrospective Review

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ABSTRACT

Introduction

Brachiobasilic fistula (BBF) with transposition is one of methods for creating native arteriovenous fistula (AVF) for hemodialysis. This study aims to highlight the result of a BBF in a tertiary referral center and aims to improve its result.

Methods

This is a retrospective descriptive study conducted on the basis of data collected of patients undergoing BBF with transposition from January 2014 to December 2018 (5 years) at Manmohan Cardiothoracic Vascular and Transplant Center (MCVTC). Data regarding demographics, results and complications has been analyzed.

Results

Total 59 patients underwent brachiobasilic fistula performed by 3 surgeons with male to female ratio of approximately 3:2 with mean age of patient 68.78±13.77 years. Hypertension was the most common comorbidity present in 91.53% (54) of patients. Fifty six (94.92%)patient had previous undergone some sort of arteriovenous fistula creation and in 10 (16.95%) patients it was done in two stages. There were 2 immediate failures (within 1 week) and 9 early failures (before 1st dialysis) however 2 patients presented later with blocked BBF after starting dialysis. Only 31 patients could be followed up with patent BBF after 1 year of creation. About 71.19% of fistulas were able to mature and undergo dialysis by 6 week period and most common complication was bleeding from incision site in 20 patients (33.90%).

Conclusion

Brachiobasilic fistula is the good option for native arteriovenous fistula access for hemodialysis but it need proper selection of cases to decrease complication rates.

Keywords: *Brachiobasilic fistula, hemodialysis access, native arteriovenous fistula*

INTRODUCTION

Globally, the number of chronic kidney disease patients is increasing daily and our country is not left behind. Hemodialysis (HD) is the most common method of renal replacement therapy and arteriovenous fistula (AVF) the most common method of vascular access for it.[1] According to vascular access guidelines, radiocephalic and brachiocephalic fistula are first and second choice of hemodialysis followed by brachiobasilic fistula (BBF) and arteriovenous grafts.[2] Native fistulas are always preferred as first choice as long as it is feasible over graft due to its better patency rates, complication rates and need of secondary interventions. BBF is the only choice left in patient with no cephalic vein.[3]

The technique of BBF was first described in 1976 by Dagheret al[2] and was modified in later year by several surgeons. It basically

involves mobilization, superficialization and anastomosis of basilic vein with brachial artery. Dagher described it as a single stage procedure but nowadays some prefer to do it in two stages depending on the physical status of the patient and condition of the vein. This paper aims to study the demographics, results and complications encountered at Manmohan cardiothoracic vascular and transplant center in patients with BBF.

METHODS

Between January 2014 and December 2018, 59 patients (36 males and 23 females) who were not eligible for radiocephalic and brachiocephalic AVF were recruited for BBF is included in the study. This is a retrospective descriptive study based on hospital records and follow up information obtain via telephonic conversation. The data collected was recorded in excel sheet and analyzed. The demographics, outcome and complication encountered during the procedure and afterwards was recorded and presented in this paper.

Before BBF, all patients were subjected for Doppler ultrasound (M- turbo, Sonosite) to assess the feasibility of BBF and to measure the size of basilica vein and brachial artery. Most of the BBF's were performed in single stage while some (10 cases) were also done as staged procedures. All the cases were done by 3 surgeons under local anaesthesia, brachial plexus block or general anaesthesia.

In single stage procedure, after assessment the incision was made over the basilica vein located in the medial condyle of the humerus till axilla. The vein is dissected out of the fascia ligating the branches and preserving medial cutaneousnerve of forearm. The vein was the tunneled laterally using a tunneller and its patencyand position was confirmed by heparin flush. The basilica vein is then anastomosed with the brachial artery at the antecubital fossa in end to side fashion using 6.0 or 7.0 polypropylene continuous sutures. Following anastomosis, evaluation of thrill, hemostasis and fascia was closed using 3.0 polyglactin sutures. The skin was closed with nylon 3.0 or polypropylene 3.0 cutting body suture.

In two stage procedures, the incision is made over basilic vein located over medial and lateral condyle of humerus and it was anastomosed to the brachial artery laterally in end to side fashion using 6.0 or 7.0 polypropylene continuous sutures. The incision was closed

Table 1. Age group distribution of the patients

Age group (yrs)	Number of patient	Percentage
Below 20	0	0
21- 40	1	1.69
41- 60	21	35.59
61- 80	35	59.32
Above 80	2	3.39
	59	100

Table 2. Demographic profile of the patients

Co-morbidities	Number of patient	Percentage
Diabetes	49	83.05
Hypertension	54	91.53
Heart disease	29	49.15
Peripheral vascular disease	12	20.34
Smoking	25	42.37
AVF made before	56	94.92

Table 3. Complication rates in patients

Complications	Number of patients	Percentage
Mortality within 1 mnth	2	3.39
Maturation rate at 6weeks	42	71.19
Infection	6	10.17
AVF Thrombosis	2	3.39
Bleeding	20	33.90
Hematoma	7	11.86
Pseudoaneurysm	4	6.78
Steal syndrome	1	1.69
Oedema	5	8.48

after evaluation of presence of thrill. After about 2 to 3 weeks, the incision was made through the basilica vein located at the medial condyle of humerus till the axilla. The vein was carried over the fascia tying all the tributaries during the release of the basilica vein and preserving medial cutaneous nerve of forearm. The subcutaneous plane above the fascia was created laterally and the dissected vein was placed and fixed using 6.0 or 7.0 polypropylene sutures. Finally the wound was closed in layers using 3.0 polyglactin 910 and 3.0 nylon sutures.

