Hybrid Treatment of Large Brachial Artery Pseudoaneurysms

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Background: Conventional surgical treatment of brachial artery pseudoaneurysms (BAPs) includes aneurysm excision/opening and subsequent arterial reconstruction with different options depending on the extent of the arterial deficit. Endovascular repair of BAPs with stent grafting has also been reported but published experience remains limited. In this report, we present our experience with a novel hybrid approach consisting of primary endovascular aneurysm exclusion with a stent graft and subsequent open surgical evacuation of pseudoaneurysm content for decompression of adjacent structures.

Methods: This study included all patients who underwent hybrid repair of a BAP within the period 2005–2014 in our institution. Data were collected retrospectively.

Results: During the study period a total of 5 patients with iatrogenic BAPs were treated. Mean BAP diameter was 58 ± 4.9 mm. Technical success was 100%. Thirty-day mortality was null. No major perioperative complications were noted. Hand ischemia and neurological symptoms were reversed in all patients after the procedure. During follow-up (median 24 months, range 6–60 months) all stent grafts remained patent and no aneurysm relapse was noticed. No signs of stent-graft infection were noticed in any of the patients and no reintervention was needed.

Conclusions: Primary endovascular exclusion of BAPs with a stent graft followed by surgical evacuation of pseudoaneurysm sac content is associated with good early and mid-term results in this limited experience. Larger patient cohorts are required for further evaluation of this technique.

INTRODUCTION

True brachial artery aneurysms are rare. Most of them are pseudoaneurysms caused after penetrating or blunt trauma including humeral fracture, iatrogenic trauma, and drug abuse.[1] Brachial artery pseudoaneurysms (BAPs) usually present as a pulsating mass and local tenderness and occasionally with distal ischemia. Larger BAPs may also present with median nerve paresis.

Small BAPs may be managed conservatively under frequent follow-up examinations, or with external compression or thrombin injection.[2,3] Symptomatic and larger BAPs should undergo surgical treatment; open and endovascular procedures are available, with the latter being rarely reported in the literature.[4,5]

The aim of this article is to report a series of 5 patients with large BAP who underwent a novel hybrid repair consisting of primary endovascular stent grafting and subsequent surgical opening and evacuation of pseudoaneurysm for decompression of adjacent structures.

MATERIALS AND METHODS

This study included all patients who underwent hybrid repair of a BAP within the period January

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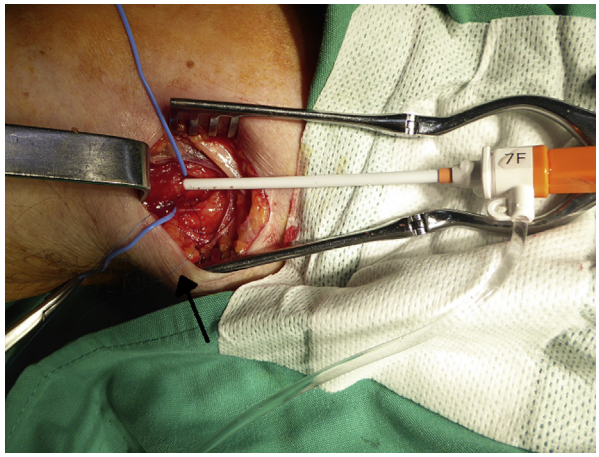

Fig. 1. Access via a 7F sheath introduced antegrade in the axillary artery. Note the prolene 6-0 purse-string suture (*arrow*).

2005 to December 2014 in our institution. Data were collected retrospectively. All patients provided their informed consent.

Indications for such a hybrid treatment included the presence of a large BAP with suitable proximal and distal landing zone at the brachial artery for an endograft to be implanted. Exclusion criteria included unsuitable anatomy for stent-graft implantation and renal insufficiency (serum creatinine >300 mmol/L).

Preoperative imaging evaluation consisted of color duplex ultrasound and either digital subtraction angiography (DSA) or computed tomography angiography (CTA) for evaluation of the anatomy of the BAP and the existence of adequate landing zones at the brachial artery for endograft implantation.

Technique and Required Equipment

The procedure was performed under local anesthesia. The axillary artery was exposed via a small skin incision and a purse-string suture (6-0 prolene) was applied on the front wall of the artery. Subsequently, 5000 IU of heparin was administered intravenous, and a 7F sheath, 11 cm long, was introduced antegrade in the axillary artery, in the middle of the purse-string suture (Fig. 1). Thereafter an angiography was performed and a hydrophilic 0.035″ Terumo guidewire (Terumo Corp., Tokyo, Japan) was advanced under roadmapping to the radial or the ulnar artery and then exchanged for a stiffer guidewire. Subsequently, a stent graft (VIABAHN; W. L. Gore, Flagstaff, AZ) of appropriate length (5 cm) and diameter (6 mm) was positioned and deployed excluding the BAP (Fig. 2). A proximal and distal sealing zone of 1.5−2 cm was routinely aimed. For more proximal BAPs, the sheath had to be withdrawn accordingly to allow adequate working length for stent-graft deployment.

Thereafter, an incision was performed at the BAP to evacuate its content (thrombi and necrotizing tissues/debris) and reduce compression to adjacent structures (Fig. 3). Microbiology cultures were routinely taken from pseudoaneurysm content to exclude infection. After evacuation a control angiogram was performed to verify exclusion of the BAP, and stent-graft patency and the sheath were removed. The purse-string suture was tied to close the puncture hole and the axillary wound was closed accordingly. The skin incision over the BAP was left open to heal secondarily, to facilitate continuing evacuation of the aneurysm content for the first postoperative days.

Postoperatively, patients received double antiplatelet treatment (aspirin 100 mg/day and clopidogrel 75 mg/day) for at least 6 months and thereafter monotherapy with aspirin 100 mg/day.

RESULTS

During the study period a total of 5 male patients (mean age 66.2 ± 5.5 years) were treated. All patients had a BAP at the right brachial artery. Mean BAP diameter was 58 ± 4.9 mm. Patients' demographics are shown in Table I. The cause of BAP formation was iatrogenic after brachial artery puncture in all 5 patients (coronary angiography in 4 patients, abdominal aortic aneurysm repair in 1 patient). All 5 patients presented with painful excessive arm swelling. Two of these patients had additionally hand ischemia due to external compression of the brachial artery from the aneurysm. Two patients had neurological symptoms (paresthesia and diminished motor function of hand) due to median nerve compression.

Technical success defined as successful exclusion of the BAP, patent stent graft at the end of the procedure, and surgical evacuation of the BAP content was achieved in all 5 patients (100%). Thirty-day mortality was null. No major perioperative complications were noted. Hand ischemia and neurological symptoms were reversed in all patients after the procedure. Microbiology cultures from pseudoaneurysm content were negative in all patients.

Median follow-up was 24 months (range 6−60 months). During follow-up all stent grafts