



Pseudoaneurysm discovered during reverse radial forearm flap after a gunshot injury: a case report

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Abstract

Gunshots cause injury on the vascular wall by physical forces and thermal effect. These injuries are minor intimal damage, complete or partial transaction of the vessel, arteriovenous fistula and pseudoaneurysm. In this article we report a pseudoaneurysm case, at a gunshot wound on right hand planned to repair by reverse radial forearm flap for to cover the defect occurred at the ipsilateral dorsum of the right hand, which was suspected on CT angiography but missed out preoperatively and seen in surgery during exploration and repaired.

Key words: Gunshot wound, hand injury, pseudoaneurysm, radial forearm flap

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Introduction

Gunshot injuries to the hand are particularly significant because they limit the hand functions and these injuries cause great morbidity and loss in manpower. They cause fractures, traumatic amputations, infections, nerve and vascular injuries. The rate of vascular trauma in gunshot wounds has been reported at a range of 0,2-6,8%[1]. Approximately 30%-50% of all peripheral vascular traumas involve the upper extremity [2]. Pseudoaneurysm is a contained hematoma caused by loss integrity of the three layers of arterial wall [4]. These injuries should be treated in case they enlarge or become symptomatic, because of the risk of rupture. Treatment may consist of embolization or surgical resection [3]. Some unintentional complications such as severe bleeding or ischemia of involved extremity can occur in neglected or misdiagnosed cases. In this type of injuries, surgeons frequently found some open wounds with fractures and neuro-vascular damages. The optimum goal is a complete repair of the all injured tissues if appropriate, and after an early hand rehabilitation for to get a full functional recovery.

In this case, we aimed to report a pseudoaneurysm case, at a gunshot wound on right hand planned to repair by reverse radial forearm flap for to cover the defect occurred at the ipsilateral dorsum of the right hand, which was suspected on CT angiography but missed out preoperatively and seen in surgery during exploration and repaired.

Case report

A 29 years old man presented to emergency department with a gunshot wound to the dorsal-ulnar side of the right hand (Fig.1a). He was hemodynamically stable. Besides of normal radial and ulnar pulses, an Allen test for vascular integrity of radial and ulnar artery were normal at that extremity. After clinical and radiological examination, we determined fracture with some bone loss (Fig 2a,b) at 4th and 5th metacarpals and extensor tendon injury. Median, radial and ulnar sensorial exams was normal. Under regional anaesthesia we washed the wound by chlorhexidine soapy scrub and saline. We debrided wound and excised all devitalized tissues. Then, we fixed

fractures with K-wires (Fig. 2a,b) . We prescribed a first-generation cephalosporin for five days. After 4 weeks we planned a surgery for to repair tendons, bone defect and to perform a reverse radial forearm flap for dorsal skin defect. At surgery we removed K-wires and used iliac bone graft to repair bone defect of metacarpals also applied mini-plates (Fig. 3a, b). Then we used palmaris longus tendon to strengthen extensor digiti minimi tendon. And finally while we started to exposure radial artery to make a reverse radial forearm flap to coverage of skin defect, we detected an pseudoaneurysm on radial artery (Fig.1c) which we missed out preoperatively because of pellet artefacts on CT angiography (Fig.1b). We excised pseudoaneurysm and performed end to end anastomosis of the radial artery and then we closed the defected region of hand with this reverse radial forearm flap (Fig.1d). After discharged from hospital at follow up 6th months visit, we found a satisfactory results related the hand functions and skin coverage (Fig. 4a-b).

Figure 1.a) Preoperative view of injured hand; b) Preoperative CTA image of radial and ulnar artery of injured hand (Black arrow points out the pseudoaneurysm) ; c) Pseudoaneurysm on radial artery, detected during surgery; d) Postoperative view of hand



Figure 2.a)-b) Postoperative anteroposterior and lateral radiograph of hand after K-wires applied for metacarpal fractures in first surgery. Bone defects at 4th and 5th metacarpals.

