

Unexpected complication after reverse shoulder arthroplasty: Brachial artery pseudoaneurysm: A case report

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Abstract

Pseudoaneurysm should be acknowledged as a possible but infrequent postoperative complication after shoulder arthroplasty which could be easily misdiagnosed. It is important that the upper-extremity surgeon suspects this problem in the follow-up assessment for appropriate management. In this paper, we present an unusual case of brachial artery pseudoaneurysm in the early postoperative period after reverse shoulder arthroplasty.

Keywords

brachial artery, pseudoaneurysm, reverse shoulder arthroplasty

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Introduction

The use of reverse shoulder arthroplasty (RSA) surgery is increasing over time. Vascular complications after RSA are unusual and mainly reported as hematomas in up to 2–5% of the cases.^{1,2} The incidence of pseudoaneurysm in the shoulder has been reported in isolated cases of overhead athletes due to traumatic stretching and compression,³ after trauma such as shoulder dislocation⁴ or surgery either arthroscopy⁵ or recently after reverse shoulder arthroplasty^{6–8}. We present a case of brachial artery pseudoaneurysm eleven weeks after reverse shoulder arthroplasty.

The patient was informed that his case data was going to be submitted for publication and he signed the proper consent form approval.

Case report

A 69-year-old man previously treated with a Putti Platt procedure⁹ for left shoulder instability at the age of 22 years presented to our clinic with a history of progressive shoulder pain that limited sleep and daily activities. He was diagnosed with severe glenohumeral osteoarthritis. He had no known comorbidities and was not taking any medications. On clinical examination, the patient had restricted active motion with forward elevation of 120°, abduction of 30°, internal rotation at the first lumbar vertebral level and no external

rotation. Atrophy of the supraspinatus and infraspinatus muscles was evident on inspection of the shoulder.

Radiographs of the left shoulder revealed end-stage osteoarthritis with prominent inferior osteophyte, posterior subluxation of the humeral head and biconcave glenoid (Figure 1). With these findings, RSA was the recommended surgical treatment.

Through a deltopectoral approach, the remaining subscapularis tendon was dissected from the lesser tuberosity, and a Delta Xtend™ reverse shoulder system was implanted (De Puy Synthes). No bone grafting was required for glenoid

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augmentation and standard metaglene and 42mm glenosphere were used, as well as 14mm cementless stem with 0 degrees of retroversion (Figure 2). The subscapularis was

not repaired to allow improvement on external rotation of the shoulder.

The rehabilitation protocol included immobilization with a sling for 2 weeks, then active assisted forward elevation up to 90°, abduction to 45° and external rotation to 10°. At 5-week follow up the patient had complete pain relief and progressive improvement in shoulder range of motion.

Eleven weeks postoperatively, the patient presented to the emergency department with a history of ten days of progressive ecchymosis in the affected posterior upper arm without loss of shoulder function or pain. Distal pulses were normal. Doppler ultrasound disclosed no deep vein thrombosis but revealed focal dilatation of the distal subclavian versus proximal axillary artery with a yin yang sign appearance suggestive of turbulent flow in a pseudoaneurysm (Figure 3). A CT arthrogram confirmed a 3 × 1.7 × 2.8 cm proximal brachial artery pseudoaneurysm (Figure 4). Digital subtraction angiography of the left subclavian and axillary artery was performed (Figure 5) and a Gore Viabahn 8 mm x 5 cm covered stent was placed via transfemoral and then post dilated to 7mm with an angioplasty balloon (Figure 6).

Two weeks after the procedure the patient was assessed with a new doppler ultrasound confirming proper placement of the stent. He was prescribed clopidogrel and aspirin. Without any further complication, he continued with physiotherapy for the shoulder.



Figure 1. Left shoulder axial radiograph demonstrating posterior subluxation and biconcave glenoid.

