Axillary Vein Rupture after Angioplasty

Carl N. Valentin, M.D.,¹ and Steven M. Zangan, M.D.¹

ABSTRACT

Venous rupture is an uncommon complication resulting from dialysis graft interventions. The authors describe a case of axillary vein rupture following angioplasty necessitating placement of a covered stent for the control of hemorrhage.

KEYWORDS: Covered stents, venous angioplasty, venous rupture, hemodialysis access thrombosis

Autogenous arteriovenous fistulas (AVFs) are considered the most reliable long-term vascular access in patients undergoing hemodialysis. However, in addition to nonmaturation, fistula complications such as inadequate flow, venous stenosis, aneurysm formation, and thrombosis can develop. Fistula thrombosis typically results after a period of AVF dysfunction, usually the result of hemodynamically significant venous stenosis. When this develops, early intervention, either percutaneous or surgical, can salvage the AVF. Success rates for percutaneous interventional thrombectomy and angioplasty exceed 90%. Though these procedures are usually well tolerated, venous rupture and hemorrhage occur in 2 to 5% of cases.

CASE REPORT

A 51-year-old man with end-stage renal disease was found to have occlusion of his left upper arm brachial artery to basilica vein fistula. Six months prior to this presentation, the patient had undergone angioplasty and stenting of refractory axillary and brachiocephalic vein stenoses with no further evidence on inadequate flow.

The AVF was accessed using a crossed catheter technique and flow was restored after lacing the graft with 4 mg of tPA (Alteplase[®], Genentech, South San

Francisco, CA). Heparin (5000 U) was also administered through a peripheral IV. Angiography was performed demonstrating recurrent stenosis at the outflow of the existing axillary vein stent (Fig. 1). The venous stenosis was dilated with an 8 × 40 mm Blue Max[®] angioplasty balloon catheter (Boston Scientific, Natick, MA). Postdilation venography demonstrated no minimal improvement, but >30% residual stenosis. Then, the narrowing was dilated with a 10 × 40 mm Blue Max[®] angioplasty balloon catheter. A follow-up angiogram at this point revealed rupture of the axillary vein and contrast extravasation into the axilla (Fig. 2). The balloon was quickly reinflated at the site of rupture. The patient was asymptomatic and on physical exam, no hematoma was palpable. After 5 minutes of balloon inflation, a repeat venogram demonstrated persistent extravasation. Therefore, a Viabahn[®] (Gore, Flagstaff, AZ) 10 × 100 mm covered stent was deployed across the site of rupture, definitively treating both the stenosis and ongoing hemorrhage. A repeat venogram demonstrated no evidence of extravasation or stenosis (Fig. 3). Next, 7-French dialysis sheaths (HemoCath[®], Angiodynamics, Queensbury, NY) were placed using the existing access, and the patient had uneventful dialysis. The fistula has been patent for over 4 months and there have been no difficulties achieving the prescribed Kt/V.

¹Vascular and Interventional Radiology, University of Chicago Medical Center, Chicago, Illinois.

Address for correspondence and reprint requests: Carl N. Valentin, M.D., Fellow, Vascular and Interventional Radiology, University of Chicago Medical Center, 5841 S. Maryland Avenue, MC 2026, Chicago, IL 60637 (e-mail: carl.valentin@uchospitals.edu).

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Figure 1 Note the stenosis at the central portion of the axillary vein stent.

Figure 2 There is extravasation of contrast into the axilla and retarded antegrade flow as evidenced by reflux into collateral veins.

DISCUSSION

Venous rupture is identified by the spread of contrast beyond the vessel margin into the soft tissues, accompanied by vessel wall irregularity and poor antegrade flow. When hemorrhage is recognized, manual compression and balloon tamponade are first instituted. However, these measures may not be sufficient to adequately control the bleeding. This is especially true during declotting procedures, when thrombolytics and anticoagulants are commonly used. When these measures fail,

stent placement can be attempted. Funaki et al achieved 100% technical success in utilizing Wallstents in 23 patients with venous rupture following thrombolysis. When bare stents are not sufficient, a covered stent, such as was used in this case, may be necessary. AVF occlusion is a last resort for controlling hemorrhage due to venous rupture.

Thrombectomy procedures are more challenging in fistulas than grafts, though 1-year primary patency rates of 50% and secondary patency rates of 80% have

Figure 3 Brisk antegrade flow has been restored with no residual narrowing or hemorrhage.

been reported. To our knowledge, no studies have been performed comparing rupture rates between fistulas and grafts. Rundback et al reported venous rupture in 7 of 253 (2.8%) patients who underwent hemodialysis access-related angioplasty, though the number of grafts versus fistulas was not disclosed. Funaki et al reported venous rupture in 23 of 514 (5%) of patients who underwent pharmacomechanical thrombolysis of arteriovenous grafts. Turmel-Rodrigues et al reported rupture in 20 out of 526 (3.8%) cases involving treatment of graft stenosis or thrombosis. In a retrospective review, Welber et al reported rupture in 14 out of 683 (2.0%) angioplasties performed to either recanalize thrombosed or salvage poorly functioning upper extremity PTFE grafts.

Though percutaneous thrombectomy procedures are commonplace, a variety of techniques including purely mechanical methods such as dilation and aspiration, pharmacologic thrombolysis, or a combination of these are employed to restore flow. Regardless of technique, it is essential to unmask the cause of the fistula dysfunction, usually venous stenosis, and treat it accordingly. Interventionalists performing these procedures must be facile with the detection and management of complications such as venous rupture.

SUGGESTED READINGS

- Funaki BF, Szymiski GX, Leef JA, Rosenblum JD, Burke R, Hackworth CA. Wallstent deployment to salvage dialysis graft thrombolysis complicated by venous rupture: early and intermediate results. *AJR Am J Roentgenol* 1997;169(5):1435–1437
- Kumar V. Endovascular treatment of penetrating injury of axillary vein with Viabahn endoprosthesis. *J Vasc Surg* 2004;40(6):1243–1244
- Rundback JH, Leonardo RF, Poplausky MR, Rozenblit G. Venous rupture complicating hemodialysis access angioplasty: percutaneous treatment and outcomes in seven patients. *AJR Am J Roentgenol* 1998;171(4):1081–1084
- Schon D, Mishler R. Salvage of occluded autologous arteriovenous fistulae. *Am J Kidney Dis* 2000;36(4):804–810
- Turmel-Rodrigues L, Pengloan J, Baudin S, et al. Treatment of stenosis and thrombosis in haemodialysis fistulas and grafts by interventional radiology. *Nephrol Dial Transplant* 2000;15(12):2029–2036
- Turmel-Rodrigues L, Pengloan J, Rodrigue H, et al. Treatment of failed native arteriovenous fistulae for hemodialysis by interventional radiology. *Kidney Int* 2000;57(3):1124–1140
- Welber A, Schur I, Sofocleous CT, Cooper SG, Patel RI, Peck SH. Endovascular stent placement for angioplasty-induced venous rupture related to the treatment of hemodialysis grafts. *J Vasc Interv Radiol* 1999;10(5):547–551