Original Article

Comparative Study Between two Techniques of Radiocephalic Fistula for Patients on Hemodialysis

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Objective: To compare the patency rate and complications of two different surgical techniques of radiocephalic arteriovenous fistula side to side anastomosis with distal vein ligation and without distal vein ligation in patients who are on hemodialysis (HD) due to end stage renal failure.

Methods: This prospective study was carried out on total 468 patients over the duration of two years. The fistulae were created between radial artery and cephalic vein, side to side anastomosis. In one group distal vein was ligated to compare with the other one without distal vein ligation. Patients were followed up to first dialysis by AVF to assess the overall outcomes and various complications. Data of Follow up was collected for 6 months from patient's dialysis staff.

Results: 468 patients were included in study. Patients were divided in two groups i.e. Group-X (without distal vein run off) and Group-2 (with distal vein run off). In group-1, patency rate was 171(73.1%), while 207(88.5%) patients in group-Y with a statistically significant p-value of 0.0001.

Conclusions: This study explained that there was a significant difference of patency rate and complications between the radiocephalic fistula with and without distal vein run ligation. Hence we will prefer distal vein run off in our setup in future.

Keywords: Radiocephalic, Arteriovenous Fistula, Hemodialysis (HD), End Stage Renal Disease (ESRD), Chronic Kidney Disease (CKD).

Introduction

End stage renal failure or Chronic kidney disease is a serious illness because of damage to both kidneys. According to recent studies incidence of chronic kidney disease has increased from previous decades.[1] Arteriovenous fistula has been the vascular access of choice for hemodialysis due to less incidence of morbidity, mortality and lower cost.[2] Arteriovenous fistulas, arteriovenous fistula with graft material interposed in-between, and tunneled permacaths are three different ways of vascular access in hemodialysis. Among these, the arteriovenous fistula is best option for long-term hemodialysis because it has better primary patency rate, and requires the fewest manipulation for any access, and incidence of morbidity and mortality is less in this.[3-7] Benefits of arteriovenous fistulas over other types of vascular access are: Arteriovenous fistulas are related with less morbidity and mortality in patients on hemodialysis compared with central venous catheters and arteriovenous grafts.[8-10] Arteriovenous fistulas have the best primary patency rates, the less chances of thrombosis, and require the less secondary manipulations.[6,11-13]

Arteriovenous fistulas generally provide longer hemodialysis access survival rates.[13-16] The total number of manipulations during the life of the access is considerably lower for arteriovenous fistulas compared with arteriovenous grafts.[6,11,15]

Methods

This prospective study was carried out on total 468 patients over the duration of two years. Fistulae were created using radial artery and cephalic vein side to side anastmosis between with and without distal vein ligation. Doppler ultrasounds were done before and after every operation to determine the velocity, volume of blood flow, depth from the skin, diameter of vessels and to access the time of maturation of AVF.

Patients were followed up to first dialysis by AVF to assess the overall outcomes and various complications. The inclusion criteria was; patients of both gender ages between 25-70 years with end stage renal disease on maintenance hemodialysis and patients with end stage renal disease that will require renal transplant surgery, now on HD. The exclusion criteria was previously operated AVF, previously operated complicated AVF and previously operated Failed AVF. Follow up information was obtained for 6 months from patients dialysis technician.

Results

During 24 months from December 2016, to Dec, 2018 total 468 patients were part of study. Patients were divided in two groups i.e. Group-X (without

distal vein run off) and Group-Y (with distal vein run off).

In group-X, there were 135(57.7%) were males and 99(42.3%) were females. In group-Y, 120(51.3%) were males and 114(48.7%) were females.

The mean age of patients in group-X was 47.3±13.6 years and in group-Y was 46.1±13.2 years. In group-X, there were 57(24.4%) in 25-35 years age group, while 69(29.5%) and 108(46.2%) were in 36-50 years and >50 years age groups respectively. In group-Y, there were 63(26.9%) in 25-35 years age group, while 84(35.9%) and 87(37.2%) were in 36-50 years and >50 years age groups respectively. In group-X, there were 54(23.1%) who were hypertensive, while 45(19.2%) patients in group-Y. In group-X, there were 75(32.1%) who had diabetes mellitus, while 57(24.4%) patients in group-Y. In group-X, there were 27(11.5%) who had post-operative infection, while 9(3.8%) patients in group-Y. In group-X, there were 12(5.1%) who had numbness at thumb, while 3(1.3%) patients in group-Y. In group-X, there were 6(2.6%) who had aneurysm, while 0(0.0%) patients in group-Y. In group-X, there were 12(5.1%) who had edema, while 3(1.3%) patients in group-Y. In group-X, patency rate was 171(73.1%), while 208(88.5%) patients in group-Y with a p-value of 0.0001, which is statistically significant.

