

Hemodialysis Arteriovenous Fistula After Transplant To Keep or Not to Keep?

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Most of patients with a well-functioning kidney allograft ask their physicians whether it is safe to preserve the dialysis vascular access or not, as it becomes useless after successful kidney transplantation. They certainly do not want to have a second fistula placed if that were the case. Arteriovenous fistula (AVF) for hemodialysis has its risks and can be expensive as well as being associated with considerable morbidity. There are several important complications for AVF including bleeding, infections, nerve injury, early AVF or graft failure, venous stenosis, steal syndrome, thrombosis, and aneurysmal formation.¹ Physicians working in kidney transplant centers commonly face the difficult task of advising recipients whether it is safe to keep the access or not. There is no consensus on the strategy for keeping or ligating the AVF. Dialysis access issues should always be at the forefront of thought for any patient with end-stage renal disease—without access, the disease wins.

Hemodialysis vascular access usually remains patent following kidney transplantation.^{2,3} Surgical closure of the AVF can be indicated in kidney transplant patients with heart failure, high-flow AVF, fistula complications, and cosmetic reasons. Arteriovenous fistula ligation decreases left ventricular volume and mass in a stable kidney transplant recipient.³ Thus, in kidney transplants with well-functioning allografts and persistent left ventricular dilatation, closing of the AVF could be considered.³ It is of interest that although a functioning AVF has adverse effects on cardiac morphology and function,⁴ surprisingly, few studies have reported the impact of AVF on cardiac function among these patients after transplantation. Furthermore, cardiac impact of the functioning asymptomatic AVF for hemodialysis in kidney transplant patients is unknown.⁴

In the current issue of the *Iranian Journal of Kidney Diseases*, Soleimani and colleagues⁵ have published a study on 180 kidney transplant patients which shows that spontaneous AVF closure had no significant cardiac beneficial effects.⁵ They reported that left ventricular ejection fraction was improved in the functional AVF and closed AVF groups after kidney transplantation. In the patients with a functioning fistula, however, the left ventricular end-systolic and end-diastolic diameters were slightly smaller, and there was a significant reduction in interventricular septum diameter and left ventricular posterior wall diameter in the closed fistula group. Improvement of cardiovascular parameters was observed in both groups with patent and closed AVF, which can be mainly due to correction of uremia, normalization of hemoglobin level, and improved volume status in these patients. It is obvious that kidney transplantation corrects uremia, volume status, and anemia, as well as normalizing serum albumin and reducing the inflammation, which might lead to reduction of left ventricular hypertrophy (LVH).^{6,7} Soleimani and colleagues⁵ concluded that AVF closure is not routinely indicated after successful kidney transplantation.

Although LVH as a result of a functioning AVF is a common finding in kidney transplants and high-output cardiac failure may be improved after surgical AVF closure in these patients,³ the beneficial impact on the associated high cardiac morbidity and mortality is unknown. In addition, operative removal of the fistula has improved heart failure in some hemodialysis patients⁸; hence, AVF ligation might be a therapeutic option for refractory heart failure in kidney transplant patients. Some studies have shown that leaving AVF is a high risk of cardiac events such as LVH,^{2,3,9} high-output heart failure,³ hypertension, and aortic stiffness.^{1,10} In multivariable

analysis, functioning of the AVF is independently associated with arterial stiffness intensification.¹⁰ In a prospective study on 20 patients with well-functioning kidney transplants, AVF ligation results in a decreased left ventricular mass and a decline in the left ventricular end-diastolic diameter.³ Furthermore, in another prospective study on 17 kidney transplants, a reduction in left ventricular diameter and left ventricular mass are observed after surgical removal of AVF.² On the contrary, other researchers demonstrate that AVF has no important adverse effects on the cardiovascular system in prolonged periods.^{9,11} In a prospective study on patients with stable kidney allograft function, no significant differences were seen in the left ventricular mass and volume changes between recipients with and without the persistence of a patent AVF.¹¹ In another prospective study on 24 recipients of well-functioning kidney transplants, a reduction in the left atrial diameter was observed in patients with a closed AVF, but there were no differences in cardiac structure or function in patients with and without a patent AVF.¹² Moreover, no differences were seen in the left ventricle, cardiac index, ejection fraction, and LVH between 39 kidney transplants with patent AVF and 22 patients with occluded AVF.⁹ However, it should be noted that the number of patients included in these controversial studies was relatively small. Thus, further studies with a larger of sample are required to define whether the AVF closure will have a protective role on cardiac events.

It is important to know that most high-output heart failures are related to high-flow AVF, especially in cases of preexisting heart disease.^{6,7} In addition, symptomatic heart failure related to AVF is infrequent and usually happens in patients with an underlying cardiovascular disease.¹³ Moreover, cardiovascular events are a leading cause of death and kidney allograft loss after kidney transplantation.¹⁴ In the short-term and the long-term periods, an improvement of LVH after surgical closure of AVF can be observed.^{2,15} Nonetheless, exacerbation of diastolic pressure and residual concentric remodeling hypertrophy may attenuate the expected advantageous cardiac effects.^{15,16} Vajdic and colleagues have shown in a historical cohort study on 311 kidney transplant recipients that patients with an AVF closure have a better allograft function at 1 year following

transplantation and a decreased risk for future allograft loss when compared to those having a functional AVF.¹⁴ This study indicates an additional argument in favor of AVF ligation among kidney transplant patients with well-functioning grafts.

