

Endovascular treatment of an Axillary Artery Pseudoaneurysm after Anterior Shoulder Dislocation: A Case Report

Znotrajžilno zdravljenje lažne anevrizme pazdušne arterije, nastale po sprednjem izpahu rame: Prikaz primera

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Abstract

Traumatic injury of the axillary artery after shoulder dislocation is a rare event.

Till recently, surgical repair was the only viable option in this type of pathology, with high morbidity and even mortality rates reported. In recent years, endovascular interventions became an effective method to treat arterial pathology including blunt arterial injuries.

We present a case of an 82-year old man with a traumatic pseudoaneurysm of the right axillary artery after anterior shoulder dislocation. The patient was successfully treated by stent graft placement over the arterial tear. Despite the technical success, serious neurological impairment persisted after the procedure.

Izvleček

Izpah rame lahko izjemoma privede tudi do poškodbe pazdušne arterije. Zdravljenje tovrstnih žilnih poškodb je do nedavnega zahtevalo kirurški poseg, ki pa je bil povezan z znatno obolevnostjo in celo s smrtnostjo. V zadnjih letih so se uveljavili skozikožni znotrajžilni posegi, ki so učinkovit način zdravljenja aterosklerotičnih pa tudi popoškodbenih sprememb na arterijah.

V članku prikazujemo primer 82-letnega bolnika s popoškodbeno lažno anevrizmo pazdušne arterije, ki je nastala kot posledica izpaha desne rame. Lažno anevrizmo smo uspešno izključili z uporabo znotrajžilne proteze, vendar so pri bolniku ostale trajne nevrološke okvare.

Introduction

Shoulder dislocations account for half of the joint dislocations seen in emergency departments.¹ Associated injuries of the axillary artery are rare, occurring in less than 1 % of cases.² Different arterial injury patterns have been reported after shoulder dislocation including: traumatic arterio-venous fistula, true or false aneurysm formation, complete laceration of the arterial wall and secondary thrombosis.³⁻⁶ The long-term prognosis of these lesions is mainly determined by the presence and extent of a concomitant neurological damage.⁵

Traditionally, patients with peripheral artery pseudoaneurysms were referred for surgical treatment,⁶ but in the last years, endovascular procedures became a viable option.^{7,8} We report a case of a patient with a traumatic axillary artery pseudoaneurysm

after an anterior shoulder dislocation which was successfully treated with a covered stent.

Case report

An 82-year old man, without significant medical or surgical history, sustained a trivial fall on his right shoulder. He was admitted to the local emergency unit because of pain, reduced motion and visible distortion of his right shoulder. A plain radiogram revealed an anterior dislocation of the humeral head without evidence of bone fracture. Manual reduction was achieved under general anesthesia and a plaster cast immobilization applied for three weeks. The neurovascular status of the limb before and after the reduction was not documented. After cast removal painful swelling and restricted motions of the humeral joint were noticed but they

