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## Introduction

Pseudoaneurysm, also known as false aneurysm, occurs when there is a localised extravasation of blood from the arterial wall and is confined by a pseudocapsule. There is an increasing trend in cases of iatrogenic pseudoaneurysms due to the increase rates of endovascular procedures. Open surgical repair used to be the mainstay of treatment, however it has since been replaced by less invasive approaches such as ultrasound-guided compression and endovascular techniques such as stenting and embolization.

## Materials and methods

We conducted a retrospective review from 2019 until 2021 on cases of iatrogenic pseudoaneurysms that were referred to our Vascular Unit for our expert management. Medical records of patients who presented with iatrogenic pseudoaneurysms were reviewed.

## Results

We managed a total of 7 cases of iatrogenic pseudoaneurysms. Majority of our patients were male (85%) whereby the eldest patient was 55 years old and the youngest patient being only 14 years old. The commonest site of pseudoaneurysms was femoral artery (42%) followed by brachial artery (28%), inferior thyroid artery (15%) and carotid artery (15%). Treatment given ranged from non-invasive methods such as observation and ultrasound guided compression, to less invasive approaches such as endovascular embolization and stent deployment, and finally, via open surgical repair. Successful treatment was confirmed by radiological imaging and patients were observed closely for post-procedural complications until discharge. Five patients (70%) were discharged well while another two patients (30%) succumbed to non-vascular disease related death.



Figure 1: Presence of brachial artery pseudoaneurysm whereby the defect was repaired primarily

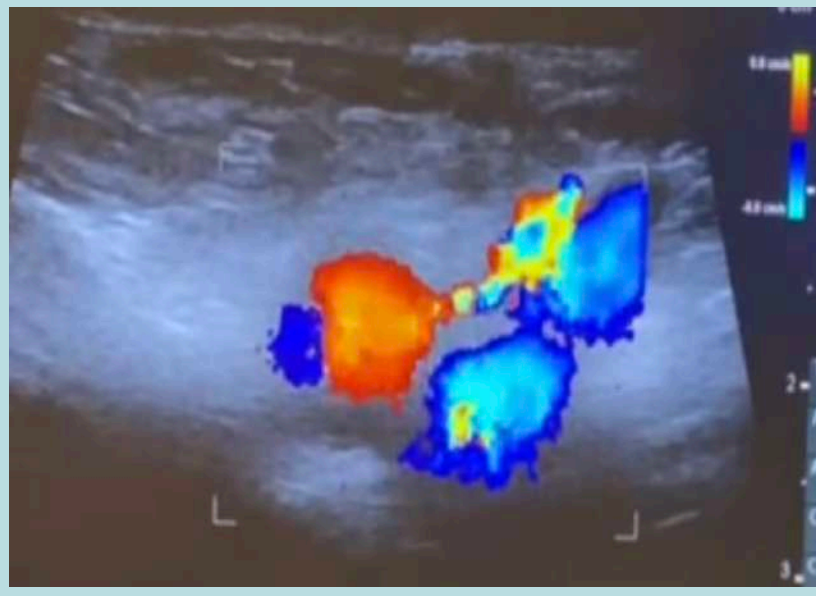


Figure 2: Femoral artery pseudoaneurysm that occurred post catheterization for a cardiac angiogram.

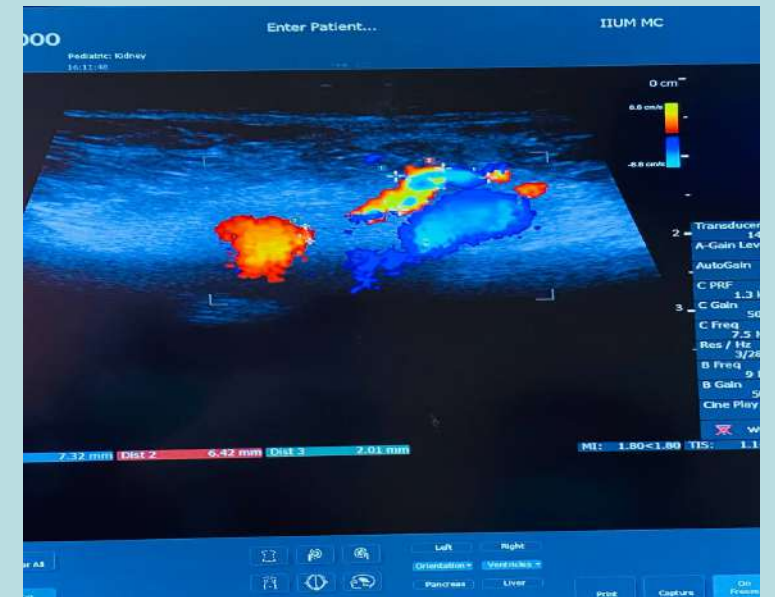


Figure 3: Ultrasound guided compression was done for the femoral artery pseudoaneurysm, obliterating the neck of the defect