Although AVF ligation following kidney transplantation may be valuable for both cardiac and kidney function, there is no consensus on routine ligation of fistula. In addition, despite the controversial findings, many clinicians do not recommend routine AVF closure for patients with functioning AVFs. In addition, the risk of graft loss should be considered, as it might eventually lead to creation of a new vascular access. Therefore, closure of the AVF should be restricted to those who definitely meet the criteria including presence of a large AVF with a high flow, persistent left ventricle dilatation, low probability of graft loss, cosmetic reasons, and a high risk of cardiovascular diseases.³ Because the increase in diastolic blood pressure after AVF ligation can occur,¹⁶ we strongly recommend that blood pressure be monitored after AVF closure.

CONFLICT OF INTEREST

None declared.

REFERENCES

1. Shohaib SA, Waness A, Sayyari AA. Hemodialysis angioaccess choice and survival in a tertiary care Saudi Arabian center from 1993 to 2004. *Nephro-Urol Mon.* 2011;3:69-73.
2. Unger P, Wissing KM, de Pauw L, Neubauer J, van de Borne P. Reduction of left ventricular diameter and mass after surgical arteriovenous fistula closure in renal transplant recipients. *Transplantation.* 2002;74:73-9.
3. van Duijnhoven EC, Cheriec EC, Tordoir JH, Kooman JP, van Hooff JP. Effect of closure of the arteriovenous fistula on left ventricular dimensions in renal transplant patients. *Nephrol Dial Transplant.* 2001;16:368-72.
4. Cridlig J, Selton-Suty C, Alla F, et al. Cardiac impact of the arteriovenous fistula after kidney transplantation: a case-controlled, match-paired study. *Transpl Int.* 2008;21:948-54.
5. Soleimani MJ, Shahrokh H, Shadpour P, Shirani M, Arasteh S. Impact of dialysis access fistula on cardiac function after kidney transplantation. *Iran J Kidney Dis.* 2012;3:198-202.
6. Anderson CB, Codd JR, Graff RA, Groce MA, Harter HR, Newton WT. Cardiac failure and upper extremity arteriovenous dialysis fistulas. Case reports and a review of the literature. *Arch Intern Med.* 1976;136:292-7.
7. Isoda S, Kajiwara H, Kondo J, Matsumoto A. Banding a hemodialysis arteriovenous fistula to decrease blood flow and resolve high output cardiac failure: report of a case.

- Surg Today. 1994;24:734-6.
8. Kurita N, Mise N, Tanaka S, et al. Arteriovenous access closure in hemodialysis patients with refractory heart failure: a single center experience. Ther Apher Dial. 2011;15:195-202.
 9. De Lima JJ, Vieira ML, Molnar LJ, Medeiros CJ, Ianhez LE, Krieger EM. Cardiac effects of persistent hemodialysis arteriovenous access in recipients of renal allograft. Cardiology. 1999;92:236-9.
 10. Ferro CJ, Savage T, Pinder SJ, Tomson CR. Central aortic pressure augmentation in stable renal transplant recipients. Kidney Int. 2002;62:166-71.
 11. Peteiro J, Alvarez N, Calvino R, Penas M, Ribera F, Castro Beiras A. Changes in left ventricular mass and filling after renal transplantation are related to changes in blood pressure: an echocardiographic and pulsed Doppler study. Cardiology. 1994;85:273-83.
 12. Huting J. Course of left ventricular hypertrophy and function in end-stage renal disease after renal transplantation. Am J Cardiol. 1992;70:1481-4.
 13. Harnett JD, Parfrey PS, Griffiths SM, Gault MH, Barre P, Guttmann RD. Left ventricular hypertrophy in end-stage renal disease. Nephron. 1988;48:107-15.
 14. Vajdic B, Arnol M, Ponikvar R, Kandus A, Buturovic-Ponikvar J. Functional status of hemodialysis arteriovenous fistula in kidney transplant recipients as a predictor of allograft function and survival. Transplant Proc. 2010;42:4006-9.
 15. Unger P, Velez-Roa S, Wissing KM, Hoang AD, van de Borne P. Regression of left ventricular hypertrophy after arteriovenous fistula closure in renal transplant recipients: a long-term follow-up. Am J Transplant. 2004;4:2038-44.
 16. Unger P, Xhaet O, Wissing KM, Najem B, Dehon P, van de Borne P. Arteriovenous fistula closure after renal transplantation: a prospective study with 24-hour ambulatory blood pressure monitoring. Transplantation. 2008;85:482-5.

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