




Percutaneous endovascular exclusion of radial artery pseudoaneurysm

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Case Report

Abstract

BACKGROUND: Coronary angiography and intervention through transradial approach is becoming default approach because of infrequent local site complications. Although pseudoaneurysm is a well described complication for femoral access, it is extremely rare in transradial access.

CASE REPORT: Our patient was 68-year old female who had presented with pulsatile, painful, and gradually increasing swelling over lower part of right forearm near wrist joint for past 8-weeks following coronary angiography through right radial route. Swelling did not resolve following manual compression. It was diagnosed as pseudoaneurysm arising from right radial artery by duplex ultrasound. It was successfully excluded by deploying 3.5x18mm Graftmaster covered stent (Abott Vascular, USA) through right transbrachial route. Ultrasonography next day revealed partially thrombosed and completely excluded pseudoaneurysm with swelling completely disappearing at 6 weeks with patency maintained at one year.

CONCLUSION: With increasing use of transradial access, more cases of radial pseudoaneurysm are likely to surface which can be prevented following a proper haemostatic protocol. To best of our knowledge, it is first ever report of percutaneous endovascular exclusion using covered stent of radial pseudoaneurysm through transbrachial approach.

Keywords: Angiography; False Aneurysm; Radial Artery; Stent

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Introduction

Transradial route is increasingly being adopted for both diagnostic and therapeutic purpose ever since first reported in 1989 because of inherent advantages like lower vascular complication, faster ambulation, patient preference, and lower morbidity and mortality.¹ Nevertheless, rare complications like spasm, haematoma, perforation, dissection, depigmented scar, and persistent radial artery occlusion have been reported.² Another exceedingly rare reported complication is radial artery pseudoaneurysm (RAPA) whose incidence is 0.009%.^{3,4} Trauma, advanced age, multiple stick, arterial cannulation for invasive hemodynamic monitoring and blood gas sampling, underlying coagulation disorder, ongoing anticoagulation, and improper haemostasis following removal of transradial band (TR band) are few of the predisposing factors for RAPA. Though most of

such cases can be managed conservatively, surgery remains as the gold standard. In cases where conservative approach fails to mitigate the problem and refusal to surgery, percutaneous endovascular exclusion may be a good alternative.

Case Report

A 68-year old female presented with pulsatile swelling over the lower part of right forearm near the wrist joint which was painful and gradually increasing in size for past 8-weeks (Figure 1).

She had undergone coronary artery bypass

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grafting (CABG) along aortic valve replacement 2 months earlier at a private centre for which coronary angiogram was performed preoperatively through right transradial route. She was receiving aspirin-325 mg, warfarin-5 mg, frusemide-40 mg, and rosuvastatin- 20 mg.



Figure 1. Large swelling at radial puncture site

After few days following angiography, small swelling was noted at the radial puncture site for which she consulted her physician. According to her, manual compression was attempted which failed to resolve it. She was advised surgery which she refused as she was already traumatized by her past experience. By the time she visited our hospital, swelling had already progressed. On clinical examination, blood pressure was 112/84 mm Hg in left arm in supine position. Pulse rate was 76/min, regular, normal in volume, with no special character and all pulses were equally palpable. On auscultation, S1 was normal and S2 was normal with aortic click. Her electrocardiogram showed sinus rhythm and chest X-ray postero-anterior view indicated normal cardiac size. Her routine investigation, and biochemistry including international normalized ratio was within the normal range. Transthoracic echocardiogram (TTE) revealed normal systolic function, normal opening and closing of aortic valve prosthesis, and grade II diastolic dysfunction. Duplex ultrasound was performed which confirmed it to be a large pseudoaneurysm arising from right radial artery with a narrow neck (0.18 mm) (Figure 2).



Figure 2. Large pseudoaneurysm arising from the right radial artery having a narrow neck as demonstrated by duplex ultrasound

Haematoma was ruled on the basis of pulsatile

nature and persistent communication of the swelling with the arterial lumen with to and fro flow through its neck. True aneurysm was ruled out on the basis of narrow neck of the swelling.

As manual compression had already failed to resolve the swelling and it had been more than 2 months old, compression using ultrasound probe was not considered, and thrombin injection being unavailable, percutaneous endovascular exclusion was planned after taking her informed consent as she refused any surgery further. 6-F sheath was introduced into right brachial artery antegradely and cocktail containing 200 µg nitroglycerin, 2.5 mg diltiazem, and 5000 IU unfractionated heparin (UH) was administered. Radial angiogram was performed through 6-F Judkins Right (JR) guide catheter (Medtronic Inc, USA) which revealed pseudoaneurysm, its narrow neck and large size (Figure 3A, B). 0.014-inch runthrough wire (Terumo Inc, Japan) was parked into distal branch of radial artery. 3.5x18-mm Graftmaster covered stent (Abott Vascular, USA) was positioned over the neck of pseudoaneurysm (Figure 3C).



