

Pseudoaneurysm - A Late and Rare Occurrence Following Shoulder Arthroscopy

Ankitha Devaraj¹, Mohamed Elsakka², Daoud Makki³, Muhammad Zamir², Vivek Dubey³

Learning Point of the Article:

Pseudoaneurysms can be a late complication following shoulder arthroscopy.

Abstract

Introduction: The incidence of vascular injuries from arthroscopic surgeries has been reported to be 0.005%. Pseudoaneurysms account for 11% of those injuries.

Case Report: In this case report, we discuss a 76-year-old female who presented with a pulsatile swelling in the right shoulder after 10 years following arthroscopic rotator cuff repair. Imaging confirmed the diagnosis of a posterior circumflex artery pseudoaneurysm. The patient was successfully embolised using a transradial approach with thrombosis of the pseudoaneurysm.

Conclusion: Vascular injuries following arthroscopic shoulder surgery are rare. However, a pseudoaneurysm should be considered in patients who present with swelling at the surgical site, regardless of the post-operative interval.

Keywords: Vascular injury, arthroscopy, circumflex artery pseudoaneurysm, embolisation.

Introduction

Arthroscopic surgery is the gold standard for the treatment of many orthopedic conditions [1, 2]. It is used in the diagnosis and treatment of intra-articular disorders of major joints, such as impingement, instability, and osteochondral lesions. Evidence-based benefits include lower morbidity, shorter admissions, and early recovery. It is usually a safe procedure; however, it does not come without risks. Arthroscopies are performed in restricted spaces adjacent to neurovascular bundles, with an obvious risk of injury to these structures [3].

In this article, we discuss a 76-year-old lady who developed a circumflex humeral artery pseudoaneurysm a decade after her shoulder arthroscopy. Post-operative pseudoaneurysm formation is recognized in the lower limb; however, only a few

cases have been recorded following shoulder arthroscopy [1, 4, 5, 6]. Our review of the literature confirms that pseudoaneurysms of the circumflex humeral artery have not been reported yet.

Case Report

A 76-year-old female patient presented to her general practitioner with pulsatile posterior right shoulder swelling for 2 months. She had a history of osteoarthritis but was otherwise fit and well and not taking any medication. An ultrasound scan (US) in the community demonstrated a 23 mm hypoechoic lesion in the right deltoid region with flow on color imaging. The patient was referred to the local Vascular Surgical Team, who advised an angiographic computed tomography (CT) scan, which demonstrated a 23 × 15 mm pseudoaneurysm arising

Access this article online

Website:
www.jocr.co.in

DOI:
<https://doi.org/10.13107/jocr.2023.v13.i07.3756>

Author's Photo Gallery



Dr. Ankitha Devaraj



Dr. Mohamed Elsakka



Dr. Daoud Makki



Dr. Muhammad Zamir



Dr. Vivek Dubey

¹Department of Acute Medicine, Watford General Hospital, West Hertfordshire NHS Trust, Watford, Hertfordshire, UK,

²Department of Radiology, Watford General Hospital, West Hertfordshire NHS Trust, Watford, Hertfordshire, UK,

³Department of Trauma and Orthopaedics, Watford General Hospital, West Hertfordshire NHS Trust, Watford, Hertfordshire, UK.

Address of Correspondence:

Dr. Ankitha Devaraj,

Department of Acute Medicine, Watford General Hospital, West Hertfordshire NHS Trust, Watford, Hertfordshire, UK.

E-mail: ankitha.devaraj1@nhs.net

Submitted: 02/04/2023; Review: 28/05/2023; Accepted: June 2023; Published: July 2023

DOI: <https://doi.org/10.13107/jocr.2023.v13.i07.3756>

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 License <https://creativecommons.org/licenses/by-nc-sa/4.0/>, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms



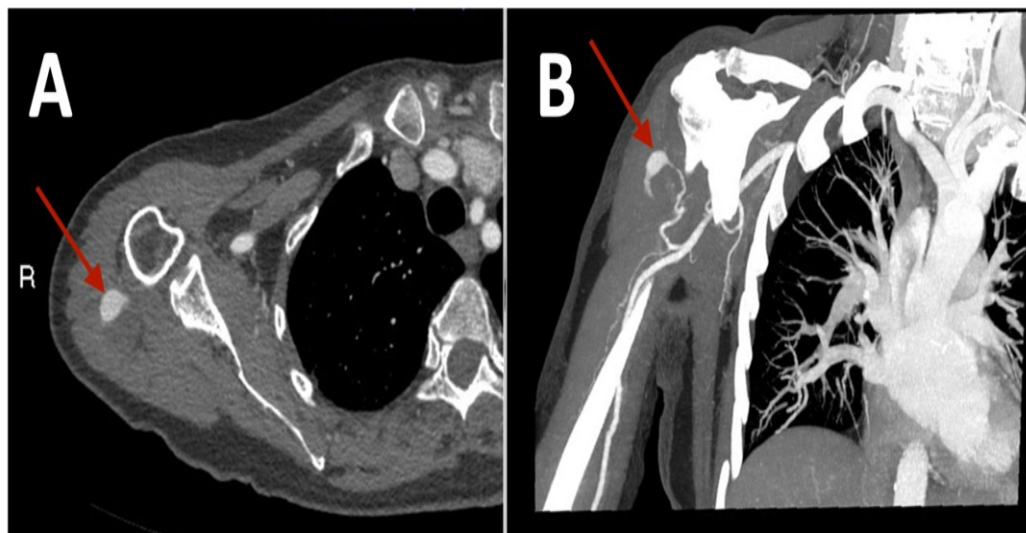


Figure 1: Computed tomography arterial angiography of the upper limb showing a pseudoaneurysm (23 mm × 15 mm) (arrow) deep to the right deltoid muscle arising from the posterior humeral circumflex artery associated with a small haematoma (32 mm × 25 mm). (a): Axial view. (b): Coronal view.

from the circumflex humeral artery (Fig. 1).

Clinical history revealed that the patient suffered from right-sided subacromial impingement and a partial supraspinatus tendon tear 15 years ago. The patient underwent arthroscopic subacromial decompression and rotator cuff repair 12 years ago.

She had an arthroscopic procedure combined with a mini-open approach, with the incision placed on the anterolateral aspect of the shoulder, 4 cm below the lateral edge of the acromion. The rotator cuff repair was carried out using one anchor in a single-row.

Given that the patient had symptoms for a long time and the findings were of a partial tear involving more than 50% of the thickness of the tendon with a good quality margin, the decision was made to repair the tear. She was then followed up immediately and for 3 months after the procedure. She had

experienced intermittent shoulder pain between these consultations but continued to have a good range of movements, specifically abduction at 160°. She was discharged from the clinic, given the satisfactory clinical outcome. The patient denied a history of trauma or any procedure, including injections to her right shoulder, in the decade preceding her presentation with swelling.

The case was discussed at the multidisciplinary team meeting and referred to the interventional radiology

team for catheter angiography and embolization. The right radial artery was accessed with a 5-French introducer sheath (Radiofocus® Transradial Kit, Terumo Corporation). Digital subtraction angiography of the axillary artery confirmed the presence of a pseudoaneurysm arising from the posterior circumflex humeral artery with no demonstrable outflow vessel (Fig. 2). The inflow vessel was cannulated with a microcatheter (0.021" J-tip Direxion™, Boston Scientific) and embolized with a selection of 3 mm and 4 mm coils (Nester®, Cook Medical) with satisfactory occlusion on the post-procedural angiogram and no immediate post-procedural complications.

A duplex ultrasound performed 12 months after the embolization confirmed thrombosis of the pseudoaneurysm (Fig. 3) and patent right axillary, brachial, and radial with

