



## OUTCOMES OF END TO SIDE RADIO-CEPHALIC AV FISTULA FORMATION FOR VASCULAR ACCESS IN PATIENTS ON DIALYSIS: OUR EXPERIENCE

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**ABSTRACT** **Introduction:** Despite all the recent advances in the field of Medicine, yet hemodialysis is still the mainstay in the treatment of chronic renal failure patients. An appropriate vascular access is of utmost importance in patients on regular dialysis and the best permanent access is an Arterio-venous fistula preferably in the distal forearm.

**Objectives:** To study the feasibility, efficacy and complication rates associated with end to side technique of Radio-cephalic AV fistula formation.

**Patients and Methods:** This study comprised of 186 patients of chronic renal disease on regular dialysis who were operated for Radio-cephalic AV fistula replacement during period of 2 years from October 2016 to October 2018. All the AV fistula were formed using end to side venous patch overlay technique. All the patients were followed up regularly for the first 6 months to access patency and look for any complications.

**Result:** Out of the 186 patients who underwent the surgery , by end to side technique, 16(8.6%) patients had non-functional AV fistula at 6 months. Thrombosis was the cause in 14 AVF failures whereas 2 AVF failures were due to proximal venous system.

**Conclusion:** End to side AV fistula formation is well established technique with excellent efficacy with acceptable complication rate.

**KEYWORDS :** End stage renal disease, Dialysis, fistula, end-to-side, side-to-side, Outcome

### BACKGROUND:

Despite all the recent advances in the field of medicine in general and renal replacement in particular, yet hemodialysis is the mainstay of treatment in most of the patients of chronic renal diseases. The most important pre-requisite for hemodialysis is a well-functioning vascular access. Native arterio-venous fistulae are preferred over synthetic grafts and cuffed double lumen catheters due to their superior patency rates and lower complications. A high primary failure rate and maturation problems still enforce the search for better solution<sup>1,2</sup>.

With overall success rates of about 84% arterio-venous fistula is the gold standard for vascular access for hemodialysis<sup>3</sup>. Arterio-venous fistula can be formed at different location like radio-cephalic at distal forearm, brachio-cephalic or brachio-basilic AVF at cubital fossa. Radio-cephalic AVF in the distal one third of forearm is the preferred site. The anastomosis can be formed in either side-to- side or end-to-side fashion.

In an AVF the venous system offers little resistance to the blood therefore increasing the flow in the artery and in the communicating vein thus providing a high flow segment for vascular access .A functional AVF must provide a flow rate of 350-400 ml/min.

Results of AVF surgery may be affected by surgical skill, condition of native vessel wall, hyper-coagulable site, endothelial injury, puncture techniques etc.

Most common complication associated with AVF formation are thrombosis, bleeding, venous hypertension, steal syndrome, aneurysm formation .

### OBJECTIVES:

This study was done to evaluate the outcomes, efficacy and complications of end to side technique of AV fistula formation as vascular access for renal replacement therapy.

### PATIENTS AND METHODS:

This study comprised of 186 patients of chronic renal disease on regular dialysis who underwent radio-cephalic AV fistula formation during a period of 2 years from October 2016 to October 2018. All the fistulae were formed by end to side overlay venous patch technique.

All the patients underwent detailed history and physical examination. Optimal venous condition was by physical examination and duplex ultrasound scan of the target limb. A venous diameter of at-least 2mm without any clot or thrombus was a pre-requisite. Radial Artery scan was done to look for flow, diameter and atherosclerotic calcifications. A severely calcified radial artery with monophasic flow, diameter less

than 2mm, incomplete palmer arch were some of the exclusion criteria. Non-dominant upper extremity was preferred but in some cases due to lack of optimal vascular characteristics , dominant upper limb was chosen.

All the surgeries were done under local anesthesia with standard linear incision in the distal one third of upper limb. Radial artery and cephalic vein were dissected and proximal and distal controls achieved. Cephalic vein was divided at the distal most end and its proximal end anastomosed with the radial artery in end-to-side fashion as an overlay venous patch using continuous 6-0 polypropylene sutures.

Success of the access surgery was defined as a good thrill obtained on table and absence of thrill prompted immediate revision of the anastomosis to look for any detectable cause. All the patients were followed up in the post-op period with a visit on day 1 , 2weeks and then monthly follow-up for the next 6 months . AVF patency and maturation were checked by palpation of thrill, auscultation for machinery murmur and, in cases of maturation failure, duplex ultrasound was used to delineate the cause of failure.

The data collected during 6 months of follow up was compiled and evaluated. Quantitative and qualitative data was expressed as means and percentages respectively.

### RESULTS:

The present study included 186 patients who underwent surgery for radio-cephalic AV fistulas vascular access for regular hemodialysis. Out of these 109(58.6%) were males and 77(41.3%) were females. The mean age was 45.3 years and majority of the patients were in 4<sup>th</sup> and 5<sup>th</sup> decade of life. The youngest patient was 10 years old and the oldest one was 81 years old.

Medical history revealed hypertension in 116(62.3%) and type 2 diabetes in 104(55.9%) patients. Hepatitis B and C infection was detected in 16(8.6%) and (6.4%) patients respectively. HIV infection was detected in 2(1.07%) patients.

Out of 186 patients 6(3.22%) had failure of AVF at day one and all of them were thrombosed. At 6 months follow up a total of 18(9.6%) had an ineffective AV fistula. Most common complication was edema in 20(10.7%), local hematoma in 9(4.8%), wound infection in 7(3.7%) and bleeding requiring re-exploration in 1(0.53%).

### DISCUSSION:

This study was done over two years and comprised of 186 patients of chronic renal disease on regular hemodialysis who underwent radio-cephalic AV fistula using end to side technique by a single surgeon.

Patients were followed up with detailed work-up till 6 months post-operatively.

Total of 18(9.6%) patients had AVF failure while the rest had acceptable patency. Out of these 18 patients,14(77.7%) had failed due to thrombosis and 4(22.2%) failed to mature despite a patent AV fistula due to stenosis of subclavian vein due to previous cannulation.

Type 2 diabetes and hypertension were both present in 12(66.6%) out of 18 patients in whom AVF failed to mature .

A review of literature revealed a primary rate of 24-35% in radio-cephalic AVF<sup>6,9</sup> . Most of these studies were done using side to side technique. Our study had a low failure rate of 9.6% at 6 months of follow up.

#### CONCLUSION:

Radio-cephalic AV fistula remains the best option as vascular access for regular hemodialysis . End to side AVF anastomosis is an excellent technique with low failure rates. Nevertheless comparative studies with longer follow up will be required for any conclusive recommendations can be made.

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