Case Report

Radial artery pseudoaneurysm after a glass cut injury: A rare case report

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ABSTRACT

Pseudoaneurysm of the radial artery secondary to direct penetrating trauma, rather than iatrogenic arterial injury, is rare, with reported incidence figures of 0.048–0.05% for pseudoaneurysm following arterial cannulation; the true incidence of post-traumatic cases remains unknown due to sparse reporting. We report the case of a 22-year-old male who presented with a slowly enlarging, pulsatile swelling over the right lateral aspect of the distal forearm, 1 month after an accidental glass-cut injury sutured at a local clinic. Duplex ultrasonography confirmed a 1.5 × 0.6 cm pseudoaneurysm of the distal right radial artery. He underwent surgical exploration with resection of the pseudoaneurysm and end-to-end arterial reconstruction, confirmed histopathologically. The post-operative course was uneventful, with good distal perfusion at 3 months of follow-up. This case highlights the need for a high index of suspicion for pseudoaneurysm after any forearm laceration presenting with delayed swelling, and supports early surgical repair as the treatment of choice.

Key words: Pseudoaneurysm, Radial artery, Trauma, Vascular repair

A pseudoaneurysm is formed when arterial blood leaks from an artery into the surrounding tissues due to communication between the originating artery and the blood-filled cavity [1]. Subsequently, a fibrin wall forms around the area of swelling, resulting in a false aneurysm [2]. Unlike true arterial aneurysms, a pseudoaneurysm is not bounded by all three layers of the arterial wall. The femoral and radial arteries are the most common peripheral sites. Pseudoaneurysms are most often observed in the groin after coronary artery catheterization but may also occur peripherally after arteriovenous shunting for dialysis, after placement of indwelling catheters, after arterial puncture for blood gas analysis, or after direct trauma, laceration, or puncture to the involved artery [3]. Radial artery pseudoaneurysm is a well-recognised, though uncommon, complication of arterial cannulation, with reported incidence figures of 0.048–0.05% of such procedures [4]. Pseudoaneurysms occurring after direct, non-iatrogenic trauma, such as a glass-cut or knife injury, are considerably rarer, and the literature on this subject is limited to isolated case reports rather than large series, so the true incidence and prevalence of post-traumatic radial artery pseudoaneurysm remain unknown [5]. A delayed, insidious presentation, sometimes weeks to months after a laceration that was thought to have healed uneventfully, is characteristic of this entity and can easily be mistaken for a simple soft-tissue swelling, abscess, or ganglion, leading to diagnostic delay. Because untreated pseudoaneurysms can enlarge, rupture, cause distal ischemia, or compress adjacent nerves, we report this case to highlight the need for a high index of clinical suspicion after seemingly minor forearm lacerations, and to add to the limited existing literature on the presentation, diagnosis, and surgical management of traumatic radial artery pseudoaneurysm.

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CASE REPORT

A 22-year-old male presented with a swelling over the right lateral aspect of the forearm located approximately 4 cm above the wrist joint. The swelling had been growing slowly for 1 month following an accidental glass-cut injury. The patient had undergone primary suturing of the skin laceration at the site of injury at a local clinic on the day of the injury.

Local examination revealed a spherical, smooth, firm, pulsatile swelling over the lateral aspect of the

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distal forearm, at the site of a well-healed longitudinal surgical scar corresponding to the previous laceration (Fig. 1). The swelling was mobile in the horizontal plane but fixed vertically. Radial and ulnar pulses were well felt distally, and there was no clinical evidence of distal ischemia. Duplex ultrasound confirmed a 1.5 cm × 0.6 cm pseudoaneurysm arising from the distal segment of the right radial artery.

Surgical exploration was performed under general anesthesia. The radial artery was approached through the pre-existing longitudinal scar, and dissection was carried out proximal and distal to the pseudoaneurysm to obtain adequate vascular control before the sac was opened; the artery was looped with vessel slings at both ends to allow temporary occlusion and minimise intraoperative bleeding. No tendon or muscle injury was identified on exploration; the surrounding soft tissues were otherwise unremarkable. The pseudoaneurysm sac was excised along with the damaged segment of the arterial wall, and the healthy proximal and distal ends of the radial artery were mobilized sufficiently to permit a tension-free, end-to-end anastomosis, which was completed with interrupted fine non-absorbable sutures under loupe magnification. Restoration of a palpable radial pulse and normal capillary refill in the digits was confirmed before closure. The wound was closed in layers after achieving hemostasis. The excised aneurysm sac was sent for histopathological analysis, and the report confirmed it as a pseudoaneurysm (Fig. 2).

The patient was discharged on the following day and was followed up in the outpatient clinic. The incision healed well without infection or wound complications. Over a follow-up period of 3 months, the patient remained entirely asymptomatic, with a well-healed scar, a palpable radial pulse, and normal distal perfusion, and there was no clinical evidence of recurrence.