Figure 3. Radial artery angiography by 6-F Judkins Right (JR) guide catheter through transbrachial route showing contrast flow into aneurysm through narrow neck (A, B); The covered stent was positioned across the neck of aneurysm (C).

The stent was slowly deployed over one minute time at 14-atm pressure (Figure 4A). Subsequent angiogram demonstrated complete exclusion of pseudoaneurysm without any spillage of contrast into the sac (Figure 4B).



Figure 4. The stent was slowly deployed at 14-atm pressure (A); Subsequent angiogram demonstrated complete exclusion of pseudoaneurysm without any spillage of contrast into the sac (B).

The sheath was removed after 6 hours of keeping the activated clotting time < 180 seconds and replaced by light pressure bandage using dynaplast, which was removed next day. Ultrasonography on the following day revealed partially thrombosed and completely excluded pseudoaneurysm and patent radial artery (Figure 5).

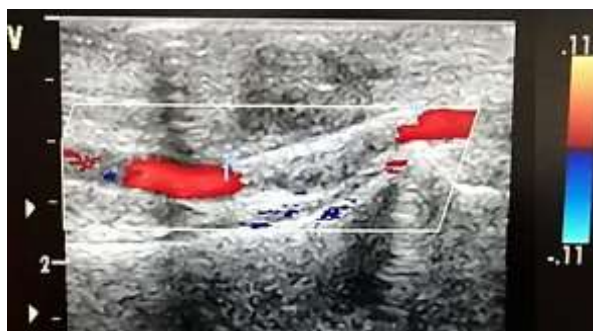


Figure 5. Duplex ultrasonography demonstrating partially thrombosed pseudoaneurysm without any flow

The patient was discharged in stable condition with appropriate advice. In the 6-week follow up, the swelling had completely normalized (Figure 6). At 1-year follow up, radial artery was patent as Barbeau test was normal.



Figure 6. Completely resolved pseudoaneurysm on follow up at 8-week (red arrow indicating original site of pseudoaneurysm)

Discussion

RAPA is a contained haematoma by surrounding fibrous tissue, thus creating a false sac as a result of puncture through all the three layers of an artery, i.e. intima, media, and adventitia in contrast to true aneurysm which is lined by all three layers of arterial wall. Since it is created by a puncture, it has a narrow neck which connects it to the lumen of underlying artery, thus making it pulsatile. Radial artery is a quite unusual site for RAPA formation as it can be compressed against underlying radial styloid process, but it may happen rarely. We speculate that ongoing anticoagulation using

warfarin and aspirin along with improper early haemostasis might have been responsible for pseudoaneurysm formation. It may lead to complicated nerve injury causing pain and numbness, digital ischaemia as a result of direct mechanical compressive effect, thrombo-embolism, and rupture due to the thin overlying covering unlike true aneurysm, and infection. RAPA can be approached using various strategies such as prolonged manual compression, ultrasound compression using the probe, percutaneous thrombin injection under ultrasound supervision, and surgical repair, which is the gold standard depending on its anatomy, however a standard guideline is lacking because of limited data available. Radial styloid process can be exploited as an advantage to compress an early and small haematoma using either prolonged manual compression using either TR band, or occlusive dressing by dynaplast, but if not properly done (incorrect positioning or inadequate pressure), it may refill after release of pressure through its neck.^{2,5,6} Direct mechanical compression using ultrasound doppler probe may be another option, but it is painful, time consuming, and has potential risk of Iatrogenic tracheal rupture (TR) because of thin overlying covering as reported by Zegri et al.⁷

Percutaneous injection of thrombin under ultrasound surveillance is another option as frequently used to seal femoral artery pseudoaneurysm, however data regarding RAPA is limited and it is not readily available in many centres. Furthermore, pseudoaneurysm needs to be superficially located, and has higher failure rate among patients receiving anticoagulants.^{8,9} Additionally, it can potentially lead to acute thrombosis of radial artery or its distal embolization.⁷ Recently reported use of Onyx™ 18 (Medtronic Inc, USA) by Boumezrag et al. to seal RAPA using microcatheter may be a good option. It is ethylene-vinyl alcohol copolymer liquid embolic system material which has been frequently used to treat various arterio-venous malformations and endoleak.¹⁰

Although surgery remains the gold standard approach for RAPA, it adds further burdens to an already comorbid patient and being most invasive, is the principle reason for refusal by many patients. Another novel approach is percutaneous endovascular exclusion of aneurysmal sac using covered stent by retrograde ipsilateral ulnar access as reported by Tsiafoutis et al.¹¹ Kinking of guide catheter because of acute bend, tortuosity and spasm of ulnar artery may be the potential issues

with ulnar access. In our case, it was antegrade brachial access which potentially negated such issues. Moreover, the patency was maintained in the 1-year follow up. To the best of our knowledge, it is the first ever report of percutaneous endovascular exclusion of radial pseudoaneurysm using antegrade transbrachial approach.

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None.

Conflict of Interests

Authors have no conflict of interests.

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