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EARLY OUTCOME OF HEMODIALYSIS ACCESS ARTERIOVENOUS FISTULAE

Cardiology

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ABSTRACT

Background: Arteriovenous fistulae (AVF) are created in end stage renal failure patients for the purpose of a vascular access for hemodialysis.
Aim: The aim of this study was to retrospectively evaluate the site, results and complications of arteriovenous fistula creation procedures in our hospital.
Results: We found 154 patients who had undergone 167 AVF creation surgeries. Among these patients, 86 were male and 68 were female. Mean age was 52.24 ± 16.8 years (range 9 – 71 yrs). Of these procedures 149 were created at the wrist and 18 were brachiocephalic fistulas. Early failure occurred in 13 patients of which 8 were males and 5 were females. Fistula patency rate was 92.2 percent.
Conclusion: Early thrombosis and failure of hemodialysis access arteriovenous fistulae is a known complication. Good pre operative evaluation of the surgical anatomy can keep the rate of primary failure low.

KEYWORDS

Arteriovenous, Fistula, Failure, Patency

Introduction

Hemodialysis continues to remain the main modality of treatment of end stage renal failure patients although the number of renal transplants performed every year is increasing. [1] For the ease of hemodialysis, arteriovenous fistulae are created for vascular access. Therefore it is very essential that these surgically created AVF have good long term patency. The first external arteriovenous shunt was used by Quinton in 1960 and Brescia-Cimino used the endogenous arteriovenous shunt in 1966. [2, 3] The radio cephalic Brescia-Cimino fistula created at the wrist is still the preferred AVF even today. The purpose of our study was to evaluate the site, early results and the complications of AVFs created in our hospital.

Materials and Methods

This retrospective observational study was carried out in our hospital in patients who underwent AVF creation between January 2018 and January 2020. We could find 167 AVF procedures were performed in 154 patients. All these patients were physically evaluated prior to surgery and most of these patients were referred from our nephrology department. The distal most vascular access site (wrist) on the non dominant hand was chosen primarily for AVF creation. The presence of a prominent vein upon application of pressure, recent vascular access, arterial pulses was assessed on pre operative evaluation. The most distal site would be chosen for patients with more than one suitable site. We defined early failure or early thrombosis for those which occurred in the first 30 days. All these patients were followed up until 30 days after creation of the AVF.

Surgery

All surgeries were performed under local anaesthesia with Lignocaine 1 percent (5mg/kg) and Bupivacaine diluted to 0.125 – 0.25 percent (2 -3 mg/kg). Incision was taken longitudinally between the radial artery and the cephalic vein at the wrist for the distal fistula and on the surface marking of the brachial artery for the brachio-cephalic fistulas. Following the incision, after careful dissection of both the artery and the vein, intravenous heparin was administered (100 IU/kg). After 3 minutes, the artery would be clamped. The end to side technique was preferred for the distal anastomoses, however proximally there was no preference between either the end to side or the side to side anastomoses. Continuous suturing technique using polypropylene 7 – 0 was employed to create the anastomoses. In case of vasospasm, topical papaverine was used. After careful hemostasis, wound closure was done and a light dressing was applied. The presence of a thrill marked the successful outcome of the surgery. For patients who did not have a thrill but had a palpable arterial pulse over the vein, nothing was done and they were followed up. However for patients without a pulse, the entire anastomosis was redone.

Results

Out of the 154 patients who underwent AVF creation, 86 patients (55.8%) were male and 68 patients (44.2%) were female. The mean age was 52.24 ± 16.8 yrs (range 9 – 71 yrs). 149 procedures (89.22%) were distal AV fistulas performed at the wrist and 18 were proximal AV fistulas performed at the antecubital fossa. Site of surgery was the left side in 130 surgeries (77.84%) and the right side in 37 (22.16%) patients. This was the first ever AVF creation surgery for 128 patients whereas 26 patients had at least one previous fistula either made in our institution or some other. Our patient demographics are summarised in table 1.

Table 1: Patient demographics

Parameters	Number
Patients	154
Fistulae created	167
Males	86
Females	68
Age	52.24 ± 16.8 yrs

Early failure of the AVF within 30 days occurred in 13 out of the 167 cases. All these cases were fistulae created distally and there was no early failure in any of the brachiocephalic fistulae.

The various complications that we faced in our patients were early thrombosis, wound infection, hematoma formation at the surgical site and excessive hyperaemia of the surgical site. The incidence of the various complications is summarised in table 2.

Table 2: Complications

Complication	Number
Early thrombosis	13 (7.78 %)
Hematoma	5 (2.9%)
Wound Infection	4 (2.4%)
Hyperemia	3 (1.8%)

Patient who had a hematoma underwent re exploration of the wound and those who had wound infection or hyperaemia were treated by standard antibiotic therapy. Dialysis was not initiated through the AVF on any of the patients during the course of the first 30 days for any of the patient.

Discussion

A good vascular access is very essential for continuation of hemodialysis in end stage renal failure patients. There are many options in creating a hemodialysis access AVF; however the most preferred are the Brescia-Cimino and anatomical snuffbox methods. The first site for a fistula is always the distal most and in case of failure of these distal fistulae, the next options are an AVF on the same arm proximally or on the other arm distally.

Fistula failure can be mainly divided into 2 groups – early failure and

late failure. Reasons for early failure are use of ill suited veins, severe dehydration, outlet obstruction, poor anastomosis, vein kinking near the anastomosis and compression due to a hematoma. [4,5] Reasons for late failure include stenosis of the anastomotic line during and after development of intimal hyperplasia, fibrous tissue development of the vein walls due to needle puncture trauma and calcium phosphate deposition on the anastomotic line. [6]

Different early fistula failure rates have been published by various authors. Sozudogru et al reported a failure rate of 18% [7], Ozkoleli et al 18.8% [8] and Da Silva et al 15 % [9]. Other studies have quoted early failure rates between 12 and 29 percent. [9] In a study by Iyem, an early failure rate of just fewer than 6 percent has been reported. [10]. Our early fistula failure rate was 7.8 percent which was acceptable. In an Indian study by Sahasrabuddhe et al, fistula failure occurred in 75 out of 271 patients. [11] However their study also included patients whose vein diameter was less than 2.5mm for the purpose of comparison. Stringent pre operative evaluation and delaying surgery for patients who have small veins had an important share in keeping our fistula failure rate low.

There are studies which compare success rates of fistulae done on the forearm in men and women. These studies have got varied results. [10] However, no attempt was made to analyse any such differences in our study. Our study had a higher proportion of males as compared to females; similarly fistula failure was more in males as compared to females.

The complications of AVF are well known and there is always a need to keep the patients under observation for some time period even though AVF creation is a simple and an outpatient procedure. The most common complication is early thrombosis of the fistula. [12] Bleeding and hematoma formation is a complication which needs to be tackled at the earliest because it can lead to fistula failure. Hematoma formation occurred after 5 surgeries in our study and these patients had to be taken for a re exploration. However, after the hematoma evacuation, thrill returned in all cases and there was no fistula failure in these cases at least during the duration of our study.

Conclusion

The fistula patency rate and the early failure rate in our study were comparable to published literature. Careful pre operative inspection of the surgical site for radial artery pulse and good venous contour leads to proper patient selection and hence better results. Proximal brachiocephalic fistulae have a better patency rate as compared to the distal radiocephalic fistulae.

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