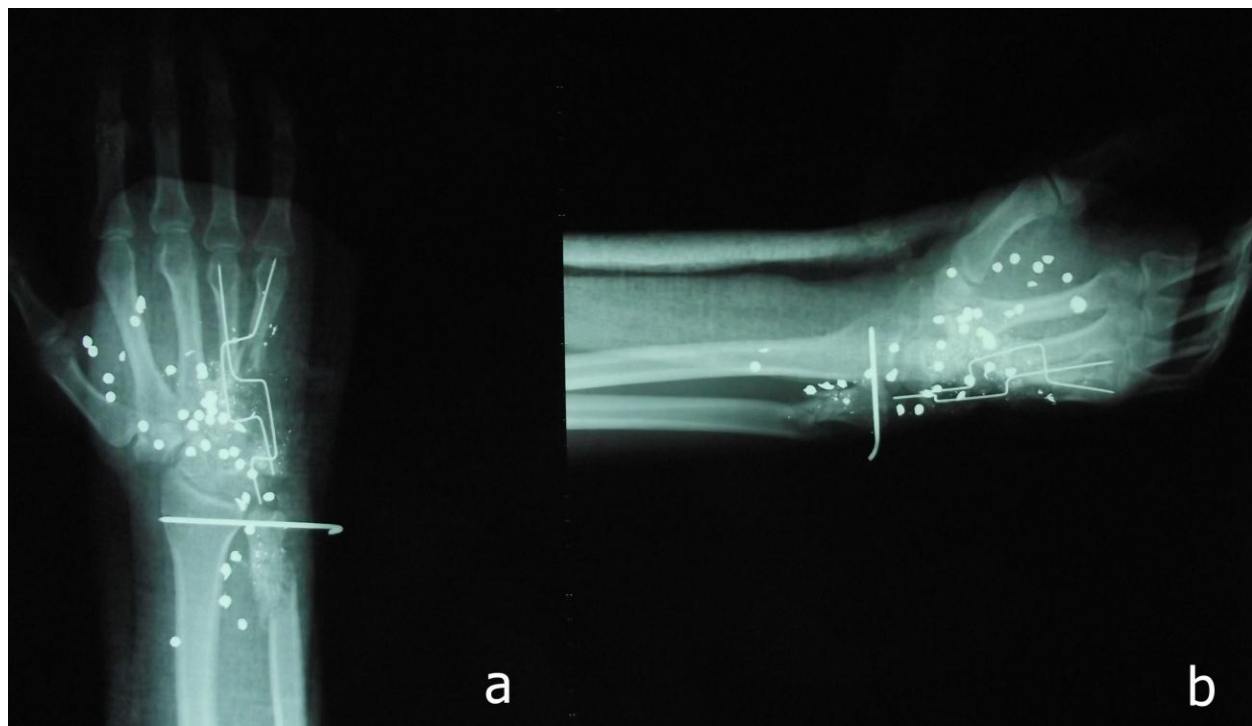


Figure 3.a)-b) Postoperative anteroposterior and lateral radiograph of hand after plate was applied for metacarpal fractures in second surgery.