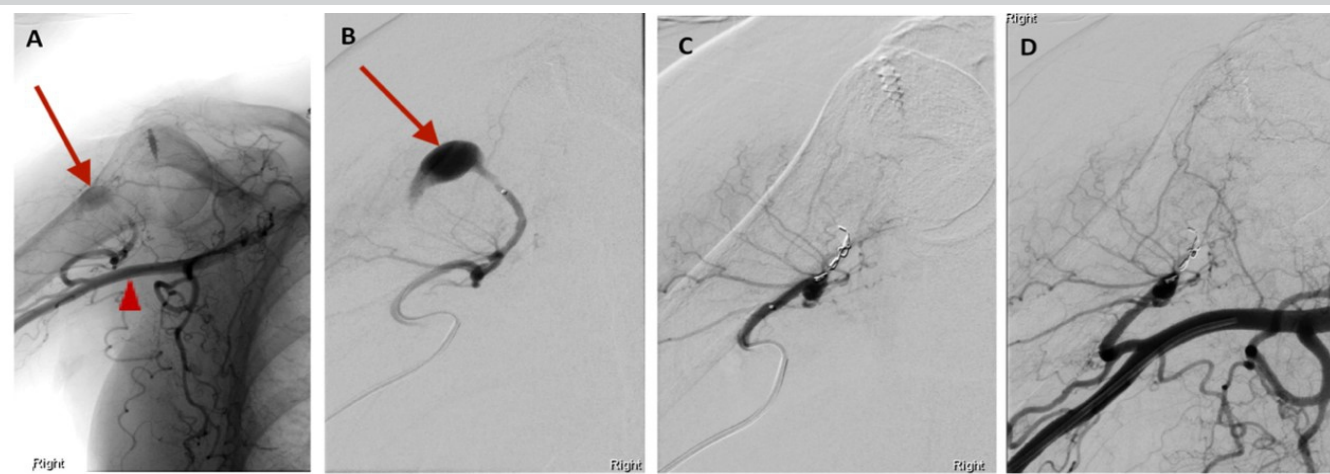


Figure 2: Digital subtraction angiograms demonstrating embolisation of the right pseudoaneurysm. (a) Angiogram demonstrating posterior circumflex aneurysm (arrow) in relation to the axillary artery (arrowhead). (b) Magnified angiographic image illustrating the inflow to the pseudoaneurysm. (c) Embolisation coils demonstrated in the inflow vessel of the pseudoaneurysm. (d) Angiogram demonstrating thrombosis of pseudoaneurysm.

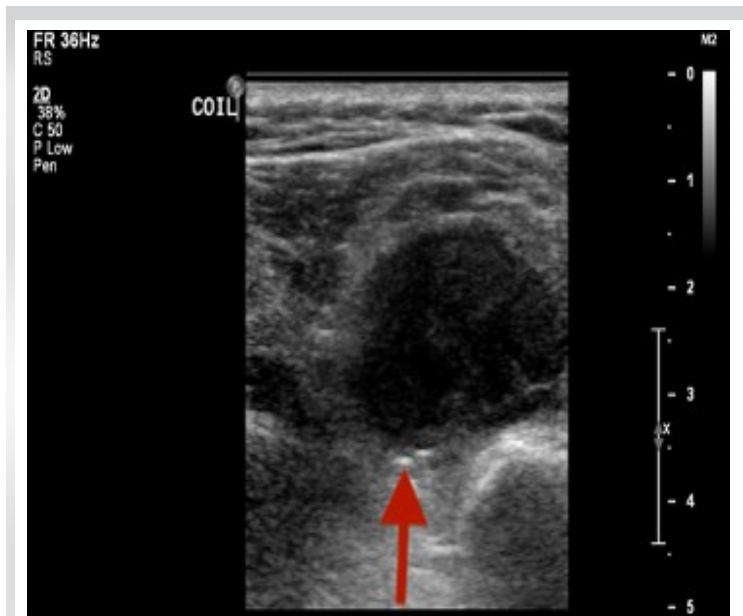


Figure 3: Ultrasound scan demonstrates thrombosis of the pseudoaneurysm and coils within the inflow vessel (arrow).

satisfactory flow.

Discussion

The arterial wall is made of three concentric layers: the tunica adventitia, media, and intima, from outer to inner, respectively. A true aneurysm is dilation, which involves all three layers. Conversely, a pseudoaneurysm is a defect that is bounded only by the adventitia or adjacent perivascular tissue, forming an extravascular hematoma [4, 6]. Pseudoaneurysms have the potential to expand and rupture, which can result in life-threatening bleeding [7].

