Experience with covered stents for the management of hemodialysis polytetrafluoroethylene graft seromas

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Prosthetic graft seromas is a rare complication that has been traditionally managed with open methods using partial graft replacement and open drainage. We report the first two cases of hemodialysis graft seromas successfully treated with a covered stent. Both patients underwent arteriovenous graft placement from the brachial artery to the axillary vein using a standard wall, tapered 4 to 7 mm polytetrafluoroethylene graft, but developed a seroma at the arterial end of the graft. Unsuccessful attempts were made to treat these seromas with percutaneous and open drainage. In both patients, an 8 mm × 50 mm Wallgraft (Boston Scientific, Natick, Mass) was retrogradely deployed "bareback" at the arterial end of the graft allowing for complete resolution of the graft seromas. (J Vasc Surg 2008;48:216-7.)

Graft seromas, also known as a "weeping graft", are often painless and may be confused with a lymphocele, hematoma, abscess, or pseudoaneurysm.[1] Fortunately, the incidence of such seromas are rare occurring anywhere between 0.48% and 4.2%, more commonly in upper arm compared with forearm arteriovenous grafts.[1]

Numerous etiologies have been proposed to elucidate the occurrence of graft seromas.[1,2] These include manufacturing errors in which the grafts have excessive porosity, technical factors in which the grafts are exposed to caustic agents such as alcohol or iodine prior to implantation, immunologic (or allergic) factors, and biochemical factors such as inhibition of fibroblast growth.[1,2]

The Society of Vascular Surgery has recognized graft seromas as a significant problem and devised a grading system ranging from grade 0 to grade 3; grade 1, the most benign, in which the seroma spontaneously resolves on its own to grade 3, the most severe, in which the graft is removed or bypassed.[1,2]

Traditional management has included observation of the seroma, percutaneous drainage if this fails, and finally graft removal or bypass.[1-3] Successful anecdotal strategies have been reported in which microfibrillar collagen (Avitene) is applied to the serous portion of the graft and plasmapheresis.[1] This report describes the successful management of two upper arm hemodialysis graft seromas with a covered stent.

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Competition of interest: none.

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0741-5214/$34.00

doi:10.1016/j.jvs.2008.01.046

CASE REPORTS

Case 1. One patient is a 90-year-old female who underwent right upper extremity grafting for hemodialysis from the brachial artery to the axillary vein using a standard wall 4 to 7 mm tapered polytetrafluoroethylene (PTFE) (W. L. Gore & Associates, Inc, Flagstaff, Ariz) graft. She developed a graft seroma 1 month following placement of the graft and was unsuccessfully managed with both percutaneous and open drainage of the seroma. Transudation of fluid was seen emanating from the arterial end of the PTFE graft. An 8 mm × 50 mm Wallgraft (Boston Scientific, Natick, Mass) was percutaneously deployed in the arterial portion of the graft (Figs 1 and 2) and the seroma cavity was drained with a No 7 Jackson Pratt drain. The seroma completely resolved at 2 weeks, and the graft was successfully accessed for hemodialysis at 1 month. The hemodialysis graft has remained patent for 8 months and has been functioning well without any recurrence of the seroma.

Case 2. The other patient is a 62-year-old female who also underwent left upper extremity grafting from the brachial artery to the axillary vein with a standard wall 4 to 7 mm tapered PTFE graft. She developed a graft seroma and was managed successfully with open drainage and placement of a No 7 JP drain. Transudation of fluid was also seen emanating from the arterial end of the PTFE graft. Six weeks following removal of the drain, the seroma recurred. An 8 mm × 50 mm Wallgraft was also deployed in the arterial portion of the graft resulting in complete resolution of the seroma. The hemodialysis graft has remained patent for 10 months and has also been functioning well without any seroma recurrence.

DISCUSSION

These are the first two reported cases of hemodialysis graft seromas successfully managed with a covered stent. Despite observation and percutaneous drainage, these seromas failed to resolve on their own and required definitive treatment to allow for graft usage during hemodialysis.

