



# Management of Hemorrhage from Dialysis Access Site: Our Experience

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## ABSTRACT

Arteriovenous fistula (AVF) is access to choice for hemodialysis in patients with end-stage renal disease (ESRD). Hemorrhage from the access vein is a known complication. Due to repeated punctures during dialysis, the vein wall may become necrotic and may slough off leading to severe bleeding. It may end fatally if not appropriately managed. We present our experience in 14 patients who reported to our hospital with bleeding from the dialysis access vein site. After excising the necrotic material, the wall of the vein was reconstructed and covered with a skin flap. In 13 patients, we could preserve patency of AVF for future dialysis.

**Keywords:** Arteriovenous fistula, Cutaneous transposition flap, Hemodialysis, Hemorrhage, Vascular access

**How to cite this article:** Sulkowski L, Matyja M, Walocha JA, Pasternak A. Management of Hemorrhage from Dialysis Access Site: Our experience. *MGM J Med Sci* 2018;5(3):109-111.

**Source of support:** Nil

**Conflict of interest:** None

## INTRODUCTION

Arteriovenous fistula (AVF) provides optimum vascular access for hemodialysis (HD) for patients suffering from an ESRD and is accessible to choice.<sup>1</sup> Long-term strategies are required for ESRD patients receiving HD since AVF related complications are significant factors of morbidity, loss of an access line and even mortality.<sup>2-4</sup>

Repeated punctures weaken the access vein wall. This evokes skin and vein wall erosion and leads to a subse-

quent hemorrhage (Fig. 1).<sup>1,5</sup> Rupture of an access vein in the puncture site causes hemorrhage which may be life-threatening unless immediate intervention is done.<sup>5,6</sup> This study presents our experience in the management of hemorrhage from a hemodialysis access vein at AVF site.

## MATERIALS AND METHODS

Between January 2015 and June 2017, 14 ESRD patients on hemodialysis were referred to Department of General and Vascular Surgery Regional Specialist Hospital Czestochowa, Poland with hemorrhage from the access vein site. Their age ranged from 42 to 71 years (mean 57.8 years). Six patients were males and eight females. Eleven patients (78.6%) had undergone brachiocephalic AVF construction, and three patients (21.4%) had a radiocephalic fistula. Comorbidities, besides ESRD, included diabetes in 10 patients (71.4%) and hypertension in 11 patients (78.6%). All patients had received first aid to stop bleeding by local compression, either self-administered or given by a family member and during transport in an ambulance, compression was maintained. Due to prompt local compression which controlled bleeding, all patients had stable vital parameters and were taken directly to the operating room. Under local anesthesia, an incision was made around the necrotic area which was excised. The bleeding access vein was dissected proximal and distal to the site of rupture and occluded with bulldog clamps to stop bleeding. Now the necrotic area of the wall of the vein at the site of bleeding was excised, and the resulting hole was sutured with 6/0 or 7/0 prolene (Fig. 2). Bulldog clamps were released to confirm cessation of bleeding. The skin incision was extended, and a flap of healthy skin with subcutaneous tissues was elevated. The site of the repaired access vein was covered with this skin flap without tension (Fig. 3). Using a Z-plasty technique, donor area could also be closed primarily, over a size 8 Ch drain. Simple interrupted sutures were used to close the wound. In one case, who had brachiocephalic AVF and a long history of co-existing lupus, the local skin was thick, stiff and rigid. The ruptured vein could not be repaired. So AVF had to be closed. In this patient, general anesthesia was used.

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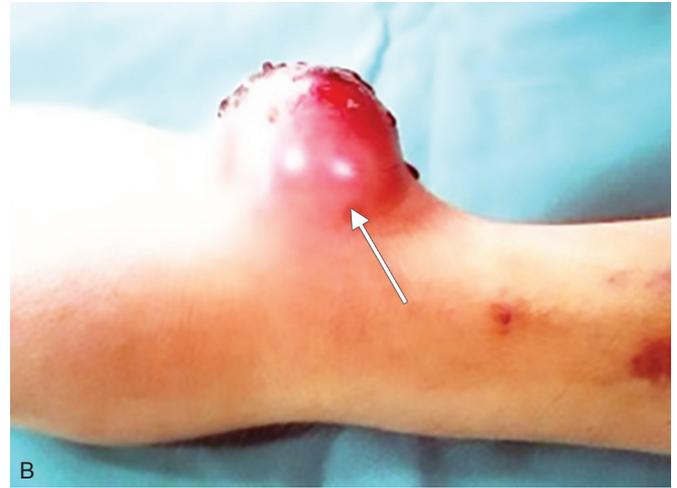
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**Figs 1A and B:** The buttonhole puncture site with skin necrosis (arrow)



**Fig. 2:** Exposed access vein. Excised necrosis of skin (arrowhead) and anterior wall of vein (arrow)

**RESULT**

One patient developed postoperative wound infection which resolved fully with antibiotics. One patient needed re-exploration because of bleeding on the day of operation. All patients were discharged on the second or third postoperative day. Fistula remained patent in 13 patients.