Table-1: Comparison of gender distribution between groups.

Gender	Groups		
	Group-X (Without distal vein run off)	Group-Y (With distal vein run off)	Total
Male	135	120	255
	57.7%	51.3%	54.5%
Female	99	114	213
	42.3%	48.7%	45.5%
Total	234	48.7%	468
	100.0%	100.0%	100.0%

Table-2: Comparison of age groups distribution between groups.

Age Groups	Groups		
	Group-X (Without distal vein run off)	Group-Y (Withdistal vein run off)	Total
25-35 years	57	63	120
	24.4%	26.9%	25.6%
36-50 years	69	84	153
	29.5%	35.9%	32.7%
> 59 years	108	47	195
	46.2%	37.2%	41.7%
Total	234	234	468
	100.0%	100.0%	100.0%

Table-3: Comparison of diabetes mellitus and hypertension between groups.

Gender	Groups		
	Group-X (Without distal vein run off)	Group-Y (With distal vein run off)	P-value
Diabetes Mellitus	75	57	0.064
	32.1%	24.4%	
Hypertension	54	45	0.308
	23.1%	48.7%	

Table-4: Comparison of complications between groups.

Compliations	Groups		P-value
	Group-X (Without distal vein run off)	Group-Y (With distal vein run off)	
Infection	27	9	0.002
	11.5%	3.8%	
Numbness at thumb	12	3	0.018
	5.1%	1.3%	
Aneurysm	6	0	0.014
	2.6%	0.0%	
Edema	12	3	0.018
	5.1%	1.3%	

Table-5: Comparison of patency rate between groups.

Patency	Groups		Total	P-value
	Group-X (Without distal vein run off)	Group-Y (With distal vein run off)		
Yes	171	207	207	
	73.1%	88.5	80.8%	
No	63	27	90	0.0001
	26.3%	11.5%	19.2%	
Total	234	234%	468	
	100.0%	100.0%	100.0%	

Discussion

Increasing need for vascular access in patients of renal failure lead to importance of fistula surgery. In our study we compared two AVF (with distal vein run off) and (without distal vein run off) in terms of patency rate and complications documented. Generally fistula surgery at wrist encounter complications like carpel tunnel syndrome, venous hypertension, numbness at thumb, aneurysm formation, gangrene of limb and wound infection.[17] In a study, patency rate and complications rate is better in patients who are dealt with distal vein run off.[18] There results are comparable to our study as patency rate in their study was 93% at the end of 6 months while in our setup it was 88.5% in patients without distal vein run off.[18] In another study, patency is superior in distal vein run off than without distal vein run off.[19] Vascular access related mortality and morbidity is internationally accepted. A large number of randomized control trial results focus the need of fistula creation for hemodialysis patients because of good results, better outcome and less complications.[20] Hammes et al stated that problems occur in nearly one-third of fistulas and include:

Aneurysms, infection, numbness at thumb and thrombosis.[21] Beathard GA et al in his study said that the distal vein run off is associated with less complications than without distal vein run off are seen with other types of vascular access, they do occur and they should be handled effectively.[22]

He stratified major complications that are seen in arteriovenous fistulas in different types e.g early failure, late failure, formation of anerysm and wound infection. Both kind of failures have multiple reasons. Fistula fails within three months of use should be classified as an early failure.[22] The complication that were encountered during this study were oedema of the hand, numbness at hand, infection and aneurysm. Mahakalkar CC et al in his study found that the rate of complications was more at Radiocephalic site. In the series ,complications were seen in 26 (18.57 %) patients out of 140.[23] In present study the overall complic1ation were seen in 24(15.3%) patients out of 156. In Mahakalkar CC et al study mild swelling and redness around the operated site were seen in 16 (65.38%) all at wrist region.[23]

Conclusion

This study demonstrated that there was a significant difference of patency rate and complications between the radiocephlic with and without distal vein ligation . Hence we will prefer distal vein ligation in our setup in future.

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