



FACTORS ASSOCIATED WITH ARTERIOVENOUS FISTULA FUNCTIONAL MATURATION IN PATIENTS WITH CHRONIC KIDNEY DISEASE

Clinical Research

**Dr.Marwin
Manoah Baylis**

Department of Cardio Thoracic surgery , Tirunelveli Medical college, Tirunelveli - 627011, Tamilnadu,

**Dr.Arul
Vijayakumar***

Department of Cardio Thoracic surgery, Tirunelveli Medical college, Tirunelveli - 627011, Tamilnadu*Corresponding Author

ABSTRACT

Introduction:With increasing numbers of patients diagnosed with CKD, arteriovenous fistula (AVF) maturation has become a major factor in improving both dialysis related outcomes and quality of life of those patients. Compared to other types of access it has been established that a functional AVF access is the least likely to be associated with thrombosis, infection , secondary interventions to maintain patency, hospital admissions and death.**AIM:**Study of demographic factors implicated in the function maturation of arteriovenous fistulas. Also, to explore any possible association between preoperative haematological investigations and functional maturation..**METHODS:**We performed a retrospective chart review of 115 patients with CKD, of which male were 95(82.6%) and female were 20(17.4%) who were referred to Cardiothoracic department in Tirunelveli Medical College Hospital for creation of vascular access for HD. We included patients with primary AVFs ; and excluded those who underwent secondary procedures. Results Overall AVF functional maturation rate in our study was 53.91% (62/115) and the failure was 46.09% (53/115). Female gender showed significant association with non maturation and lower the systolic and diastolic blood pressure , more the failure . Patients who had relatively lower haemoglobin levels showed better functional maturation rates . Blood vessel diameters , the lesser the risk of failure.**Discussion:**In our study functional maturation of AVF is considered as successful cannulation for atleast 1 complete hemodialysis session.Complications faced were thrombosis , postop edema , infection , steal phenomenon non maturation. Although male gender is more prone to smoking and vessel wall damage , the patency rate was better among the male gender the reason for this preponderance is not known. The effects of the artery size may be because (1) blood flow proportional to the fourth power of the arterial radius and (2) larger arteries exhibit greater vasorelaxant response there by accommodating greater blood flow during AVF maturation.We also found better functional maturation rates with lower haemoglobin. This might be explained by the up regulation of endothelial Nitric oxide synthase (eNOS) in the newly formed conduit, leading to increased production of Nitric oxide (NO) and hemeoxygenase-1(HO-1).No is associated with vasodilatation and decreased cellular proliferation , whereas HO-1 has been shown to inhibit proliferation of vascular smooth muscle cells , platelet aggregation and vasospasm.**Conclusion** Female gender and lower systolic and diastolic BP was found to be associated with functional non –maturation and low haemoglobin levels and larger diameter vessels were all associated with successful functional maturation.

KEYWORDS

Chronic Kidney disease. AV fistula. Maturation

INTRODUCTION:

With increasing numbers of patients diagnosed with CKD, arteriovenous fistula (AVF) maturation has become a major factor in improving both dialysis related outcomes and quality of life of those patients. Compared to other types of access it has been established that a functional AVF access is the least likely to be associated with thrombosis, infection , secondary interventions to maintain patency, hospital admissions and death.**AIM:**Study of demographic factors implicated in the function maturation of arteriovenous fistulas. Also, to explore any possible association between preoperative haematological investigations and functional maturation..**Methods:**Study design: cross sectional study.Study period: January 2107 to January 2018.We performed a retrospective chart review of 115 patients with CKD, of which male were 95(82.6%) and female were 20(17.4%) who were referred to Cardiothoracic department in Tirunelveli Medical College Hospital for creation of vascular access for HD. We included patients with primary AVFs ; and excluded those who underwent secondary procedures

Table 1:

	No of Patients	%
Total	115	100
Male	95	82.6
Female	20	17.4
Successful AVF	62	53.9
Failed AVF	53	46.1

Table2:

Variable	Matured AVF	P Value
	Yes	No
Male	57 (60%)	38 (40%)
Female	5 (25%)	15 (75%)
Bp >90/60 (T=50)	42 (84%)	8 (16%)

<90/60 (T=32)	15 (46.8%)	17(53.2%)	
Hb <9gm (T=43)	38 (88.3%)	5 (11.7%)	0.036
>9gm (T=28)	13 (46.4%)	15(53.6%)	
Blood Vessel Diameter >3mm (T=48)	42 (87.5%)	6 (12.5%)	0.001
<3mm (T=35)	12 (34.3%)	23(65.7%)	