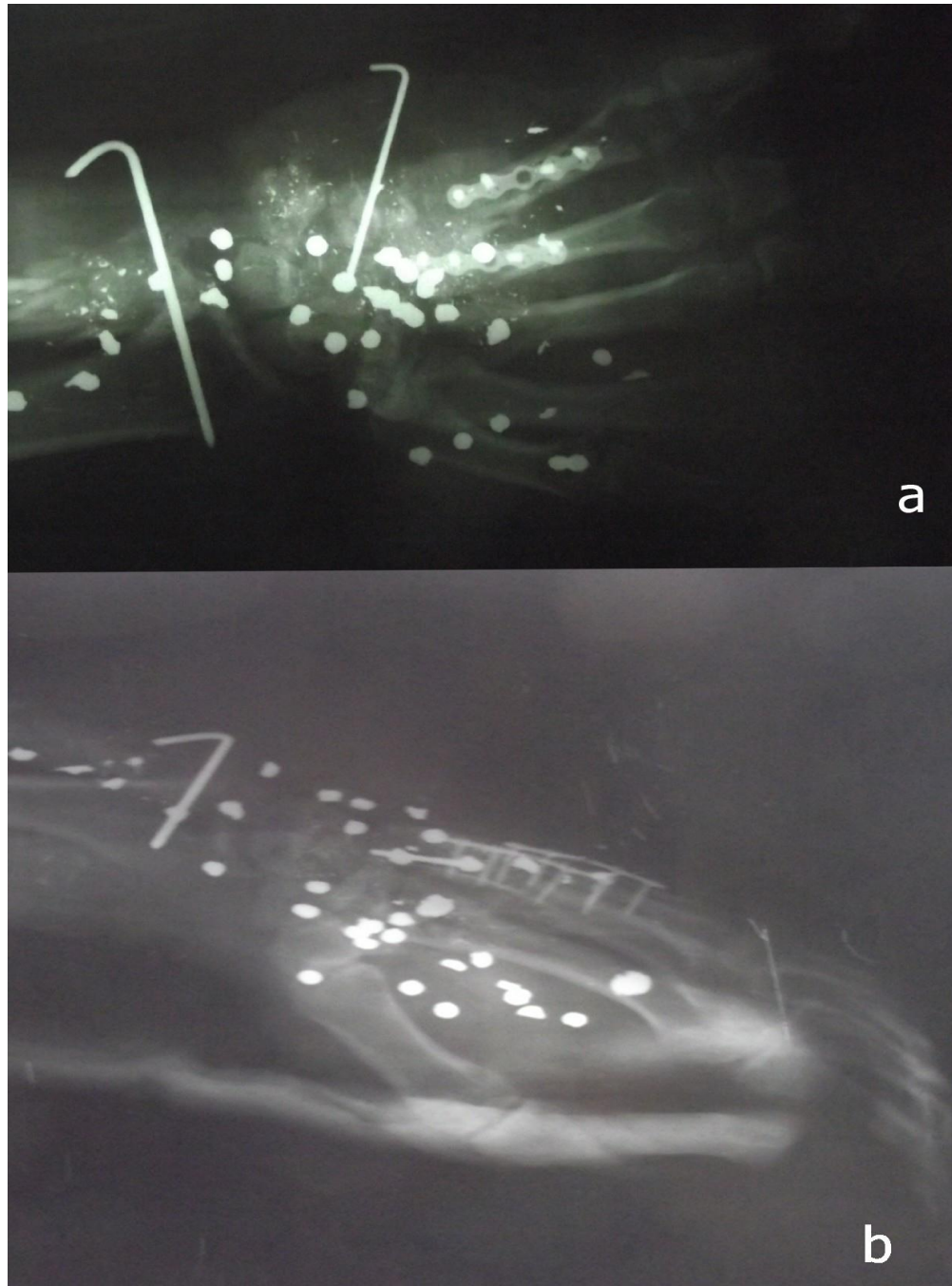


Figure 4.a) Postoperative view of hand and donor site at six months after surgery; b) Postoperative view of reverse radial forearm flap at six months after surgery.



Discussion

Gunshots cause injury on the vascular wall by physical forces and thermal effect. These injuries are minor intimal damage, complete or partial transaction of the vessel, arteriovenous fistula and pseudoaneurysm. Pseudoaneurysm is a contained hematoma caused by loss integrity of the three layers of arterial wall. Imaging modalities in arterial injury are doppler, magnetic resonance angiography, angiography and CT angiography CTA). Angiography was gold standard imaging technique but not anymore because of time consumption and inherent inaccuracies including %15 false negative rate. CTA is now gold standard in vascular injuries [4]. Because it is rapid, accurate and provides additional information such as size of hematoma, periarterial hematoma, bony fragments compression and more details. But CTA studies may result in poor diagnostic quality due to improper technique, to patient factor and to source artefacts [4].

We intended to emphasize that we could have a flap failure because vascular thrombosis or ischemia complications at an early postoperative period, If we could not detect this vascular injury in this case.

Conclusion

We present a pseudoaneurysm discovered during reverse radial forearm flap after a gunshot injury. Despite this presentation is not a new case, we intended to re emphasize the probability of pseudoaneurysm related gunshot injuries. And surgeons must take into account this situation and especially when they are planning a vascularised flap as donor close to the injury region for to avoid early flap failure related this vascular injury.

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References

1. Clouse, W.D., Rasmussen T.E., Eliason P.M.A ,JL, C.M.W., Bowser, A.N., Jenkins, D.H. Smith, D.L., Rich, N.M. In- theather management of vascular injury: 2 years of Balad vascular registry. J. Am Coll Surg . 2007; 204:625-32.
2. Borman KR, Snyder WH III, Weigelt JA. Civilian arterial trauma of upper extremity: An 11 years experience in 267 patients. Am J Surg. 1984; 148:796-9.
3. Van Alphen JC, Niekus HT, Koning J, Jansen WB. False aneurysm of common carotid artery and injury of the brachial plexus due to trauma inflicted by an air gun pellet. J Trauma 1996 Dec;41(6): 1044-6.
4. Fleiter TR, Mervis S. The role of 3D-CTA in the assessment of peripheral vascular lesion in trauma patient. Eu. J Radiol. 2007;64; 92-102.
5. Miller- Thomas MM, West OC, Cohen AM. Diagnosing traumatic arterial injury in the extremities with Ct angiography: pearls and pitfalls, Radiographics. 2005;25 S(1)133-142.