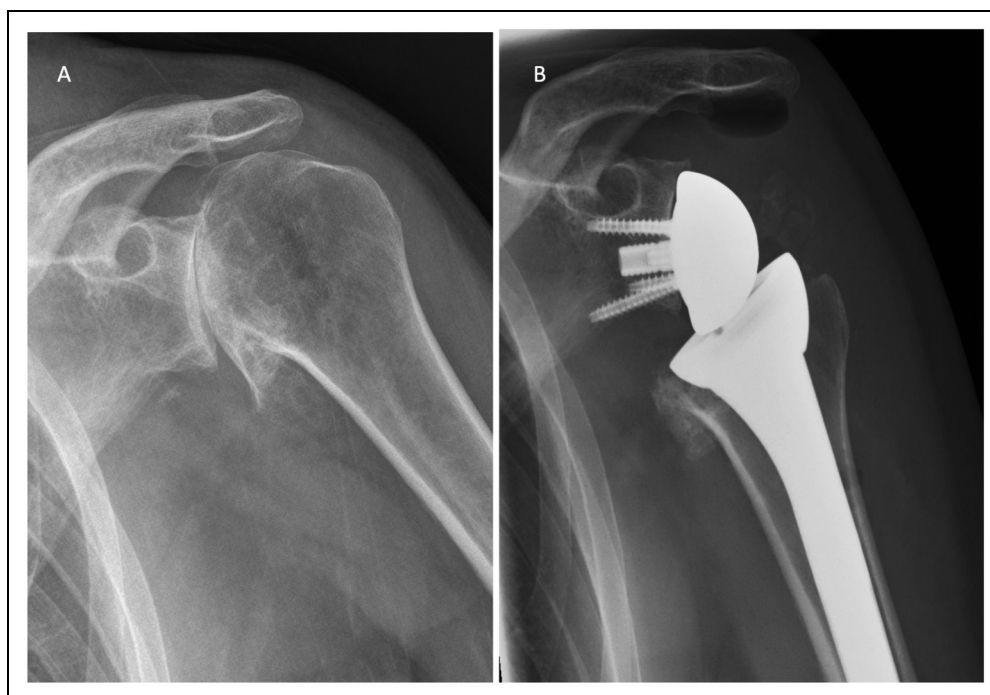


Figure 2. A. Preoperative left shoulder anteroposterior radiograph showing prominent inferior osteophyte and end-stage osteoarthritis. B. Postoperative left shoulder anteroposterior radiograph showing Delta Xtend™ reverse shoulder system (De Puy Synthes), inferior osteophyte can still be noticed.

Discussion

The indications for RSA have been expanding, not only for treatment of rotator cuff arthropathy but also in fracture, glenoid bone defects and inflammatory arthropathy among others. An increase in the number of cases have shown a proportional rise in the rate of complications and reoperations,¹ this also have led to the emerge of different types

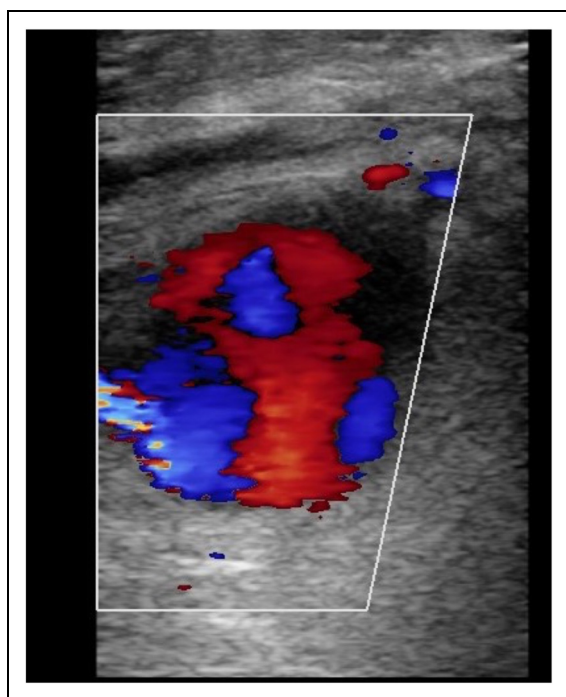


Figure 3. Doppler ultrasound of brachial artery showing yin yang sign compatible with pseudoaneurysm.

of complications that were not seen before. In the current case report, we present an uncommon complication which is rarely described in the shoulder literature.

A pseudoaneurysm is a pulsatile hematoma due to bleeding into the surrounding soft tissue with fibrous encapsulation and persistent communication between the disrupted vessel and the hematoma without normal arterial wall components. The brachial artery is superficial and covered anteriorly only by skin and fascia with two exceptions: the first at the cubital fossa and the second is when the median nerve crosses the brachial artery near the distal attachment of the coracobrachialis.¹⁰ The risks for pseudoaneurysm formation include fracture, osteochondroma, joint dislocation, orthopedic procedures with implants, penetrating or blunt trauma, and other medical conditions such as congenital disorders, infection or inflammatory processes.¹¹ In this regard, a RSA as a surgical procedure itself can be aggressive to the surrounding structures, in this case due to overstretching at the moment of the glenoid preparation the vessels could be damaged, however, the area where the retractors are placed work as a protection of the axillary artery. In our case, the compromise was more distal at the start of the brachial artery which would likely not be related with the retractor positioning.

