

# Comparative Study of Efficacy of End-to-Side with Side-to-Side Arteriovenous Fistula in patients on Hemodialysis

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## ABSTRACT

**Aim:** To compare efficacy of end-to-side with side-to-side arteriovenous fistula in patients on hemodialysis.

**Methods:** Randomized controlled trial conducted in the Department of Urology, Nishtar Hospital Multan for a period of 6 months. The exact dates are from 08-7-2012 to 08-1-2013,. Sample size was 168 patients in each group. Sampling technique was non- probability purpose sampling

**Results:** Among 336 patients divided in two equal groups of 168 patients each. Mean age ( $\pm$ S.E.M.) of patients was  $39.79 \pm 0.41$  vs.  $39.45 \pm 0.51$  in group A and group B respectively. There were 15(8.9%) vs. 18(10.7%) patients having hemorrhage at 24 hours in group A and group B respectively. There were 3(1.8%) vs. 7(4.2%) patients having hemorrhage assessed after 1 month in group A and group B respectively. Efficacy of group A (end to side technique) was 89.3% while in group B (side to side technique) efficacy was 85.1%. There was no significant difference regarding efficacy between the groups i.e. group A (end to side) or Group B (side to side)  $p=0.253$ .

**Conclusion:** Efficacy of end-to-side AV fistula is superior to side-to-side AV fistula in terms of postoperative hemorrhage at 24 hour and one month post operatively.

There was no significant difference regarding efficacy between the groups i.e. group A (end to side) or Group B (side to side)  $p=0.253$ .

**Keywords:** End to side arteriovenous fistula, side to side arteriovenous fistula,

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## INTRODUCTION

Chronic renal failure refers to an irreversible deterioration in renal functions over a period of years which finally leads to end stage renal disease<sup>1</sup>. End stage renal disease (ESRD) is a condition when the kidneys lose their function completely and there is no reversible element. It is estimated that there are 100-150 new patients / million population/year in Pakistan who suffer from such a condition. With the passage of time the incidence of this condition is increasing because of more awareness as well as increase in incidence of certain diseases like diabetes mellitus and hypertension<sup>2</sup>.

These patients require either chronic maintenance dialysis (hemodialysis or peritoneal dialysis) or renal transplantation<sup>3</sup>. Renal transplantation is the curative therapy for ESRD but its availability is limited due to problems of donor organs, cross matching and surgical and technical expertise<sup>4</sup>. Hemodialysis performs the excretory functions of the kidney. It is a process in which

solutes move across a semipermeable membrane against the concentration gradient in a dialyzer<sup>5</sup>. Hemodialysis is a life-sustaining procedure for the treatment of patients with end-stage renal disease. With adequate amount of dialysis it results in a dramatic reversal of uremic symptoms and helps to improve the patient's nutritional as well as functional status and increases patient's survival<sup>6,7</sup>.

Patients are dialyzed mostly for renal failure. Peritoneal dialysis and Hemodialysis are its two types having their own indications. Hemodialysis may be emergency therapy or planned in renal failure. End Stage Renal Disease (ESRD) is managed by either Peritoneal Dialysis or maintenance Hemodialysis or and ultimately by Renal Transplantation. It may be done on Outpatient or Indoor basis. Less frequently it is done at home<sup>8</sup>. Different arteriovenous access has been adopted worldwide for hemodialysis Dialysis but functionality and patency of each access has been weighed on availability of skills and choice of techniques. At present, no single technique has been recommended superior to others in terms of better outcome from various study results. The present study was performed at urology department Nishtar Hospital Multan The rationale of study was to find out the best technique for Arteriovenous fistula formation after comparing end to side arteriovenous technique with

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side to side AV technique in terms of postoperative hemorrhage .

**PATIENTS AND METHODS**

Patients were with End stage renal disease (ESRD) admitted in Renal & Urology department of Nishtar Hospital Multan. Randomized controlled trial conducted in the Department of Urology, Nishtar Hospital Multan for a period of 6 months. The exact dates are from 08-7-2012 to 08-1-2013,. Sample size was 168 patients in each group. Sampling technique was non- probability purpose sampling. End stage renal disease (ESRD) is a condition when the kidneys lose their function completely and there is no reversible element. It is estimated that there are 100-150 new patients / million population/year in Pakistan who suffer from such a condition. With the passage of time the incidence of this condition is increasing because of more awareness as well as increase in incidence of certain diseases like diabetes mellitus and hypertension.