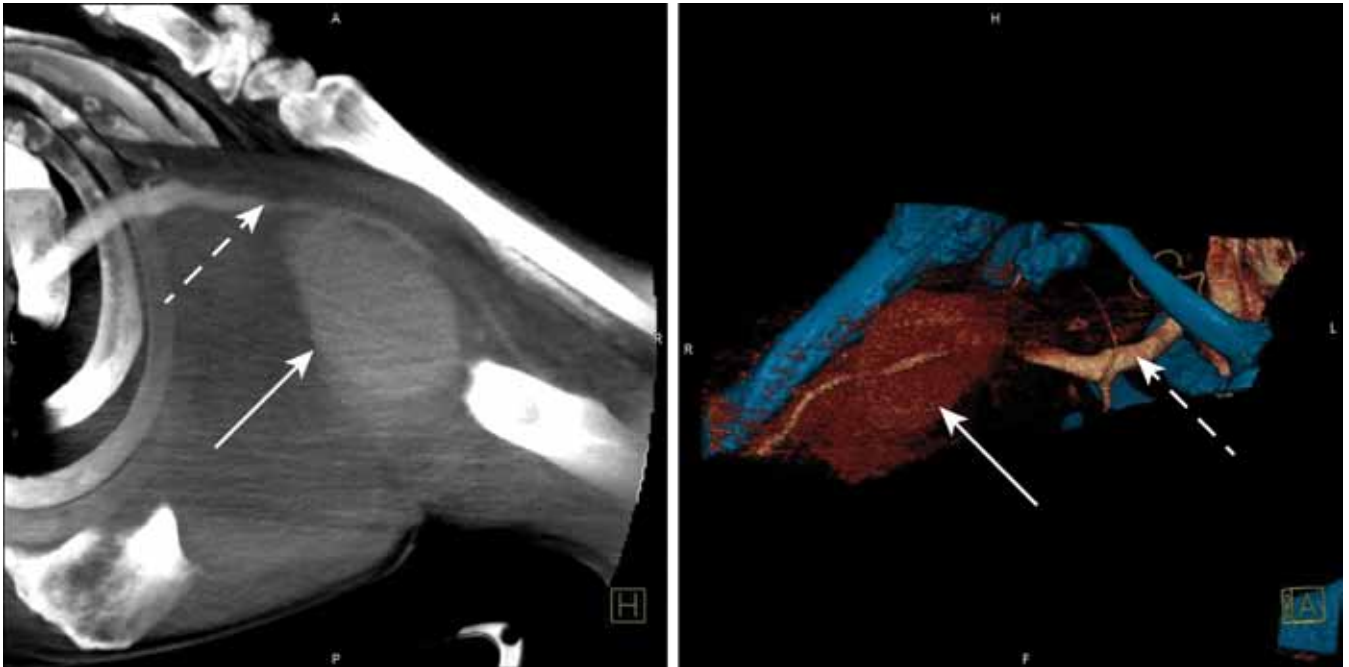


Figure 1a and 1b: CTA reconstruction showing the pseudoaneurysm (full arrow) growing from the posterior wall of the axillary artery (dashed arrow).

were attributed to a possible rotator cuff injury and a sling, local ice and anti-inflammatory medications were prescribed.

Two months after the injury the patient was referred to our hospital due to a growing mass in his right axilla and progressive dysfunction of his upper limb. He complained of pain over the shoulder, motor weakness, sensibility loss and dysesthesias in his right arm. On physical examination a pulsatile mass was present in his right infraclavicular fossa expanding toward the axilla with a bruit audible over it. No active flexion or extension of the elbow or wrist was attainable and there was a complete loss of sensation distal to the elbow. Brachial, ulnar and radial pulses were absent and a monophasic Doppler signal was present over the wrist arteries. Laboratory tests showed low hemoglobin level (90 mmol/l) but were otherwise normal.

An emergent contrast-enhanced CT scan was ordered which revealed a 15 x 18 cm large pseudoaneurysm originating from the lateral third of the right axillary artery (Figure 1a and 1b). Because of the patient's advanced age and late presentation we decided to use an endovascular approach to exclude the pseudoaneurysm. The vascular access was obtained via a 9 Fr sheath, positioned in the right common femoral artery. Angiography confirmed the presence of a pseu-

doaneurysm originating from the posterior wall of the axillary artery, compressing significantly the arterial lumen. An 8 x 50 mm Viabahn stent graft (W. L. Gore & Associates, Flagstaff, Arizona, USA) was placed across the arterial tear. A control angiogram showed normal flow through the axillary artery without any evidence of extravasation. After the procedure the brachial and wrist pulses were palpable and the patient was discharged two days later with an antiplatelet prescription.

On control CT scan, performed two months later, the stent graft appeared patent (Figure 2a and 2b) and no residual pseudoaneurysm was present. Eight months after the procedure a good arterial flow and no significant in-stent stenosis were seen on duplex scan. However, successful revascularization was followed by only minimal neurological improvements and the right limb was still functionless.

Discussion

Injury to the axillary artery is a very rare complication of anterior shoulder dislocation. Factors that predispose to arterial injury include: advanced age, stiffness of the arterial wall due to atherosclerosis, violent trauma, recurrent dislocations and forceful joint reduction.^{6,9} The mechanism of inju-



Fig. 2a and 2b: CTA reconstruction after stent graft deployment (arrow) showing total exclusion of the axillary artery pseudoaneurysm.

ry is supposed to be an overstretching and compression of the axillary artery by the dislocated humeral head.¹⁰ The lateral third of the artery is involved in almost 90 % of cases,⁹ our included.