Pseudoaneurysms have been described in 0.1% of cases after hip and knee replacement as acute complication of the procedure due to drill, pin insertion, screw placement or traction.⁷ Consequently, pseudoaneurysm can also be seen after shoulder replacement surgery.

Miwa et al. described the hypothesis of repetitive contact between the humeral component and the artery and/or chronic traction of the blood vessel because of the change on the center of rotation of the humerus after RSA.⁷ In the present case, there is no evidence for direct contact

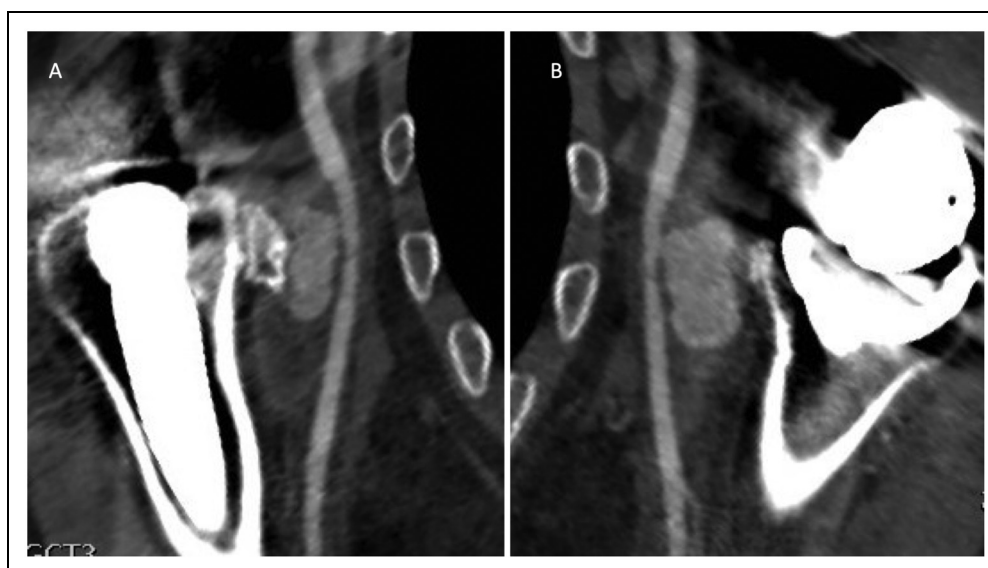


Figure 4. A-B. Two CT angiogram cuts presenting pseudoaneurysm next to proximal humeral osteophyte.

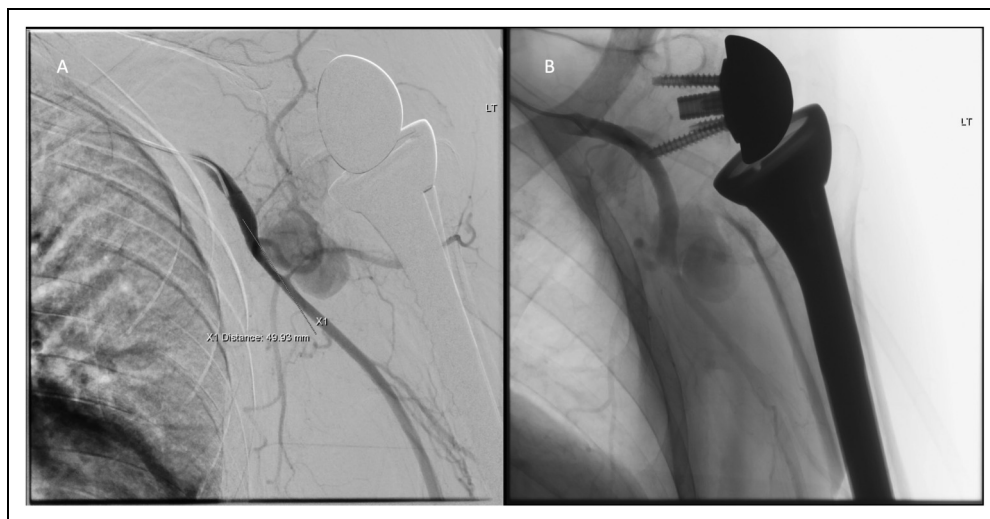


Figure 5. A-B. Digital subtraction angiography of the left subclavian and axillary artery.

