

## A Prospective Study to Determine Complications Associated with Brachio Cephalic Arterio-Venous Fistula at Medanta- The Medicity, Gurugram, Haryana

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### Abstract

**Introduction:** The pattern of disease burden in the 21st century has significantly shifted towards chronic kidney disease. The focus in CKD has changed from treating a terminally ill patient, to dealing with a person who has a manageable chronic disease that requires long term care. As for CRF patients, hemodialysis should be repeated three times a week for at least three to four hours per dialysis; thus it is the best method to use arteriovenous fistula (AVF) as a vascular access.

**Aim:** to determine the prevalence of associated complications (Steal, infection, pseudoaneurysm) in BC AVF's.

**Methodology:** This was a single centre, observational longitudinal study done on 98 patients with Brachio-cephalic arterio-venous fistula (BC-AVF). Procedure was conducted in the department of peripheral vascular and endovascular surgery at Medanta - The Medicity Hospital, Gurgaon, Haryana from October 2015 to April 2017.

**Results:** In our study, 3 patients had complications (2 Pseudoaneurysm and 1 steal phenomena).

**Keywords:** Chronic Kidney Disease, Arteriovenous Fistula, Brachio-cephalic arterio-venous fistula.

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### Introduction

The pattern of disease burden in the 21<sup>st</sup> century has significantly shifted towards chronic kidney disease[1].

The focus in CKD has changed from treating a terminally ill patient, to dealing with a

person who has a manageable chronic disease that requires long term care. The changes in focus are the result of the technical advances in dialysis and improved surgical techniques. Hemodialysis (HD) is the most commonly used method of dialysis[2]. Hemodialysis can

be done as outpatient or inpatient therapy. Routine hemodialysis is conducted in a dialysis outpatient facility[3]. The most long lasting access is created surgically known as fistula, by joining an artery to vein either side to side or end to side. As for CRF patients, hemodialysis should be repeated three times a week for at least three to four hours per dialysis; thus it is the best method to use arteriovenous fistula (AVF) as a vascular access. Compared to other vascular access such as venous catheter and a synthetic graft, arteriovenous fistula is the most commonly used method as it has fewer complications[4].

Arteriovenous fistulas (AVF) are considered the gold standard for hemodialysis access based on their superior patency, low complication rates, improved adequacy, lower cost to the healthcare system and decreased risk of patient mortality. Brachio-cephalic fistula has high primary and secondary patency rates as compared to radiocephalic fistula[5].

There are many complications associated with Brachio-cephalic AV fistula. Failure, pseudoaneurysm and steal phenomenon are some of the complications. Through this study we have attempted to determine the prevalence of associated complications (Steal, infection, pseudoaneurysm) in BC AVF's.

### **Methodology:**

This was a single centre, observational longitudinal study done on 98 patients with Brachio-cephalic arterio-venous fistula (BC-AVF). Procedure was conducted in the department of peripheral vascular and endovascular surgery at Medanta - The Medicity Hospital, Gurgaon, Haryana from October 2015 to April 2017 to determine the risk factors for failure of brachiocephalic fistula. Based on the available literature on failure of brachio-cephalic arterio-venous fistula[6], the sample size worked out as 75.

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All patients requiring hemodialysis and undergoing Brachio-cephalic AV Fistula creation were included in our study. Exclusion criteria included patient having central venous obstruction, Cephalic vein diameter <2.5mm, Brachial artery diameter < 2mm, Thrombophlebitic vein (thickened wall/echo texture), Depth of cephalic vein >6mm, Local skin infection at fistula site.

### **Follow up:**

Follow up of patients were taken on 15+/-2 (visit-1) post operative day, on 30+/-7 days (visit-2) and at 6 months+/-7 days (visit-3) or earlier depending on status of fistula. During follow up, patency and complication of brachio-cephalic fistula were recorded. In particular, vein diameter was measured by Duplex Ultrasound with a tourniquet, inner wall to inner wall, using B-mode technique. The non dominant upper limb was usually preferred. Statistical testing was conducted with the statistical package for the social science system version SPSS 24.

