Hemodialysis Graft with Blind Loop Inflow Segment Treated with Stent Placement

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ABSTRACT

We report a case of occlusion of a graft related to residual thrombus collection at the inflow in a blind pouch formed by conversion of a previous brachial cephalic fistula to a graft. The thrombus was unable to be dislodged by conventional methods with the use of a Fogarty balloon and maceration of thrombus with angioplasty. A covered stent was placed at the inflow segment over this thrombus in order to restore the flow through the graft. Angiographic evidence for this case is also reported.

Patients with arteriovenous grafts for dialysis are prone to access thrombosis. Although previously thought to be infrequent, recent reports have suggested that inflow stenosis is a major problem in approximately one third of patients referred for interventional evaluation of their access (1). Although inflow stenoses can typically be treated with angioplasty, we present a case of a patient with atypical anatomy resulting from the conversion of a previous fistula to a graft resulting in a blind vein pouch at the inflow which collected thrombus and obstructed the flow in her access. We used a covered stent at the inflow to channel blood flow from the artery bypassing the blind vein loop segment and a collection of thrombus that was difficult to dislodge.

Case Presentation

A 78-year-old woman with end-stage renal disease attributed to hypertension and a remote unilateral nephrectomy had been on dialysis for 2 years. She dialyzed through a left upper arm brachial axillary graft created from a previous brachial cephalic fistula. The brachial cephalic fistula had never matured because of a cephalic vein occlusion. However, the segment just distal to the occlusion was dilated and became the site for the arterial anastomosis of the patient's aforementioned brachial axillary graft. This graft had thrombosed three times over a 30-month period prior to the current event. On all occasions, thrombectomies were successful and a lesion was noted at the venous anastomosis which was angioplastied. Of note, on the most recent thrombectomy 2 months prior, there was thrombus at the inflow segment of this graft which was successfully dislodged by maceration with a 6 mm angioplasty balloon.

Brief Procedure Summary

After verifying patency of the outflow, TPA, and heparin were instilled. Upon passing the Fogarty balloon it preferentially would pass into a blind loop segment of residual cephalic vein rather than the brachial artery. A guidewire was then passed into the brachial artery, and thrombus was macerated with a 5 mm balloon and flow was restored although it was noted to be sluggish. Repeat fistulogram noted residual stenosis at the venous anastomosis which was relieved after repeat angioplasty with an 8 mm balloon. Repeat arteriogram demonstrated extensive residual thrombus in the blind loop of cephalic vein which was partially obstructing the inflow (Fig. 1). The thrombus in the loop was noted to be mobile and acted as a valve which would obstruct flow in the graft and was difficult to remove with a Fogarty balloon. After considering options, it was concluded that placing a covered stent may provide the most lasting treatment option, correcting abnormal flow in this region and addressing the residual thrombus. A covered stent across this lesion restored brisk flow through the access (Fig. 2).

Post Procedure Follow Up

The patient's graft remained patent for 10 months at which point, it again thrombosed and was abandoned because of multiple lesions in both the inflow and

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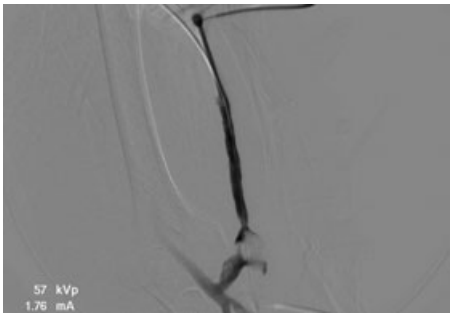

FIG. 1. Arterial inflow lesion with thrombus in blind pouch.

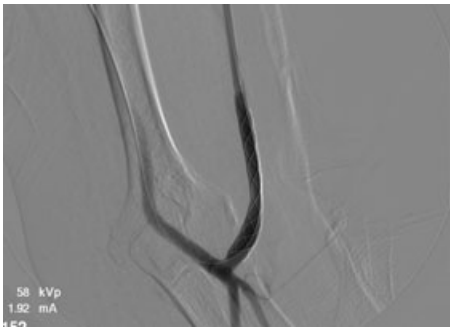

FIG. 2. Arterial inflow lesion after stent placement.

outflow, most prominently a long segmental 95% lesion in the outflow. A new graft has since been placed in the same arm that emanates directly from the brachial artery extending to the point of the previous anastomosis on the axillary vein which was revised.

Discussion

Primary failure of new arteriovenous fistulas remains a problem among prevalent hemodialysis patients with some studies suggesting primary failure rates of 40% (2). In the process of attempting to place more fistulas, an increasing number of fistulas may be converted into grafts with atypical anatomic features such as the one presented here. In this case, a graft was created from the remains of a failed fistula and resulted in the creation of a blind loop at the inflow which acted as a reservoir for thrombus and was likely a factor in the patient's frequent thrombosis. If thrombus existed or was dragged into this area during prior procedures, it could have been dislodged during routine dialysis causing obstruction to the access. Vascular anomalies, namely fistulas to native veins, have been reported at the inflow of grafts and are noted to manifest only when the venous pressures were high (3). Thus, this blind pouch may have had variable dimensions and flow patterns and variable susceptibility to thrombus formation depending on the pressure and flow dynamics within the access. The use of stent placement across this lesion should be distinguished from conventional use of stents for lesions which are not amenable to angioplasty. Stents have in the past be used for various other indications during access procedure including treatment of access wall rupture during angioplasty (4), treatment of pseudoaneursyms (5), and even steal syndrome treatment with a constrained stent (6). The use of a stent in this case appeared to extend the lifespan of this access a length of time similar to the use of a stent for angioplasty failure which have been reported to have a primary patency of 54% at 6 months (7). Similar to those reports, this access failed because of lesions distinct from the area of stent placement.

Given the success of the Fistula First initiative in increasing the prevalence of fistulas as patient's vascular access, vascular anomalies related to creation of multiple accesses in the same region may become more common. This case serves to highlight the need for ongoing management strategies given the complex nature of vascular access.

Acknowledgment

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