**RESULTS**

In present study, there were 336 patients divided in two equal groups of 168 patients each. Mean age ( $\pm$ S.E.M.) of patients was 39.79 $\pm$ 0.41 vs. 39.45 $\pm$ 0.51 in group A and group B respectively.

There were 107(63.7%) vs. 100(59.5%) patients in group A and group B respectively between the age of 30–40 years and 61(36.3%) vs. 68(40.5%) patients between 41–50 years in group A and group B respectively (Table 1). There were equal number of males 119(70.8%) vs. 119(70.8%) and equal number of females 49(29.2%) vs. 49(29.2%) in group A and group B respectively (Table 2). There were 15(8.9%) vs. 18(10.7%) patients having hemorrhage at 24 hours in group A and group B respectively (Table 3).

There were 3(1.8%) vs. 7(4.2%) patients having hemorrhage assessed after 1 month in group A and group B respectively (Table 4).

Efficacy of group A (end to side technique) was 89.3% while in group B (side to side technique) efficacy was 85.1% (Table 5). There was no significant difference regarding efficacy between the groups i.e. group A (end to side) or Group B (side to side) p=0.253. In group A, out of the total 107 patients between the age of 30–40 years, 91(85.1%) patients had efficacy. Out of the total 61 patients between the age of 41–50 years, 59(96.7%) had efficacy of the technique. In group B, out of the total 100 patients between the age of 30–40 years, 88(88%) patients had efficacy. Out of the total 68 patients between the age of 41–50 years, 55(80.9%) had efficacy of the technique (Table 6).

In group A, out of the total 119 male patients, 107(89.9%) had efficacy. Out of the total 49 female patients, 43(87.8%) had efficacy of the technique. In group B, out of the total 119 male patients, 101(84.9%) had efficacy. Out of the total 49 female patients, 42(85.7%) had efficacy of the technique (Table 7).

Table 1: Age distribution of the patients

Age (in years)	Group A	Group A
30 – 40	107(63.7%)	100(59.5%)
41 – 50	61(36.3%)	68(40.5%)

Mean $\pm$ S.E.M. of patients in Group A=39.79 $\pm$ 0.41

Mean $\pm$ S.E.M. of patients in Group B=39.45 $\pm$ 0.51

Table 2: Gender distribution of the patients

Gender	Group A	Group A
Male	119(70.8%)	119(70.8%)
Female	49(29.2%)	49(29.2%)

Table 3: Frequency of Hemorrhage at 24 Hours

Hemorrhage	Group A	Group A
Yes	15(8.9%)	18(10.7%)
No	153(91.1%)	150(89.3%)

Table 4: Frequency of Hemorrhage after 1 Month

Hemorrhage	Group A	Group A
Yes	3(1.8%)	7(4.2%)
No	165(98.2%)	161(95.8%)

Table 5: Efficacy

Efficacy	Group A	Group A
Yes	150(89.3%)	143(85.1%)
No	18(10.7%)	25(14.9%)

Table 6: Age distribution of patients in relation to outcome

Age (years)	Group A		Group B	
	n	Efficacy	n	Efficacy
30 – 40	107	91(85.1%)	100	88(88%)
41 – 50	61	59(96.7%)	68	55(80.9%)

Table 7: Gender distribution of patients in relation to outcome

Gender	Group A		Group B	
	n	Efficacy	N	Efficacy
Male	119	107(89.9%)	119	101(84.9%)
Female	49	43(87.8%)	49	42(85.7%)

**DISCUSSION**

The main problems in haemodialysis are related to vascular access. The peripheral vascular system of the patients provides limited possibilities for the recurrence of vascular access establishment. The types and incidence of complications again limit the lifetime of established accesses in dialysis patients. These represent a major problem for the dialysis and transplantation centres in their attempts to preserve the established vascular approach for as long as

possible. The main threat to the vascular approach, and subsequent successful cure through haemodialysis, is represented by the complications, the occurrence of which is associated to the mode of vascular access. Complications are mostly responsible for the short life span of the established accesses, resulting in complete morbidity and mortality in dialysis patients. This is the main problem that the expert scientific thought and daily clinical practices are engaged in. Furthermore, vascular surgeons and nephrologists<sup>25</sup> are equally committed to finding solutions to such problems.

