

## Arteriovenous Fistula Aneurysm – Plicate, Not Ligate

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### Abstract

**Introduction:** Arteriovenous fistula (AVF) created for haemodialysis can be complicated by aneurysm formation. **Clinical Picture:** Ligation of the fistula is often required to prevent aneurysmal rupture and the life-threatening haemorrhage that ensues. Other methods of treatment involve using foreign bodies like mesh and grafts. **Treatment:** We describe a new method in the treatment of this condition – plication. It involves plicating the excess free wall of the aneurysm with sutures and does not require resection or anastomosis. **Outcome:** Early results show that this method shrinks the aneurysm size and reduces the risk of haemorrhage. **Conclusion:** The AVF can continue to be used and the patient is spared the agony of having to go through the entire cycle of creating a new vascular access site.

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**Key words:** Complications, Kidney dialysis

### Introduction

Arteriovenous fistulae (AVF) are created for haemodialysis in patients with end-stage renal failure. While AVF is a lifeline for these patients, its creation is not without complications.<sup>1</sup> One complication is that of aneurysmal dilatation, which can cause rupture and potentially fatal haemorrhage.

The incidence of aneurysm formation is approximately 5% to 6%.<sup>2</sup> Repeated punctures at clustered sites can weaken the wall and cause aneurysm formation. Sometimes, proximal stenosis accelerates the process by raising the pressure in the AVF.

We report 15 cases of uncomplicated aneurysmal dilatation of AVF over a 3-year period. All underwent plication of the aneurysm. The indications for plication are when the aneurysm enlarges to disconcerting proportions and when areas of the wall become thinned out to form “blebs” (Fig. 1).

We have no definite size criteria that warrant surgery. It is the likelihood of rupture based on clinical characteristics that determines the need for intervention.

### Methods

It is useful to first do a fistulogram as a proximal stenosis may be present, in which case the patient first requires angioplasty. If there are multiple aneurysms, these have to be plicated in stages. We usually do the biggest one first or

the one most likely to rupture on account of thin wall “blebs” on the vein wall. The procedure is done under general anaesthesia. The incision over the aneurysm is placed longitudinally, with care taken not to puncture it. There is usually a plane for dissection so that the dilated venous aneurysm can be completely skeletonised. Ring handle bulldogs can then be placed in a tangential fashion to shrink the aneurysm to the desired size. This must include any “blebs”. The thrill of the AVF must be unchanged at this stage. Otherwise, the clamps have to be re-sited so that flow is not compromised. The “excess” wall is then plicated by a running 4.0 prolene suture along the whole length and back. The skin is then closed with 3.0 prolene vertical mattress sutures (Fig. 2).

The operated site must not be cannulated for 3 weeks until all the sutures have been removed and the wound has healed. That is why only 1 aneurysm is plicated at a time; the others can be used for dialysis during this time.

### Results (Table 1)

Most patients were discharged after 1 or 2 days. A few required prolonged hospitalisation as a result of uraemic complications which required haemodialysis. The average operative duration was 68 minutes and there was only 1 case of postoperative complication. Here, the patient had superficial wound bleeding which stopped with adrenaline packing.

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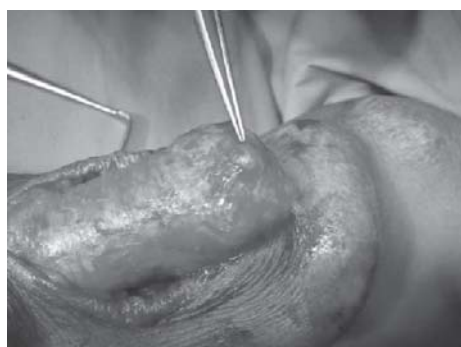
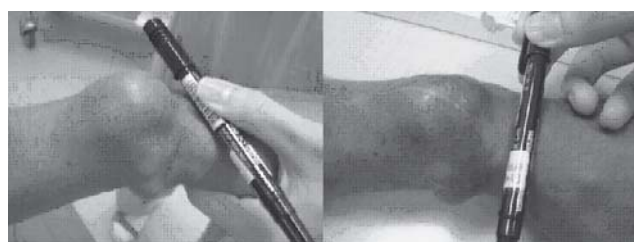


Fig. 1. Bleb found on an AV fistula – a potential point for haemorrhage.



Fig. 2. The AV fistula is plicated to obliterate the bleb but the patency is retained.



Before After  
Fig. 3. The AV fistula shrinks after surgery and is less likely to bleed.

## Discussion

AVF aneurysm is a problem because the patient and dialysis staff worry about rupture, especially when part of the wall thins out (blebs). This reduces the available sites for cannulation. The sometimes massively dilated vein can also be inadvertently traumatised. While rupture is not common, it can be fatal with rapid exsanguination.

Previously described methods for treating this condition include ligation or resection of the AVF.<sup>3,4</sup> This is effective and will eliminate the risk of bleeding but it is also wasteful because the otherwise functional AVF is sacrificed. These patients will require a temporary vascular access catheter insertion while a new AVF is created at another site. This is undesirable because catheters are associated with their own set of complications and problems, and the patients have to undergo another access creation.

Other methods involve stents and meshes.<sup>5,6</sup> While these sound promising, the presence of foreign bodies leads to a higher risk of infection. In addition, cannulation may not be possible over the stent.

We attempted a new method where we mobilised the aneurysm after controlling the inflow and outflow of the fistula. The aneurysm was then plicated along its free border. As there is no resection and anastomosis involved

Table 1. Initial Results of the Plications

S/No.	Operative date	Patients initials	Aneurysm size (cm)	Operation duration	Postoperative size (cm)	Duration of stay (day)	Complication of operation
1	August 2004	AEA	-	1 hour	-	0	nil
2	November 2004	EBK	-	1 hour 25 min	-	5	nil
3	November 2004	WHC	-	35 min	-	1	nil
4	January 2005	YLLT	-	1 hour 50 min	-	20	nil
5	January 2005	TTE	-	1 hour 25 min	-	2	nil
6	January 2005	YBS	-	1 hour 30 min	-	5	nil
7	June 2005	LHY	-	1 hour	-	1	nil
8	July 2005	CGY	-	1 hour 10 min	-	2	nil
9	August 2005	LBV	-	45 min	-	2	nil
10	October 2005	PSN	7.5	55 min	4	2	nil
11	December 2005	KKL	6	1 hour 35 min	5	1	bleeding
12	January 2006	LEH	-	45 min	5.5	2	nil
13	January 2006	TTH	-	45 min	4	1	nil
14	March 2006	HLL	6.5	1 hour	3.5	1	nil
15	March 2006	CKC	6.5	50 min	3	2	nil

in this operation, it can be done quickly and there is no risk of anastomotic dehiscence.

Postoperatively, these patients reported good results. Other than the case of superficial wound bleeding, there were no reported postoperative complications like thrombosis or graft failure. Most had a documented reduction in the aneurysm size. Even in those without a reduction in size, the aneurysm wall was thicker and less likely to rupture (Fig. 3).

This study is limited by the incomplete documentation of the pre- and postoperative sizes of the aneurysm. However, the collected data seem to suggest a good decrease in the size of aneurysms after the operation.

### Conclusion

Plication of aneurysms arising from AVF is safe and effective. It can be done quickly and is relatively complication-free. Postoperatively, most of the patients were discharged early and the aneurysm site could be used for haemodialysis once the wound is healed. Ligation or

resection, while effective, is wasteful and is not recommended unless in an emergency.

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