Pseudoaneurysm formation is a known complication of knee and ankle arthroscopy. However, pseudoaneurysms of the circumflex artery following shoulder arthroscopy have not been previously reported. There is a 5.8% to 9.5% incidence of complications in arthroscopic shoulder surgery, as reported by Weber et al. This is supported by Brislin et al., who identified similar rates of 4.8–10.6% [1].

Based on existing literature, shoulder arthroscopy poses a comparatively higher risk of injury to the cephalic vein and thoracoacromial artery [1]. The literature on arterial pseudoaneurysms following shoulder arthroscopy is reviewed below (Table 1).

Our case study is unique as the patient presented more than a decade after surgery, whereas those described above presented within weeks to months. Most cases of pseudoaneurysm formation are related to branches of the thoracoacromial artery with injury at the anterior portal site [1, 4], but none have been reported from the posterior circumflex artery or posterior

portals.

Lo et al. from their study on five fresh frozen cadaveric specimens concluded that there was a higher risk to the cephalic vein when placing the 5 o'clock or anterior port as compared to a posterior port [8]. Meyer et al. reported similar findings: by placing the 5 o'clock portal, the axillary artery and nerve had a higher risk of injury [9].

In contrast, Yang et al. reported the case of a 49-year-old patient who underwent arthroscopic lysis of adhesions and extensive debridement of the glenohumeral joint 9 months prior to developing a left deep brachial artery pseudoaneurysm. They noticed that the injury sustained was not because of the anterior portal, given the anatomy of the deep brachial artery. Hence, a high suspicion of iatrogenic injury should be kept in mind.

In general, an US can confirm a pseudoaneurysm as it shows the arterial blood flow. The advantages are that the US is quick, cheap, and does not utilize ionizing radiation, although there is a degree of operator dependence. Cross-sectional or catheter angiography is used to identify a pseudoaneurysm [10] with greater objectivity than ultrasound, although it requires the use of intravenous contrast and involves ionizing radiation. Both ultrasound and CT angiography are common modes of investigation.

There are several treatment options for pseudoaneurysms, for example, a covered stent, percutaneous thrombin injection, ultrasound-guided compression, transcatheter embolization, and surgical ligation [4, 10]. Cameron et al. reported a venous pseudoaneurysm at the anterior portal site, which was managed by surgical excision [1, 4, 10].

As upper limb pseudoaneurysms are rare, there is no consensus on the preferred management. The treatment option should be tailored to the individual based on their co-morbidities and risk of procedural complications. Choo et al. treated their patient with a less invasive procedure, notably thrombin injection with transcatheter embolization, as the patient suffered from cardiac disease and coagulopathy. This technique has a success rate of 93–100% [1].

To our knowledge, our case is the first to use a transradial approach to embolize an upper limb aneurysm. A transradial approach is commonly utilized in coronary angiography, with multiple studies reporting reduced procedure-related complications and shorter hospital stays [11]. If there is a delay in the diagnosis and management of a pseudoaneurysm, there is a risk of pain, limb ischemia, and amputation.

Our case is quite unique compared to previously reported cases given the considerable length of time from surgery to diagnosis and treatment of the pseudoaneurysm. Additionally, this is the

Literature	Presentation	Diagnosis	Investigations	Treatment
Choo et al. [8]	3 cm swelling related to the anterior port site 10-21 days post-surgery	Pseudoaneurysm of the deltoid branch of the thoraco-acromial artery	US Doppler, CT angiogram, and conventional angiography	Direct arterial puncture (thrombin and coil embolisation)
Godin et al. [6]	Swelling over the anterior port site 6 weeks post-surgery	2.1 cm pseudoaneurysm of acromial branch of the thoraco-acromial artery	CT angiography	Transfemoral arterial puncture (coil embolisation)
Webb and Elliott [9]	Swelling over anterior portal site during follow up	2 cm pseudoaneurysm of a branch of the axillary artery	US Doppler	Coil embolisation of the pseudoaneurysm
Ishida et al. [2]	Swelling over the anterior port site within 4 weeks post-surgery	2 cm pseudoaneurysm of acromial branch of the thoraco-acromial artery	MRI, US Doppler	Surgical excision and ligation of feeding artery
Yang et al. [1]	Shoulder swelling after 9 months	Pseudoaneurysm of the profunda brachial artery	CT and conventional angiography	Transfemoral arterial puncture (coil embolisation)

CT: Computed tomography, MRI: Magnetic resonance imaging

Table 1: Literature review of post shoulder arthroscopy arterial pseudoaneurysm formation.

first reported case of a pseudoaneurysm in the posterior humeral circumflex artery.