Results: Overall AVF functional maturation rate in our study was 53.91% (62/115) and the failure was 46.09% (53/115). 75% of female gender showed significant association with non maturation and lower the systolic and diastolic blood pressure(less than 90/60mmhg) and high haemoglobin levels(more than 9gm) , more the failure .88.3% of patients who had relatively lower haemoglobin levels (less than 9gm) showed better functional maturation rates . 87.5% patients with Blood vessel diameters more than 3mm ,showed lesser the risk of failure. **Discussion:**AVFs is the best method for vascular access placement in haemodialysis patients. 5,6 At first the patency rates are better in arteriovenous grafts and central vein catheters but AVFs are longlasting. 4,5 AVFs once made; needs time maturation, before their use for Hemodialysis. The maturation of AVF is a complex phenomena and many factors influencing it are yet to be fully understood. Some of the factors such as secondary procedures to maintain patency, infection, hospital admissions and thrombosis may influence functional maturation AVF . 2 In our study functional maturation of AVF is considered as successful cannulation for atleast 1 complete hemodialysis session.Complications faced were thrombosis , postop edema , infection , steal phenomenon non maturation.Conte et al followed up a total of 31 AVFs created diabetics for 24 weeks; and when compared with nondiabetics he found lower patency rates. Positive predictors for high failure rates of native AVFs as per Salmela et al were diabetes mellitus, female gender and thrombophiliaBut , Sedlacek et al reported in study of 195 patients that diabetes mellitus had no effect on AVF. Other studies also found no effect of both age

and diabetes on AVF maturation. Functional nonmaturation is high in female patients. On the contrary; a previous history of renal transplant, larger diameter of vessels used in AVF creation are associated with a successful maturation. Male gender is more vulnerable to smoking and damage to vessel wall but the patency rate was better among the male. The reason is not known. The effects of the artery size may be because (1) blood flow proportional to the fourth power of the arterial radius and (2) larger arteries exhibit greater vasorelaxant response there by accommodating greater blood flow during AVF maturation. We also found better functional maturation rates with lower haemoglobin.

This might be explained by the up regulation of endothelial Nitric oxide synthase (eNOS) in the newly formed conduit, leading to increased production of Nitric oxide (NO) and hemoxygenase-1 (HO-1). NO is associated with vasodilatation and decreased cellular proliferation, whereas HO-1 has been shown to inhibit proliferation of vascular smooth muscle cells, platelet aggregation and vasospasm. Conclusion: Female gender, lower systolic and diastolic BP and high haemoglobin levels was found to be associated with functional non-maturation and low haemoglobin levels and larger diameter vessels were all associated with successful functional maturation.

REFERENCES.

1. Brescia MJ, Cimino JE, Appel KH, Hurwicz BJ. Chronic hemodialysis using venipuncture and a surgically created arteriovenous fistula. *N Engl J Med* 1966;275(20):1089-92.
2. Barnett SM, Waters WC 3rd, Lowance DC, Rosenbaum BJ. The basilic vein fistula for vascular access. *Trans Am Soc Artif Intern Organs* 1979;25:344-6.
3. Arroyo MR, Sideman MJ, Spergel L, Jennings WC. Primary and staged transposition arteriovenous fistulas. *J Vasc Surg* 2008;47(6):1279-83.
4. Schild AF, Perez E, Gillaspie E, Seaver C, Livingstone J, Thibonnier A. Arteriovenous fistulae vs. arteriovenous grafts: a retrospective review of 1,700 consecutive vascular access cases. *J Vasc Access* 2008;9(4):231-5.
5. Frankel A. Temporary access and central venous catheters. *Eur J Vasc Endovasc Surg* 2006;31(4):417-22.
6. Amorim P, Sousa G, Vieira J, Sousa L, Ribeiro K, Sobrinho G, et al. [Complications of vascular access for hemodialysis—Limits, imagination and commitment]. *Rev Port Cir Cardiorac Vasc* 2013;20(4):211-9.
7. Allon M, Robbin ML. Increasing arteriovenous fistulas in hemodialysis patients: problems and solutions. *Kidney Int* 2002;62(4):1109-24.
8. Rayner HC, Pisoni RL, Gillespie BW, Goodkin DA, Akiba T, Akizawa T, et al. Creation, cannulation and survival of arteriovenous fistulae: data from the Dialysis Outcomes and Practice Patterns Study. *Kidney Int* 2003;63(1):323-30.
9. Lok CE, Oliver MJ, Su J, Bhola C, Hannigan N, Jassal SV. Arteriovenous fistula outcomes in the era of the elderly dialysis population. *Kidney Int* 2005;67(6):2462-9.
10. Rayner HC, Besarab A, Brown WW, Disney A, Saito A, Pisoni RL. Vascular access results from the Dialysis Outcomes and Practice Patterns Study (DOPPS): performance against Kidney Disease Outcomes Quality Initiative (K/DOQI) Clinical Practice Guidelines. *Am J Kidney Dis* 2004;44(5 Suppl 2):22-6.
11. Pisoni RL, Young EW, Dykstra DM, Greenwood RN, Hecking E, Gillespie B, et al. Vascular access use in Europe and the United States: results from the DOPPS. *Kidney Int* 2002;61(1):305-16.
12. Allon M, Lockhart ME, Lilly RZ, Gallichio MH, Y