### **Results:**

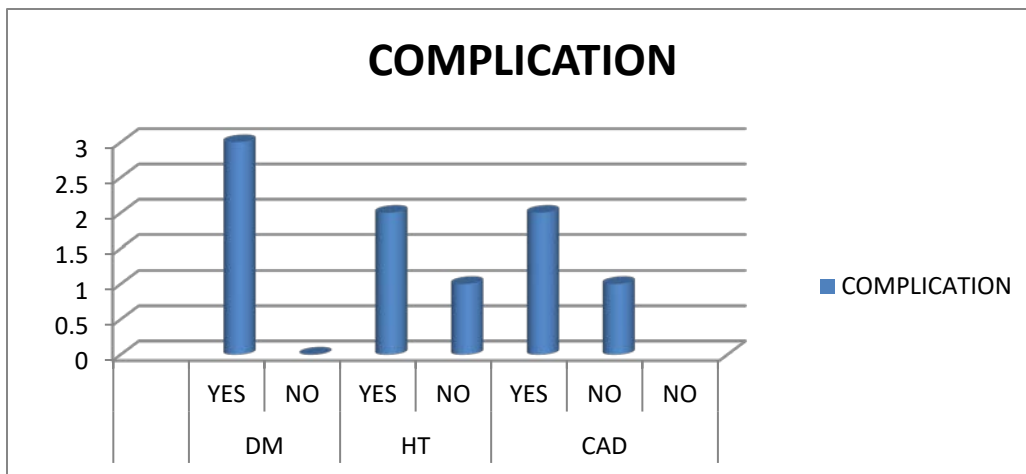
We have observed that majority patients were between 51-70 years of age. 66 cases in our study were between 51 – 70 years which accounted for 67 % of cases. 19 patients were below the age group of 50 years which accounted for 19% of all patients. The youngest patient was a 31 year male. 12 patients were >70 years of age (Elderly age group) which accounted for 13% of all patients. Mean age was 59.34 years +/- 10.61 SD (standard deviation).

In this study, between 30-50 years of age 4 fistulas were right sided and 15 were left sided. 19 fistulas were right sided and 47 were left sided in the age group of 51 – 70 years. Beyond 70 years, 2 fistulas were right sided and 11 were left sided.

In this study, 68 patients were diabetic (70%) in which 56 were males and 12 were females. 73 patients were hypertensive (75%) in which 60 were males and 13 were females. 72 patients had coronary artery disease (74 %) in which 60 were males and 12 were females.

In our study, 3 patients had complications (2 Pseudoaneurysm and 1steal phenomena) all three were diabetic. Two were hypertensive and two had coronary artery disease. P value was statistically insignifica

CO-MORBIDITY		COMPLICATION		
		YES	TOTAL	P VALUE
DM	YES	3	3	0.243
	NO	0		
HT	YES	2	3	0.752
	NO	1		
CAD	YES	2	3	0.786
	NO	1		



In our study primary patencyrate of brachio-cephalic fistula was 77.55% and primary assisted patency was 87.75% at 6 months.

PATENCY RATE	PERCENTAGE
PRIMARY PATENCY	77.55
PRIMARY ASSISTED PATENCY	87.75

**Discussion:**

In our study the mean age was 59.34 years +/- 10.61SD (standard deviation). There was male preponderance in our study with 81% of the patients being males (79) and 19% being females (19).

A study was done by Andy R.Weale et al[7] in which out of 658 patients 211(32%) patients were diabetic, 391(60%) patients were hypertensive.The higher incidence of diabetic patients in our study is likely due to the high prevalence of DM in India.

A comparative study done by C.J. Zeebregtset al[6] also showed that diabetes

mellitus was identified as a significant predictor of failure by univariate analysis. Primary assisted and secondary patency rates can, however, be brought to a much higher level, especially in patients without diabetes and a large diameter venous outflow tract.

In our study 3 patients had complications (2 Pseudoaneurysms, 1 steal phenomena) in which all three were diabetic, two were hypertensive and two had coronary artery disease. In nephrology, steal phenomenon is a syndrome caused by ischemia resulting from a vascular access device like AV fistula, that was installed to provide access for the inflow and outflow of blood during hemodialysis.

In our study, the primary patency rate of brachio-cephalic fistula was 77.55% and primary assisted patency was 87.75%. Previous study done by C.J. Zeebregts et al [4,7] showed that primary and primary assisted patency of brachio-cephalic fistula after 6 months were 73.4 and 83.2 respectively and are comparable with our study results.

### Conclusion:

In patients with chronic renal failure, AVF (arteriovenous fistula) with low incidence of complications and high long-term patency rates should be created. Several factors could affect the AVF patency but after analyzing the various factors involved in the study, we would like to conclude that failure rate of brachio-cephalic fistula was high: In patients who had co-morbidities (diabetes, hypertension, coronary artery disease); In patients age >50 years; In patients already on dialysis; In patients with ipsilateral dialysis catheter; In female patients.

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