

Case Report

Post-Traumatic Pseudoaneurysm of Superficial Branch of Radial Artery: A Case Report and Literature Review

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Abstract: Introduction: Pseudoaneurysms develop when all three layers of the artery wall are damaged, which causes blood to extravagate from the vessel and connect with the vessel lumen. Adventitia creates the fake sac's inner lining; over time, the hematoma is replaced by fibrous scar tissue, developing a false aneurysm. The fake aneurysm may grow and invade nearby structures, potentially rupturing later. Upper limb peripheral artery pseudoaneurysms are rare, with only a few case reports described in the literature and the most infrequent location being the radial artery. **Presentation of Case:** A 42-year-old male patient was admitted to our hospital with a chief complaint of pain and an open wound on his left hand after a motorcycle accident. The patient underwent debridement and primary closure for the wound. Eleven days later, the patient returned with a chief complaint of swelling on the injured side with vulnus punctum and bloody discharge at first web. Forearm MRI with contrast revealed a pocket-shaped lesion with internal hi-flow (flow void) in the left volar side associated with the left radial artery. The patient was diagnosed with a rupture of pseudoaneurysm from the left superficial branch of the radial artery and underwent evacuation of pseudoaneurysm and hematoma and ligation of the superficial branch of the radial artery. **Conclusion:** Despite being relatively uncommon, post-traumatic pseudoaneurysm of the superficial branch of the radial artery can put patients in severe danger and discomfort after hand trauma. Both emergency physicians and surgeons should be aware of the risk for pseudoaneurysm if a patient appears with a pulsatile mass following trauma. **Keywords:** Pseudoaneurysm, hand trauma, radial artery, pulsatile mass.

Introduction

Pseudoaneurysms develop when all three layers of the artery wall are damaged, which causes blood to extravagate from the vessel and connect with the vessel lumen. Pseudoaneurysms are blood collections between the arterial wall and the surrounding tissues, with persistent blood flow and communication with the parent artery. They are caused by any etiology that leads to the dissection of all arterial wall layers, such as blunt, penetrating trauma and infections.^{1,2}

Upper limb peripheral artery pseudoaneurysms are rare, with only a few case reports described in the literature and the most infrequent location being the radial artery.¹ Their diagnosis and surgical therapy are crucial because they can cause severe disabilities, including upper extremity and finger loss. Peripheral artery pseudoaneurysms in distal locations, particularly in the brachial artery with localization at the forearm, cause thromboembolic complications in the hands and fingers.³ Upper limb peripheral artery pseudoaneurysms are rare, with only a few case reports described in the literature and the most infrequent location being the radial artery. Therefore, this case report aims to

present a case of 42 years old male who suffered post-traumatic pseudoaneurysms of the radial artery after a motorcycle accident.

Presentation of Case

A 42-year-old male patient was admitted to our hospital with a chief complaint of pain and an open wound in his left hand after a motorcycle accident 2 hours before coming to the hospital. On physical examination, the local status of the left-hand area was swelling with vulnus laceratum at the volar side (size 1x0,5 cm). There was tenderness in the area, the nervus venous distal was normal, and a limited range of motion (ROM) was noted (Figure 1). The patient underwent debridement and primary closure for the wound.



Figure 1. Clinical photo of the patient

Eleven days after the injury, the patient returned to the hospital with a chief complaint of swelling in the left hand on the injured side. On physical examination, the local status of the left-hand area was swelling with vulnus punctum and bloody discharge at first web. Tenderness in the area and limited range of motion (ROM) were noted (Figure 2).



Figure 2. Clinical photo of the patient eleven days after the injury

Forearm MRI with contrast revealed a pocket-shaped lesion with internal hi-flow (flow void) in the left volar side of the hand region and is associated with left radial artery suggestive pseudoaneurysm with mural thrombus (Figure 3).

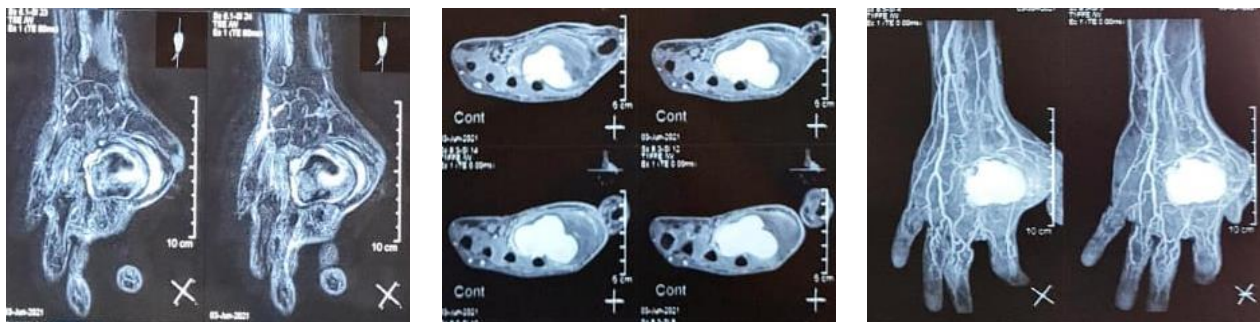


Figure 3. Magnetic Resonance Imaging (MRI) of the patient

The patient was diagnosed with a rupture of pseudoaneurysm from the left superficial branch of the radial artery and underwent evacuation of pseudoaneurysm and hematoma and ligation of the superficial branch of the radial artery (Figure 4).



Figure 4. Intraoperative clinical image

After two weeks postoperatively, the patient had no complaints, the wound on the patient's hand healed well without any signs of infection, and the function of the hand was also found to be expected (Figure 5).