In both the cases, patients were serially evaluated for 6 weeks to rule out any complications and to ensure vein maturation and proper wound healing before subjecting the patient for hemodialysis via BBF. Postoperative complications, patency rates, thrombosis, hematoma, infection and pseudoaneurysm were retrospectively analyzed.

RESULTS

Among total of 59 patients undergoing brachiobasilic fistula 36 were males and 23 were females (M:F= 3:2). Mean age of the patient was 68.78±13.77 years(Table 1). The patient's comorbidity and presence of previous fistula is shown in table 2.

The mean diameter of basilic vein undergoing BBF as measured using 2D Doppler ultrasound is 3.46 ±0.4mm and mean diameter of brachial artery is 3.81 ± 1.6mm. Most of the BBF were done in single stage (49 cases) and mean duration of patient undergoing dialysis before creating BBF was 28.8 ± 16 months.

On assessment of the result of BBF, 2 patients had failure of BBF within 1 week of creation. One of the patients died on the 2nd postoperative day due to myocardial infraction while another patient had a wound infection disrupting the incision site in which case we had to ligate the fistula and repair the artery. The patient had a prolong hospital stay and finally discharged with a permanent catheter for hemodialysis.Among 59 patients, 9 had early failure (15.25%) due to infection, thrombosis and hematoma and had to choose alternative route for dialysis. Two patients presented after initiating dialysis from the BBF site with blockage of the fistula approximately 1 year later.

Out of 59 BBF created only 48 patients underwent dialysis from BBF (81.36%) after 2 months. Rest of the patient had some issues with the fistula and could not make it to dialysis. On follow up of the patient at 1 year only 31 patients (52.54%) were using the BBF created by our team. Some patient had died, some were lost to followup, some had undergone transplant and some couldn't be traced. The complication rates are shown in table 3.

DISCUSSION

Dialysis is the ultimate treatment for patients with end stage renal diseases until they get renal transplant and hence AVF is the best modality of access for the renal replacement therapy.[1,2] According to Kidney Disease Outcome Quality Initiative (KDOQI), autologous radiocephalic or brachiocephalic AVF is the primary choice for hemodialysis and BBF is recommended only in cases with no or exhausted cephalic vein.[3]

The mean age group of patient subjecting to BBF was older (68.78±13.77 years) in our study compared to other studies probably because most of our cases had exhausted cephalic vein and patient compliance for dialysis access is also very poor in out setup. In most of the study male predominate female in dialysis as in our study and ratio of male to female for creating BBF was comparable to other study.[4-6]

The mean diameter of basilic vein and mean diameter of brachial artery were also comparable to other studies.[5] Incidence of diabetic (83.05%), hypertension (91.53%), heart disease (49.15%) and peripheral vascular disease (20.34%) was higher than expected than other studies.[6] This was probably due to most BBF was created as the last resort of vascular access and poor patient compliance to vascular access. Mean duration of dialysis (28.8 ± 16 months) before going into BBF creation was lower than the study by Ozcanet al.[4]

Considering postoperative complications, infection rate was 7% in the study conducted by Dilege et al[7] and 14% in study conducted by Veeramanive et al.[8] in our study it was 10.17% which is comparable.

River et al found the rate of pseudoaneurysm to be 3% while it was 6.78% in our study and was probably due to proximity of vein to the artery while transposition.[9]

In various published studies,10-12 the rate of steal syndrome was 3.2- 6.5% while it was just 1.69% in our study. The rate of fistula maturation (71.19%) was also comparable to other published studies (62- 97%).13-17The rate of thrombosis is widely varied in various studies ranging from 3- 38% and in our study it was also within the acceptable range (3.39%).[12-17]

The rate of patency of BBF at 12 months in ourstudy was only 52.54% while it was 57% at 36 month in reports by Cantelmo et al18 and 52% in Rivers et al.9 The rate of hematoma was 3.6- 11%in other studies[19-21] and it was 11.86% in our study which is attributed to longer incision and use of heparin. The result of bleeding and hematoma has indirect effect on fistula maturation and patency so it can limit our study.

Mortality among patients with end stage renal disease is inevitable. We had two mortalities, one due to infection and other due to myocardial infraction both are not directly related to the surgery.

Post-operative limb oedema after AVF is a common occurrence. It is due to the disease per se, venous hypertension, bleeding and tissue trauma during surgery. The limb oedema also results in delayed maturation of AVF and delay in functioning of dialysis.[10-13,22]

CONCLUSION

Brachiobasilic fistula is among the best access for dialysis in patients with exhausted or no cephalic veins. It has been routinely made in our center and the results are comparable to other centers world-wide. It needs a team approach to decrease the rate of complication and increase the use of BBF. Optimum patient selection, optimal timing of surgery and meticulous surgical techniques are all that guarantees the best outcome for the patient with End Stage Kidney Disease.

CONFLICTS OF INTEREST

None declared.

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