Several reports have documented the successful exclusion of pseudoaneurysms and other graft pathologies with covered stents.[4-6] These endovascular applications engen-

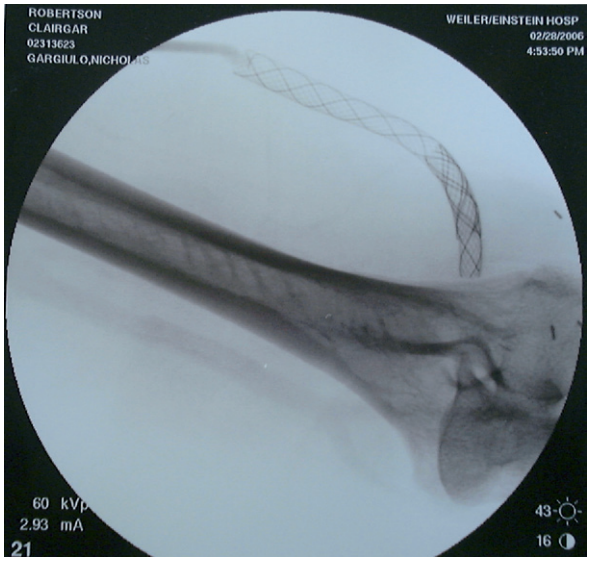

Fig 1. Successful deployment of Wallgraft precisely at arterial anastomosis.

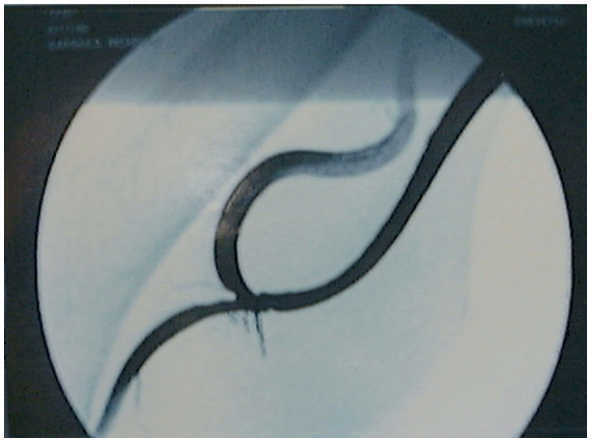

Fig 2. Completion fistulogram demonstrating patency of arteriovenous graft following Wallgraft deployment.

der less invasive methods to repair lesions that may require complex, open procedures in high risk patients. Thus far, the long-term outcome of covered stent technology for graft pseudoaneurysm has proved to be efficacious with regards to graft patency and hemodialysis use.[4-6]

It would be difficult to conjecture as to the etiology of these two graft seromas since standard techniques during implantation were used. Both grafts were soaked in normal saline for 3 minutes prior to graft implantation. Both patients had diabetes mellitus and hypertension, but neither one had congestive heart failure or fluid overload, cancer, or low albumin levels. In fact, over a 3-year period about 75 arteriovenous grafts were placed prior to developing any graft seromas, an overall incidence of 2.5%. Both grafts were standard wall 4 to 7 mm tapered polytetrafluorethylene grafts and have remained patent for 10 months since the seromas were treated with the covered stent without any other pathology.

Each of these graft seromas was successfully treated with the Wallgraft. The Wallgraft was retrogradely deployed "bareback" precisely at the arterial anastomosis. Hemostasis was achieved with manual compression and an absorbable subcutaneous stitch. Several other covered stents are commercially available and include the iCAST (Atrium Medical, Hudson, NH), Fluency (Bard Peripheral Vascular, Tempe, Ariz), and Viabahn (W. L. Gore & Associates, Inc, Flagstaff, Ariz). Deployment and performance characteristics are unique to each device, however, little is known regarding overall device durability in the hemodialysis setting. It has generally been accepted that the iCAST covered stent should not be used to treat such graft seromas since it will not safely allow or tolerate repeated punctures with a hemodialysis needle. Again, these two hemodialysis grafts have remained patent for 10 months despite repeated arterial needle punctures of the covered stent portion. Durability for the Wallgraft has thus far been reasonable.

The mechanism by which covered stent deployment minimizes and then ceases serous drainage is unclear. It might be hypothesized, however, that the overlapping Wallgraft interstices with the polytetrafluoroethylene pores creates an impervious seal. Wallgraft porosity is maintained, but completely seals the larger polytetrafluoroethylene pores. It would be interesting to observe the resolution of such graft seromas using a Viabahn or Fluency covered stent.

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Submitted Nov 20, 2007; accepted Jan 23, 2008.