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Case Report
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An Extremely Rare Case of True Brachial Artery Aneurysm: Surgical Approach with Prosthetic Graft

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Abstract

Background: True aneurysms of the brachial artery are an extremely rare disease, due to a variety of causes. They can present as a pulsating mass causing pain or paresthesia's from nerve compression or result in hand or digital ischemia. Diagnosis is based on physical examination, duplex ultrasound and CTA for operative planning.

Case Report: A 60-year-old male patient with a history of AVF closure after renal transplantation presented to our institution with pain and swelling of the left arm due to a brachial artery aneurysm. We performed a successful resection of the aneurysm and a brachial artery reconstruction using a prosthetic graft.

Conclusion: There is some evidence of association between AVF creation and BAA occurrence. Immunosuppression may also contribute to the development of aneurysmal pathology. Surgical repair is the treatment of choice, although in some cases the endovascular approach may be considered. The use of a prosthetic graft for artery reconstruction may be a valid alternative when an autologous vein is not feasible.

Further studies are needed to better understand causes, evolutions and correct management of aneurysms of the brachial artery and to evaluate long-term outcomes of prosthetic graft use.

Keywords: Brachial artery; Aneurysm; Peripheral aneurysm; Prosthetic graft

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Introduction

Upper extremity arterial aneurysms are uncommon, primarily presenting as false aneurysms secondary to repetitive blunt trauma, penetrating trauma, infections or iatrogenic complications [1].

True Brachial Artery Aneurysms (BAA) are even more rare [2]. Recently they have been reported in association with arteriovenous access creation or repetitive punctures in end-stage renal disease patients undergoing hemodialysis [3].

Other uncommon causes of true aneurysm of the brachial artery include congenital connective tissue disorders, such as Ehler-Danlos syndrome, Kawasaki syndrome, Buerger disease, Kaposi sarcoma or cystic adventitial disease [4]. However, in many instances no specific cause can be identified, and these aneurysms are classified as idiopathic.

In most cases BAA present with symptoms of median nerve compression or pain. Other symptoms include hand or digital ischemia due to thrombosis or distal embolization. Diagnosis is often suggested at physical examination by recognizing of a pulsating mass in the upper extremity.

Duplex ultrasound can usually be sufficient to confirm the diagnosis. Computed Tomography Angiography (CTA) is necessary for operative planning.

Although endovascular techniques have been described in literature to manage pseudoaneurysm of the brachial artery [5,6], the treatment of true aneurysms of this artery is mainly based on a surgical approach through resection of the aneurysm and interposition of autologous venous or

prosthetic grafts [7].

In this paper we describe an extremely rare case of a brachial artery aneurysm causing upper extremity pain and our surgical management and outcomes.

Case Presentation

A 60-year-old male patient (180 cm, 80 kg, BMI 24.7 kg/m^2) presented to our Institution with pain and progressive swelling of the left arm. Clinical examination revealed the presence of a pulsating mass at the level of the middle third of the arm. Left radial and ulnar pulses were present.

The patient was a former smoker with hypertension and COPD. He also had a history of end-stage renal disease due to Post-Streptococcal Glomerulonephritis, for which he started hemodialysis by a left radio-cephalic Arteriovenous Fistula (AVF) 20 years previously. He subsequently underwent a successful renal transplant and surgical AVF's closure 11 years previously and had been administered immunosuppressive and steroid therapy to prevent renal rejection.

Duplex ultrasound showed a fusiform aneurysmal dilatation of the left brachial artery with turbulent flow. A Computed Tomography Angiography (CTA) was then performed and documented a left brachial artery aneurysm of approximately 36 mm in maximum diameter with thrombotic apposition at the level of the middle third of the arm (Figure 1).

Considering clinical presentation and size of the aneurysm, decision was made to perform a surgical exclusion. Through an "S-shaped" incision at the level of the left antecubital fossa extended to the middle third of the arm, the median nerve was recognized and mobilized anteriorly, and the brachial artery was isolated proximally and distally to the aneurysm (Figure 2a). The aneurysm was resected, and the brachial artery was reconstructed with a collagen-coated polyester graft interposition (Intergard Synergy Knitted Ultrathin 8 mm, Maquet) (Figure 2b). An end-to-end anastomosis was performed proximally and distally with a 5/0 polypropylene continuous suture (Prolene, Ethicon). At the end of the procedure radial and ulnar pulses were present. No neurological deficits were reported.

The postoperative course was uneventful, and the patient was discharged home on postoperative day 4, on single antiplatelet therapy.

A 1-month follow-up duplex ultrasound showed patency of the graft and normal perfusion of the radial and ulnar arteries.

At the 6-months follow-up visit the patient continued to be in good clinical conditions, with normal perfusion of the left upper limb and no neurological symptoms or pain.

Discussion

Brachial artery aneurysms represent a rare disease, with a prevalence of 0.5% [8]. They are usually false aneurysm secondary to traumatic, infectious or iatrogenic causes. True BAA have an even more rare presentation and many of the patients with these lesions have a history of intravenous drugs abuse or frequent arterial catheterizations. Other causes associated with BAA occurrence are atherosclerosis, vasculitis, and connective tissue disorders, such as Behcet disease, Takayasu disease, Kawasaki syndrome, Ehlers-Danlos syndrome, Buerger disease, Kaposi sarcoma or cystic adventitial disease.