The brachial plexus, which runs in the vicinity of the axillary artery, can be easily damaged by the expanding pseudoaneurysm or hematoma.¹¹ The plexus is involved in 35 % to 70 % of cases of axillary artery injuries and is the single most important prognostic factor for patient's disability.¹²

The presentation of an axillary artery injury is dramatic if ongoing hemorrhage or marked limb ischemia is present, but symptoms could be subtle or even absent due to an extensive collateral network around the shoulder.¹³ It is not rare that several weeks or years pass before proper diagnosis is made.¹⁴ In our case the diagnosis was made two months after the injury due to an inadequate initial limb assessment. It is therefore mandatory to look for the pathognomonic triad (anterior shoulder dislocation, absent peripheral pulses and expanding axillary hematoma) to identify this limb-threatening pathology.¹⁵

Noninvasive vascular studies should be used whenever a major vessel injury is suspected after shoulder dislocation. An abnormal quotient between the systolic pressure on the injured and the healthy extremity or

a positive duplex scan has a 95 % accuracy for the detection of a major arterial injury.¹⁶ When these methods are inconclusive, CT angiography (CTA) is indicated.¹⁷ We used a 64-slice CT to confirm the diagnosis, determine the anatomical boundaries of the pseudoaneurysm and to plan an endovascular procedure. Since the introduction of high-definition CT scans the role of digital subtraction angiography (DSA) has diminished. Nevertheless, it could still provide a "one-session solution" if it is combined with an endovascular intervention.¹⁷

Till recently, surgical treatment of axillary artery pseudoaneurysms was the only viable option. Surgical exposure of the injured artery was however technically demanding due to a large area of damaged tissue, possible presence of active bleeding and a complex anatomical environment.¹⁸ In a series of 28 surgically treated patients with an injury of the axillary artery, 11 % of them finally underwent limb amputation and 3, 6 % patients died.⁹

The expanding use of endovascular techniques to treat vascular injuries in the last two decades has significantly reduced the operative time, blood loss, the number of perioperative complications and hospital stay.¹⁹ Older patients with significant comorbidities were found to be especially suitable for this less-invasive approach.²⁰ In

our case, percutaneous repair was favored because of the patient's advanced age, late presentation and because difficult surgical exposure and challenging proximal vascular control were anticipated.

Endovascular treatment of axillary and subclavian artery injuries have been reported with a 94 % technical success rate, 85 % primary patency and 6 % complication rate at 18 months follow-up.¹⁹ Procedure-related complications included in-stent stenosis, covering of arterial side-branches, stent deformation and graft occlusion.²¹ Since the stent graft is placed in a highly mobile region and exposed to considerable mechanical stress, self expandable stents are favored.²² We choose a self-expanding Viabahn endograft (WL Gore & Associates) which provides for good flexibility, noncompressibility and conformability.²³

Although surgical decompression of nerve bundles compressed by the expanding pseudoaneurysm seems a reasonable approach to prevent permanent nerve damage, long-term results have been less than satisfactory. Robbs reported ten surgically treated patients, who sustained a brachial plexus lesion following a penetrating arterial injury of the shoulder girdle and subsequent false aneurysm formation. Although at surgical exploration anatomical continuity of the nerves bundles was confirmed, only two patients recovered fully, five had partial return of neurological functions whereas three showed no signs of neurological improvements after 18 months.⁵ Endovascular exclusion of the pseudoaneurysm with early surgical nerve decompression may represent a viable option but reports on this type of procedures are only anecdotal.²⁴

The long-term patency of arterial stent grafts is not known so their use in young patients always require critical appraisal.²¹ Nevertheless, recurrent in-stent stenosis or stent-graft thrombosis can be re-treated percutaneously under less emergent circumstances.²³

Conclusion

Axillary artery pseudoaneurysm after shoulder dislocation is a rare pathology. Early diagnosis is based on a high index of suspicion, a thorough clinical examination and an appropriate noninvasive testing. If signs of neurovascular compromise are present, CT angiography is indicated. Although the optimal management of traumatic axillary artery injuries remains unclear we suggest that in a hemodynamically stable patient, especially of advanced age, endovascular treatment should be considered as a first option. Longer follow-up is needed to evaluate the long-term efficacy of these less-invasive procedures.

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