Conclusion

Vascular injury is an uncommon complication following shoulder arthroscopy. However, a pseudoaneurysm should be considered in patients who present with swelling at the surgical site, regardless of the post-operative period. Prompt recognition and early intervention with a multidisciplinary approach can prevent rupture and associated morbidity.

Clinical Message

1. As pseudoaneurysms are quite uncommon, there is often an incorrect or delayed diagnosis
2. When suspected, prompt diagnosis and treatment are warranted, with a referral to a vascular surgeon or interventional radiologist
3. Treatment plans need to be discussed as part of a multidisciplinary team to optimize the outcome.

Declaration of patient consent: The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given the consent for his/ her images and other clinical information to be reported in the journal. The patient understands that his/ her names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

Conflict of interest: Nil **Source of support:** None

References

1. Yang AE, Hall JM, Vincent GS, Chambers L. Deep brachial artery pseudoaneurysm following arthroscopic shoulder debridement. *Vasc Endovascular Surg* 2018;52:378-81.
2. Ishida Y, Chosa E, Taniguchi N. Pseudoaneurysm as a complication of shoulder arthroscopy. *Knee Surg Sports Traumatol Arthrosc* 2015;23:1549-51.
3. Vaishya R. The rise of shoulder arthroscopy. *J Clin Orthop Trauma* 2019;10:221.
4. dos Santos TF, e Dinato MC. Vascular complication after an anterior ankle arthroscopy case report. *Sci J Foot Ankle* 2019;13:87-90.
5. Audenaert E, Vuylsteke M, Lissens P, Verhelst M, Verdonk



- R. Pseudoaneurysm complicating knee arthroscopy. A case report. *Acta Orthop Belg* 2003;69:382-4.
6. Godin JA, Mayer SW, Garrigues GE, Mather RC 3rd. Pseudoaneurysm after shoulder arthroscopy. *J Shoulder Elbow Surg* 2013;22:e12-7.
7. Brimmo O, Parekh S. Pseudoaneurysm as a complication of ankle arthroscopy. *Indian J Orthop* 2019;43:6-16.
8. Choo HJ, Kim JH, Kim DG. Arterial pseudoaneurysm at the arthroscopic portal site as a complication after arthroscopic rotator cuff surgery: A case report. *J Shoulder Elbow Surg* 2013;22:e15-9.
9. Webb BG, Elliott MP. Pseudoaneurysm after arthroscopic subacromial decompression and distal clavicle excision.

Orthopedics 2014;37:e596-9.

10. Lo IK, Lind CC, Burkhart SS. Glenohumeral arthroscopy portals established using an outside-in technique: Neurovascular anatomy at risk. *Arthroscopy* 2004;20:596-602.
11. Meyer M, Graveleau N, Hardy P, Landreau P. Anatomic risks of shoulder arthroscopy portals: Anatomic cadaveric study of 12 portals. *Arthroscopy* 2007;23:529-36.
12. Tewari S, Sharma N, Kapoor A, Syal SK, Kumar S, Garg N, et al. Comparison of transradial and transfemoral artery approach for percutaneous coronary angiography and angioplasty: A retrospective seven-year experience from a North Indian center. *Indian Heart J* 2013;65:378-87.

Conflict of Interest: Nil

Source of Support: Nil

Consent: The authors confirm that informed consent was obtained from the patient for publication of this case report

How to Cite this Article

Devaraj A, Elsakka M, Makki D, Zamir M, Dubey V. Pseudoaneurysm - A Late and Rare Occurrence Following Shoulder Arthroscopy. *Journal of Orthopaedic Case Reports* 2023 July;13(7):65-69.