Regarding our patient, he had no history of trauma, connective tissue disorders, iatrogenic punctures or drugs abuse.

However, one of the other causes that can be associated with true BAA is a history of AVF creation [9].

In fact, it is described in literature how an AVF creation can increase blood flow in proximal brachial artery and lead to its expansion [10]. In addition to this, some collateral factors, like steroids and immunosuppressants' use after renal transplantation, might contribute to the formation and enlargement of arterial aneurysms [11].

The presentation of BAA is similar to that of other peripheral arteries aneurysms. They can present as an asymptomatic pulsating mass or can cause pain or paresthesia's from nerve compression. Less commonly, patients can report symptoms of distal ischemia due to thrombosis or distal embolization.

A proper diagnosis should be made with physical examination and duplex ultrasound, which allows to determine the size of the mass and the perfusion of the downstream area. CTA may be performed for operative planning.

Because of its low incidence, the management of a brachial artery aneurysm is not well defined, with conventional surgical repair being the main treatment option, although in some cases the endovascular approach may be considered. The interposition of an autologous venous graft is preferred, with the Great Saphenous Vein (GSV) used in most cases [12]. The ipsilateral cephalic or basilic vein is also used in order to preserve the veins of the lower limbs for possible future

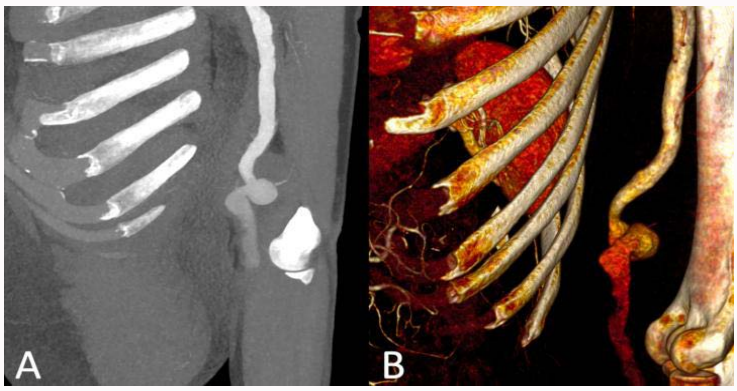

Figure 1: Computed Tomography Angiography scan showing a brachial artery aneurysm of 36 mm of maximum diameter in the middle third of the left arm (A); 3D reconstruction (B).

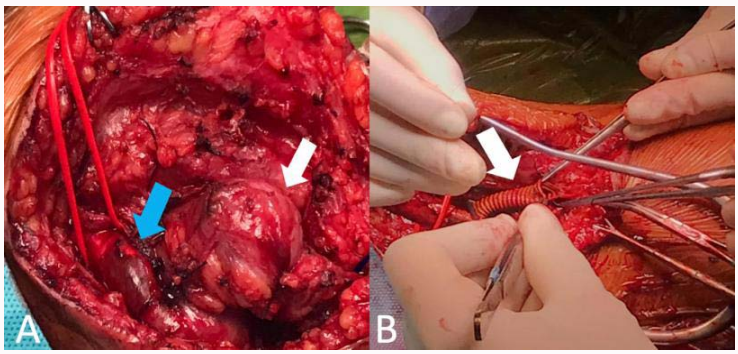

Figure 2: Intraoperative view of the brachial artery (blue arrow) and aneurysm (white arrow) (A); brachial artery reconstruction with a 8 mm collagen-coated polyester graft (B).

vascular reconstructions. If these options are not feasible, prosthetic grafts represent a good alternative.

In our case report, prior to the intervention, a vein mapping was performed to the patient: Ipsilateral cephalic vein was not feasible due to the previous AVF, and great saphenous vein was incompetent and ectasia bilaterally. Therefore, a prosthetic graft was considered.

A good outcome was achieved using a collagen-coated polyester graft, as demonstrated by a duplex ultrasound following the intervention that showed the patency of the graft and the good perfusion of the distal arteries. A long-term follow up is necessary to better evaluate the results.

Relationships between AVF creation with immunosuppressive and steroids therapy after renal transplantation and the occurrence of true BAA are not yet well defined. More dedicated studies are needed for better understand causes, evolutions and correct management of aneurysms of the brachial artery.

Conclusion

True aneurysms of the brachial artery are an extremely rare disease, due to a variety of causes. There is some evidence of association between AVF creation and BAA occurrence. Immunosuppression can may also contribute to the development of aneurysmal pathology. Surgical repair is the treatment of choice, although in some cases the endovascular approach may be considered. The use of a prosthetic graft for artery reconstruction may be a valid alternative when an autologous vein is not feasible.

Further studies are needed to better understand causes, evolutions and correct management of aneurysms of the brachial artery and to evaluate long-term outcomes of prosthetic graft use.

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