There are three possible ways of vascular access for the implementation of haemodialysis: AV-fistula, AV-graft and central venous catheter. Each of these three ways has its own indications and limitations. The central venous catheter is used in specific and limited cases, and is not in routine clinic use. Various medical centres apply the AV-fistula or the AV-graft in the different percentages of patients. The majority of European centres for dialysis and transplantation view the AV-fistula as the access of choice whereas the application of the AV graft is favoured in the majority of American centres. During haemodialysis, numerous types of threatening complications for the vascular approach arise in patients. In short, they are: thrombosis, infection, steal syndrome, neuropathy, pseudoaneurism, as well as haemorrhaging. They can appear in all three types of vascular accesses established on the peripheral vascular system.

Extensive research has been made in order to prolong the lifetime of vascular access, in other words, to anticipate the emergence of complications as well as to eliminate and cure those that have already surfaced. For the purpose of anticipating the emergence of complications, progress has been made by the application of ultrasound examination of the vascular mapping of the limbs prior to the implementation of the vascular access.

In our study, there were 336 patients divided in two equal groups of 168 patients each. Mean age ( $\pm$ S.E.M.) of patients was  $39.79 \pm 0.41$  vs.  $39.45 \pm 0.51$  in group A and group B respectively. Efficacy of group A (end to side technique) was 89.3% while in group B (side to side technique) efficacy was 85.1%. Subhani GM, Akmal M et al reported efficacy was 88.3% & 76 % in end to side AV fistula at 24 hour respectively. It is similar to our results in efficacy of end to side AV fistula technique. Galic G, Kvesic A et al In another study of 260 patients reported hemorrhage rate of (6.25%) with end to side & (15.78%) in side to side AV fistula technique. Our study result are in exact accordance with this study in efficacy Of side to side AV fistula technique in terms of postoperative hemorrhage.

Distal upper limb AV fistula are more common because of superficial venous system and less complications in comparison with proximal fistula. Our study has proved the same. Hemodialysis is done by double lumen catheter, AVF and synthetic shunts. Arteriovenous fistula is made at different sites. Our study was to compare the results distal AVF by the two techniques. There are multiple factors responsible for AVF failure but falling blood pressure, post operative hemorrhage and vascular injury during surgery are major factors. Hemorrhage was seen in 15% of end-to-side and 18% of side-to-side AVF. It is similar to our study. Abdul Hussain Talaiezadhi et al found failure of AVF due to fall of blood pressure in 22(73%) patients, thrombosis in 30% of patients. In some patients Hemorrhage and hematoma was seen after repeated punctures. Upper limbs are gold standard for AV fistula formation. Sdwab SJ, Olvers MJ et al used different type fistula as a first choice. It is as seen in our study. Feldman HI et al performed study regarding evaluation of predictor of successful arteriovenous fistula maturation with success rate 55%. Wedgwood Kr et al compared side-to-side AV fistula with end-to-side AV fistula and obtained 79.2% success rate of side-to-side anastomosis while 78.6% success rate of end-to-side anastomosis. Our success rate was 89.3% in group A (end-to-side technique) while it was 85.1% in group B (side-to-side technique).

The results of our study were statistically similar to most of the above-mentioned studies because of following standard research methodology. This study has various strengths and limitations side by side. To the best of my knowledge this is the first local study that has evaluated the efficacy in Nishtar Hospital Multan which evaluated these techniques in terms of postoperative hemorrhage.. Due to large number of referrals to our hospital, a reasonably large sample size was achieved in a relatively short period of time. This also had allowed uniformity in operating procedures.

## CONCLUSION

Both operative techniques for AV fistula formation are equally good for Hemodialysis for access but complication rate with end-to-side techniques is lower as compared to side-to-side technique. However long follow up is needed to evaluate other complications like thrombosis, aneurysm, edema and distal ischemia. Besides, nutritional evaluation of patients by dietician should be practised before going into fistula surgery. According to my study results, End-to-side technique for AV fistula should be of priority to reduce morbidities and mortalities of patients associated with dialysis in future

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