Figure 1: Pre-operative view of the 1.5-cm pseudoaneurysm of the distal radial artery

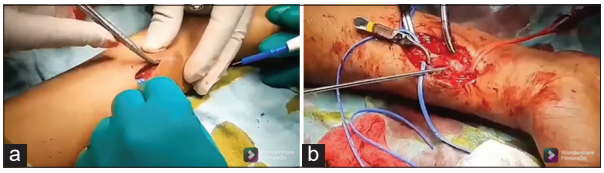


Figure 2: (a) Intraoperative view of the pseudoaneurysm (b) Repair of the distal radial artery

DISCUSSION

A pseudoaneurysm is defined as the outpouching of a blood vessel involving the innermost layers of the vessel wall (intima and media) with an intact outer layer (adventitia), or disruption of all three layers with bleeding contained by a surrounding clot or adjacent structures [4].

Radial artery pseudoaneurysms are very rare in adults, and only a few cases have been reported to date; the true incidence of radial artery pseudoaneurysm following direct trauma therefore remains unknown, although figures of 0.048–0.05% have been reported for pseudoaneurysm following arterial cannulation [5,6]. It most often develops due to penetrating trauma, iatrogenic arterial injury, or infection, and may become clinically apparent hours to months after the inciting injury [7-9].

Comparison with other published reports of traumatic radial artery pseudoaneurysm shows a consistent pattern of delayed presentation after an initially unremarkable wound [10]. Dell'Orfano *et al*. described an adult who developed a 2.5 × 1.5 cm radial artery pseudoaneurysm after wrist trauma, which was managed successfully with a conservative compression bandage rather than surgery [11]. Sarkar *et al*. reported a 20-year-old man with a 1-month-old post-traumatic radial artery pseudoaneurysm at the wrist, treated by resection with vein-graft reconstruction using the vena comitantes of the radial artery [12]. Cibulas *et al*. described a delayed presentation of a gunshot-related radial artery pseudoaneurysm managed by resection with primary end-to-end anastomosis, similar to the approach used in our patient [13]. More recently, Goru *et al*. reported bilateral radial artery aneurysms following trauma, managed by staged surgical resection [14]. Compared with these reports, our patient likewise developed a pseudoaneurysm several weeks after a penetrating (glass-cut) injury that had initially been managed with simple wound suturing, and was successfully treated with resection and primary end-to-end anastomosis without the need for interposition grafting, in keeping with the range of surgical strategies described in the recent literature.

The most common cause of an infected pseudoaneurysm is intravenous drug abuse. Penetrating trauma in the form of stab wounds, industrial injury, firearm discharge, and, occasionally, manipulation during orthopedic surgery are other frequent causes [6]. Pseudoaneurysms of the radial artery secondary to penetrating, and especially blunt, trauma are infrequent, with few reports in the literature [7]. Pseudoaneurysm of the radial artery following cannulation was first reported in 1973 [8]. The risk of pseudoaneurysm formation following arterial puncture is increased in patients with low platelet counts,

sometimes due to inadequate pressure applied after puncture or trauma to the blood vessel. Local infection also increases the incidence of pseudoaneurysm [8].

Surgical vascular repair is the management of choice for pseudoaneurysms; however, the type of surgery and reconstruction varies with the cause and presentation. Controversy remains as to whether to reconstruct vascular continuity in the involved vessel or to simply ligate and excise the involved segment along with the perianeurysmal necrotic tissue. Mohammadzadeh *et al*. have stated that when reconstruction requires the use of a prosthetic graft, graft infection becomes a serious complication [9,15].

In cases where the pseudoaneurysmal segment is not infected, vascular reconstruction should be carried out, either with an autologous reversed saphenous vein graft or a prosthetic graft. The decision for reconstruction is based on the segment of artery involved and the presence of infection. The presence of infection precludes reconstruction, in which case ligation and excision of the involved segment is the treatment of choice [10].

Taken together with the cases discussed above, our experience supports early surgical exploration and, where feasible, primary end-to-end vascular repair as a safe and effective strategy for traumatic radial artery pseudoaneurysm in the absence of infection, with a low threshold for suspicion whenever a forearm swelling develops at the site of a prior laceration, however trivial that laceration may initially have appeared.

CONCLUSION

Pseudoaneurysms of small arteries are rare and can result from penetrating injury or iatrogenic manipulation. The radial artery is commonly used in clinical practice for cannulation. Surgical ligation or repair remains the standard approach for radial artery pseudoaneurysms, once adequate blood supply to the hand has been confirmed. Pseudoaneurysms managed by surgical vascular repair do well; indeed, vascular repair should be undertaken at the earliest opportunity once the diagnosis is confirmed.

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