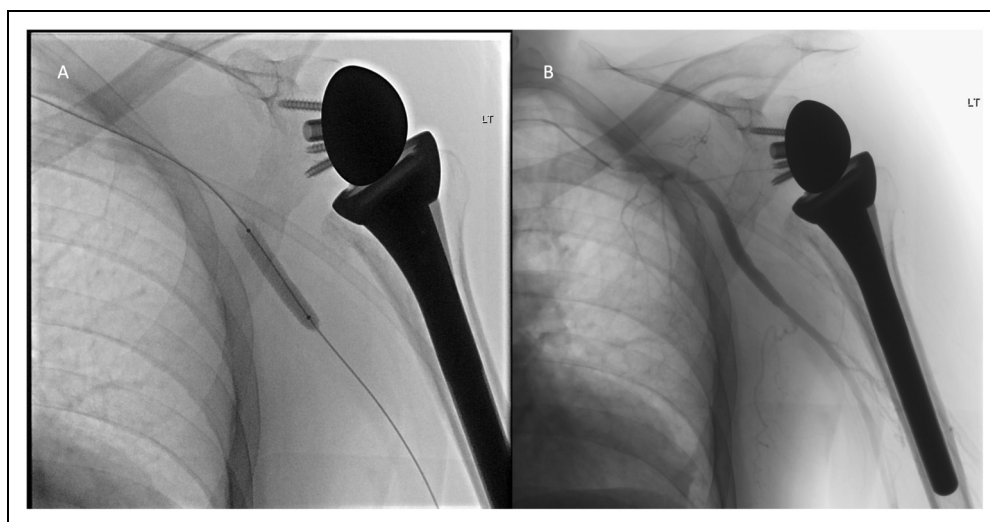


Figure 6. A. Successful implantation of Gore Viabahn 8 mm x 5 cm covered stent post dilated to 7mm with an angioplasty balloon. B. Adequate arterial perfusion post stent placement.

between humeral component and brachial artery on CT arthrogram, however we cannot deny the possibility of friction with the implant during postoperative shoulder motion, this could be also related with the unrepaired subscapularis that was performed to improve the patient's lack of external rotation after the previous surgical procedure. Furthermore, the presence of a big inferior osteophyte that was not removed during the surgical procedure might also produce friction with the brachial artery possibly causing this complication. Similarly, a relationship may exist with age related loss of arterial elasticity reported in more than 90% of the cases in people of 50 years old or older.⁴

Another hypothesis is that the pseudoaneurysm was present from his remote shoulder instability. The patient has a history of recurrent shoulder dislocation in his

youth. Moreover, he had a previous surgical procedure (Putti Platt) that restricted external rotation of the shoulder. The initial operation could have caused a traumatic pseudoaneurysm which was quiescent and non-symptomatic due to restricted mobility of the shoulder. Wright et al. presented a delayed diagnosis of pseudoaneurysm in an 82-year-old woman 9 years after RSA.⁸ Unfortunately, such a rare complication can be misdiagnosed as a hematoma which is described as a frequent complication after RSA in the literature^{1,2}

Finally, there is a hypothesis that the chosen RSA implant design may have played a role on the development of the pseudoaneurysm. The original decision was to place the 27mm metaglene in the inferior border of the glenoid face having a 7.5 mm of inferior glenosphere overhang in

a 42 mm implant to prevent any scapular notching, possible impingement was evaluated and not identified after the implants were positioned. Humeral height was maintained, the inlay design contributed to prevent deltoid and vessels overstretching, and medialized the humerus to avoid possible impingement with the coracoid or acromion. It is unknown if a lateralized glenosphere would have prevented this complication.

Conclusion

Pseudoaneurysm after shoulder arthroplasty should be acknowledged as an uncommon but possible complication. This case, as well as previously reported ones, should alert surgeons to suspect this condition when a patient presents postoperatively with a sudden hematoma. With the increased use of RSA, the surgeon should entertain unusual complications that require proper diagnosis and prompt management.

Informed consent

The patient signed the proper consent form approval.

Declaration of Conflicting Interests

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