Figure 5. Post-operative clinical image

Discussion

False aneurysms, also known as pseudoaneurysms, develop when all three artery wall layers are damaged and cause blood to extravagate from the vessel and connect with the vessel lumen. Adventitia creates the fake sac's inner lining; over time, the hematoma is replaced by fibrous scar

tissue, developing a false aneurysm, which contrasts with a true aneurysm, which dilates the vessel wall at every layer. The fake aneurysm may grow and invade nearby structures, potentially rupturing later.⁴

A full-thickness tear or laceration of an artery causes pseudoaneurysms to begin. According to histology, only adventitia and no internal elastic lamina are present. The pathogenesis of vascular injuries has been hypothesized to involve injury to all three arterial layers, which produces hematomas, inflammatory responses, and local tissue degradation, all of which later lead to the formation of pseudoaneurysms. Hematomas within the tissues pulse because blood flows into them during systole and out during diastole. The volume of the pseudoaneurysms has increased, and this has an impact on how severe the symptoms are. Neuropathy, venous blockage, and thrombosis can result from the compression of nearby nerve bundles and venous structures. High pressure from the swelling on the skin may induce tissue necrosis. Clinical signs of compartment syndrome may be observed in patients with ruptured pseudoaneurysms into a closed osteo-fascial compartment. The pseudoaneurysm sac may externally compress or pull on nearby nerves, resulting in nerve palsy.⁵

Most traumatic pseudoaneurysms, also known as hammer hand syndrome, are caused by a repetitive microtrauma or penetrating wounds, both of which were recorded in the instance of a baseball player. In the rare cases described in the literature, the symptoms include a painful, pulsatile palmar swelling. Guattani reported the first example of aneurysmal upper extremity disease in a coachman who had repeatedly experienced wrist injuries.⁴ A potentially difficult diagnostic situation is presented by patients who have masses in the palmar area. There are many possible differential diagnoses for palmar masses; thus, it is essential to keep pseudoaneurysm in mind. Foreign body retention and abscess remain at the top of the potential diagnoses in a post-traumatic condition. However, other pathology should be checked, including incision cysts, lipomas, fibromas, and even sarcoma.⁶

Surgery is the best option for giant aneurysms with a high risk of consequences like distal embolization or rupture.^{5,7} The procedure entails the removal of the aneurysm, followed by an end-to-end anastomosis to reestablish blood flow. Distal and proximal ligation and excision of the pseudoaneurysm may be possible if the procedure is for a lesion in a noncritical distal vascular that does not cause significant ischemia or if it is evident that the collateral circulation will be following adequate ligation.⁷ Blood flow should be restored whenever possible, especially in young patients. Recently, superficial palmar arch fake aneurysms have been successfully treated using endovascular procedures such as coil embolization. This minimally invasive technique may be an alternative to open surgery to treat specific lesions.⁸ Compression bandaging is one of the more common therapeutic choices for femoral artery pseudoaneurysms and has been utilized successfully in a few other instances of pseudoaneurysms of the hand.⁶ Delays in treatment result in serious vascular (thrombosis, rupture, and distant emboli) and nerve compression syndrome consequences. If there is no anastomosis network between the radial artery and the superficial palmar arch and there is arterial ulnar pseudoaneurysm thrombosis, vascular problems are more significant. Pseudoaneurysm nerve compression is the cause of neurological problems. As these aneurysms progress, they risk rupturing or can lead to thromboembolic problems with ischemia or hemorrhagic sequelae.⁹

Conclusion

Despite being relatively uncommon, post-traumatic pseudoaneurysm of the superficial branch of the radial artery can put patients in severe danger and discomfort after hand trauma. Both emergency physicians and surgeons should be aware of the risk for pseudoaneurysm if a patient appears with a pulsatile mass following trauma.

Declarations

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References

1. Gonzales SLL, Lopez AM, Arango MV. Post-traumatic pseudoaneurysm of the dorsal division of radial artery. Eurorad. Published online 2022. Retrieved from <https://www.eurorad.org/case/17718>
2. Elens S, Bossu N, Puech P, Ghekiere J, Delcour C, Casselman J. Two rare cases of post-traumatic peripheral artery pseudoaneurysm. J Belgian Soc Radiol. 2016;100(1):1-4.
3. Yetkin U, Gurbuz A. Post-Traumatic Pseudoaneurysm of the Brachial Artery and Its Surgical Treatment. Texas Hear Inst J. 2003;30(4):293-297.
4. Hughes CD, Binette C, Babigian A. Pseudoaneurysm in the hand of a three-year-old boy: a case report. J Emerg Med. 2012;42(4):e87-e89.
5. Belyayev L, Rich NM, McKay P, Nesti L, Wind G. Traumatic ulnar artery pseudoaneurysm following a grenade blast: report of a case. Milit Med. 2015;180(6):e725-7.
6. Shah S, Powell-Brett S, Garnham A. Pseudoaneurysm: an unusual cause of post-traumatic hand swelling. BMJ Case Rep. 2015;2015:bcr2014208750.
7. Toyota S, Inoue K, Kurose S, Yoshino S, Nakayama K, Yamashita S, Morisaki K, Furuyama T, Mori M. True brachial artery aneurysm after arteriovenous fistula closure following renal transplantation: a case report and literature review. Surg Case Rep. 2019;5:188.
8. Schoretsanitis N, Moustafa E, Beropoulis E, Argyriou C, Georgiadis GS, Georgakarakos E. Traumatic Pseudoaneurysm of the Superficial Palmar Arch: A Case Report and Review of the Literature. J Hand Microsurg. 2015;7(1):230-232.
9. Maertens A, Tchoungui Ritz FJ, Poumellec MA, Camuzard O, Balaguer T. Post-traumatic pseudoaneurysm of a superficial branch of the ulnar artery: A case report. Int J Surg Case Rep. 2020;75:317-321.

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