Endovascular management of axillofemoral bypass graft stump syndrome

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Objective: Upper extremity embolic complications of occluded axillofemoral bypass grafts are infrequent. However, traditional management of dissection of axillary anastomosis for removal of the stump can be challenging. We report two patients with critical upper extremity ischemia secondary to stump syndrome and its successful management with endovascular techniques.

Methods: One hundred fifty-two patients underwent axillofemoral bypass grafting over 10 years from 1991-2001. Two patients from this series had acute ischemia involving the ipsilateral upper extremity of occluded axillofemoral bypass graft. Duplex ultrasound scans revealed occlusion of the axillofemoral bypass graft and acute occlusion of ipsilateral upper extremity arteries. Both patients underwent brachial artery exploration and embolectomy. Completion angiograms revealed persistent axillofemoral bypass graft stump as the source of embolus. The stump was obliterated with a 10-mm/40-mm Wallgraft introduced through the same arteriotomy made for brachial embolectomy. Transesophageal echocardiography and magnetic resonance angiography of the arch and great vessels were performed to exclude other sources of origin for the embolus.

Results: Both patients remained symptom-free and with patent stent grafts, as seen on duplex scans at 3, 6, and 9 months of follow-up.

Conclusions: Upper extremity embolism is a rare complication after occlusion of axillofemoral bypass grafts. The endovascular approach to obliterate the stump of occluded axillofemoral bypass grafts is minimally invasive and an effective alternative treatment of this rare condition. (J Vasc Surg 2003;38:833-5.)

Extra-anatomic axillofemoral construction to revascularize the lower extremity was first performed in 1963 by Louw and Blaisdel and Ahall. Axillofemoral bypass grafting is commonly performed to treat severe aortoiliac occlusive disease in patients at poor surgical risk and for management of infected abdominal aortic aneurysms. Axillofemoral constructions are associated with several infrequently reported complications, such as graft avulsion, acute thrombosis of the axillary artery, brachial plexus injury, upper extremity steal phenomenon, and thromboembolism. Among these complications are embolization from the remaining stump after the graft has become thrombosed. Traditional treatment has consisted of open surgical repeat exploration of the axillary anastomosis and excision of the stump. We present two case reports that describe our experience with managing the stump with endovascular techniques.

CASE REPORTS

One hundred fifty-two patients underwent axillofemoral bypass grafting over 10 years from 1991 to 2001. Two patients from this series had acute ischemia involving the ipsilateral upper extremity of the occluded axillofemoral bypass graft.

Case 1. A 53-year-old man with a history of myocardial infarction, nonreconstructible coronary artery disease, hypercholesterolemia, and active tobacco use had severe bilateral lower extremity claudication at presentation. The patient underwent right axillary-bifemoral bypass grafting on October 8, 1998. This bypass graft thrombosed, and the patient underwent left axillofemoral bypass grafting on October 17, 2001. At presentation on April 3, 2002, he had an ischemic right upper extremity. A duplex ultrasound scan revealed acute embolus in the brachial artery.

Case 2. A 75-year-old woman with a history of hypertension, previous tobacco use, and chronic obstructive pulmonary disease had a saccular 6.0-cm descending thoracic aortic aneurysm. The patient underwent right axillary-bifemoral bypass grafting on November 20, 2000, for perfusion of the lower extremities and viscera before repair of the aneurysm. Open descending thoracic aneurysm repair was performed on December 13, 2000. At presentation on March 14, 2002, the patient had right upper extremity claudication.
ischemia, and a duplex scan demonstrated right ulnar artery embolus.

METHODS AND RESULTS

Externally supported 8-mm polytetrafluoroethylene grafts were used in both patients. The grafts were tunneled sub-pectorally, then subcutaneously in the anterior axillary line to the recipient femoral artery. The interval between graft occlusion and embolic manifestation was 6 months in both patients. Both patients had sudden onset of pain and coldness of the right upper extremity.

Exploration of the brachial artery and embolectomy were performed. Completion angiograms revealed a persistent axillofemoral bypass graft stump (Figs 1, 2). The stump was obliterated with a 10-mm/40-mm Wallgraft, which was introduced through the same arteriotomy made for the brachial embolectomy. Postoperatively, transesophageal echocardiography and magnetic resonance angiography of the aortic arch and great vessels were performed to exclude other sources of origin of the embolus.

Both patients were symptom-free with no recurrent embolization at 11 and 12 months, respectively, after surgery. Follow-up duplex scans showed patent stent grafts at 3, 6, and 9 months.

DISCUSSION

Upper extremity embolic complications are infrequent after axillofemoral revascularization of lower extremities. Embolic complications when graft occlusion occurs in the early postoperative period have been attributed to technical error. However, late embolic complications months after graft occlusion have also been reported. The exact mechanism of these complications is debated in the literature. The formation of a blind pouch containing thrombotic material is one postulated mechanism. However, others have suggested that the configuration of graft–axillary artery anastomosis and its transformation into a Y configuration as a result of undue tension has been hypothesized to contribute to distal embolization after graft thrombosis. In neither of our patients was Y configuration of the anastomosis observed.
Furthermore, management of these thrombosed grafts has been debated. Two groups\(^8,12\) reported a 33% to 80% incidence of upper extremity thromboembolism in patients with occluded axillofemoral bypass grafts. There were no embolic complications in patients with patent axillofemoral grafts or with immediate revision of grafts. These authors suggested revision of all occluded grafts, because they pose high risk for embolic events to the donor artery.

Bandyk et al\(^7\) reported this complication in three of five patients with occluded axillofemoral grafts. These authors suggested short-term anticoagulation therapy and limitation of shoulder range of motion in the early period after graft failure. They advocate duplex scanning to identify axillary artery defects, and elective surgical repair.

Khalil et al\(^9\) proposed surgical removal of occluded grafts if embolic potential was identified on duplex scans and confirmed at angiography.

We successfully managed two cases of occluded axillofemoral bypass graft stump syndrome with endovascular techniques, with the patient under local analgesia. Brachial artery embolectomy and insertion of a covered stent to obliterate the stump was performed through the same arteriotomy in the ipsilateral brachial artery. Many authors reported successful endovascular management of subclavian artery injuries,\(^13,14\) aneurysms,\(^14\) and atherosclerotic occlusive disease.\(^15\) The long-term durability of this technique is not known.\(^14,15\) Stent dislocation and stenosis from compression between the clavicle and first rib were described.\(^14\) However, in the case of embolization from the stump of an occluded axillofemoral bypass graft, the stent graft is deployed in the axillary artery, and every effort should be made not to cross the thoracic outlet, to avert compression of the stent graft between the first rib and the clavicle.

On the basis of this limited experience, we recommend intervention only after embolization has occurred. We suggest that endovascular management of the stump may be a less invasive but effective technique for managing this rare complication. However, the long-term results of this treatment are not known.

REFERENCES