In 1 patient, as described above, it had to be ligated electively. All the 13 patients with patent fistulae underwent dialysis through the access vein proximal to the site of surgery before discharge. There was no mortality and no thrombosis in the early postoperative period. No patient showed any hand ischemia.

**DISCUSSION**

Risk factors for complications related to AVF include female sex, diabetes, smoking, cardiovascular diseases, age over 50 years.<sup>4,5</sup> Our data corresponds to data from the literature. In our patients' average age was 57.8 years, 57.1% of them were female, and 71.4% were diabetic.

Complications related to AVF can cause a loss of vascular access and increase in morbidity and mortality rates.<sup>2,3,5-7</sup> Puncture technique could be a "rope ladder" with punctures forming a line over the access vein or "buttonhole" with repeated punctures in the same point. The buttonhole puncture technique provides easier needling for the nurses but is associated with higher risk of bacteremia and localized infection, as compared to the rope



**Figs 3A and B:** Completed reconstruction of AVF. (A) Transposed skin flap (arrow) covers the access vein; (B) Wound closed over the drain

ladder technique.<sup>8</sup> Repeated punctures weaken the access vein wall and lead to aneurysm formation and subsequent hemorrhage (Fig. 1).<sup>5</sup> Buttonhole needling technique had been used in all patients in our series (100%) and lead to necrosis at the puncture site. We avoided the use of polytetrafluoroethylene (PTFE) grafts and patches. We used only autologous tissues, including final coverage of sutured access vein site with skin flap (Fig. 3). Low infection rate (7.1%) was obtained, despite the presence of skin necrosis at admission.

Vascular access hemorrhage remains a relatively rare complication. Nevertheless, it is responsible for about 230 deaths annually in the USA, which is about 0.4% of all deaths of ESRD patients.<sup>6</sup> AVF hemorrhage requires urgent surgery, and in some cases, it may require an AVF closure.<sup>5</sup>

Our study shows that our technique of dealing with hemorrhage from the access vein, in which the vein wall is reconstructed and then covered with a skin flap, mobilized from adjacent area gives satisfactory results. Bleeding is controlled and covering the area with a skin flap ensures proper healing. At the same time, patency of the fistula is maintained in most patients so that hemodialysis can be continued without interruption through the same access vein. The technique is simple, easy to learn, safe and effective.

## CONCLUSION

Although rare, necrosis in a puncture site and subsequent hemorrhage from access vein may lead to fatal consequences. This complication is more common if

a buttonhole puncture technique is used. It requires immediate surgery. Reconstruction of necrotic access vein wall and coverage with skin flap ensure a positive outcome and preserve patent access vein for future use. Cutaneous transposed flap provides good coverage of the vein with healthy skin. The procedure can be done under local anesthesia.

## REFERENCES

1. Reyna MAA, Kim T. Hemodialysis Vascular Access Complications: Recognition and Management. *Hosp Med Clin* 2014 Oct;3(4):504-530.
2. Scher LA, Shariff S. Strategies for Hemodialysis Access: A Vascular Surgeon's Perspective. *Tech Vasc Interv Radiol* 2017 Mar;20(1):14-19.
3. Wilson NA, Shenoy S. Managing 'buttonhole' complications. *J Vasc Access* 2014;15(Suppl 7):S91-S95.
4. Padberg FT Jr, Calligaro KD, Sidawy AN. Complications of arteriovenous hemodialysis access: recognition and management. *J Vasc Surg* 2008 Nov;48(Suppl 5):55S-80S.
5. Belli S, Yabanoglu H, Aydogan C, Parlakgumus A, Yildirim S, Haberal M. Surgical interventions for late complications of arteriovenous fistulas. *Int Surg* 2014 Jul-Aug;99(4):467-474.
6. Ellingson KD, Palekar RS, Lucero CA, Kurkjian KM, Chai SJ, Schlossberg DS, et al. Vascular access hemorrhages contribute to deaths among hemodialysis patients. *Kidney Int* 2012 Sep;82(6):686-692.
7. Vo T, Tumbaga G, Aka P, Behseresht J, Hsu J, Tayarrah M. Staple aneurysmorrhaphy to salvage autogenous arteriovenous fistulas with aneurysm-related complications. *J Vasc Surg* 2015 Feb;61(2):457-462.
8. MacRae JM, Ahmed SB, Atkar R, Hemmelgarn BR. A randomized trial comparing buttonhole with rope ladder needling in conventional hemodialysis patients. *Clin J Am Soc Nephrol* 2012 Oct;7(10):1632-1638.