## Discussion

Pseudoaneurysms (PSA) can occur due to various causes, which can be categorised into acquired, iatrogenic and spontaneous. Acquired causes include blunt or penetrating injuries from trauma, repeated drug abuse via intravenous route, and bacterial seedling. Patients with vasculitis could present with spontaneous aneurysm. The most common site of iatrogenic pseudoaneurysm is the femoral artery. It is the most common complication of femoral access following diagnostic or therapeutic cardiac and peripheral angiographic procedures.<sup>1</sup> Incidence of pseudoaneurysm at 0.2% to 0.5% following diagnostic procedures and up to 8% following procedures with an intervention.<sup>2</sup> Patients would normally present with pain or swelling in the affected region after catheterization. The pain would be severe, out of proportion as compared to a normal post-procedure discomfort. In severe cases, pseudoaneurysms can be large to cause compression to nearby structures causing neuropathy, others can present with profuse active bleeding, due to rupture, or localised forming a hematoma that can be infected. Rarely, a patient may come with an acute limb, secondary to distal embolization from the pseudoaneurysm. A duplex ultrasound offers confirmation of the pseudoaneurysm and the size including the neck. Most patients will benefit from a CTA which will allow accurate assessment of the vascular anatomy in relation to the pseudoaneurysm in preparation for any intervention. For pseudoaneurysms less than 2 cm, we can offer observation. In a study by Toursarkissian et. al, spontaneous thrombosis occurred in 72 of 82 patients with PSA <3 cm at a mean of 23 days.<sup>3</sup> Rate of thrombosis reduces with double antiplatelet as the study noted a 9% failure rate with no antiplatelet therapy compared with 44% on dual antiplatelet therapy.<sup>4</sup> Another option would be ultrasound guided compression, whereby the neck of the pseudoaneurysm is identified and probe is used to compress the track. The probe is held for cycles of 10 minutes, requiring an average of 37 minutes to achieve thrombosis.<sup>5</sup> This method was successful in one of our patients. Ultrasound guided thrombin injection serves as the other option however it proposes risks of infection and distal embolization. Endovascular approach has two main interventions which are embolization and stenting. Embolization is done in arteries that can be sacrificed, no collateral supply by using coils, detachable balloons or N-butyl 2-cyanoacrylate. One of our patients had an iatrogenic pseudoaneurysm of the inferior thyroid artery, whereby embolization was done with coils. Surgical repair plays a major role in iatrogenic pseudoaneurysms. Several indications dictate the necessity of a surgical repair such as an infected PSA, rapid expansion, failure of non-surgical technique, large aneurysms with skin necrosis and patients who present with an acute limb ischaemia. Two of our patients presented with brachial and femoral artery PSA whereby we performed a primary repair after aneurysmectomy. Other surgical options include repair with a vein patch and placement of interposition grafts.

## Conclusion

Iatrogenic pseudoaneurysms can be managed by non-invasive approaches such as observation and ultrasound guided compression. Failure of non-invasive methods require more invasive approach such as endovascular technique or open surgical repair. Iatrogenic pseudoaneurysms should be dealt with urgency as they can lead to devastating complications such as bleeding, infection and compression to vital structures.

## Reference

1. Webber GW, Jang J, Gustavson S, Olin JW. Contemporary management of postcatheterization pseudoaneurysms. *Circulation*. 2007;115(20):2666–2674.
2. Schneider C, Malisius R, Küchler R, et al. A prospective study on ultrasound-guided percutaneous thrombin injection for treatment of iatrogenic post-catheterisation femoral pseudoaneurysms. *Int J Cardiol*. 2009;131(3):356–361.
3. Toursarkissian B, Allen BT, Petrinc D, Thompson RW, Rubin BG, Reilly JM, Anderson CB, Flye MW, Sicard GA, Sullivan TM. Spontaneous closure of selected iatrogenic pseudoaneurysms and arteriovenous fistulae. *J Vasc Surg*. 1997; 25: 803–809.
4. Coughlin BF, Paushter DM. Peripheral pseudoaneurysms: evaluation with duplex US. *Radiology*. 1988; 168: 339–342.
5. Eisenberg L, Paulson EK, Kliever MA, Hudson MP, DeLong DM, Carroll BAAJR. Sonographically guided compression repair of pseudoaneurysms: further experience from a single institution. *Am J Roentgenol*. 1999 Dec; 173(6):1567-73.