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Radial artery pseudoaneurysm following wrist trauma. A case report of a rare condition

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ABSTRACT

In the presence of limb trauma, the appearance of local edema should always be carefully examined by Orthopaedics surgeons. A post-traumatic wrist swelling without fracture could even lead to serious pathologies and relative sequelaes. These include the radial artery pseudoaneurysm. In this report we present a case of radial artery pseudoaneurysm following wrist trauma, successfully treated whit conservative treatment.

Introduction

An iatrogenic injury from diagnostic or interventional procedures is the most common cause [1]. However, they can rarely occur in post-traumatic cases [2,3].

They usually present as a pulsatile palpable mass and the possible complications can be even lethal so prompt diagnosis and treatment are essentials. As these patients could be referred to the Orthopaedics surgeon in the Emergency Department, they should always consider its occurrence. Nevertheless, they could complicate orthopaedic surgical procedures. We present a case of radial artery pseudoaneurysm consequent to an hyperextension trauma of the wrist, successfully managed by compression. The patient's consent was obtained to publish his anonymized records and photographs in this report.

Case report

A 40 year-old man was admitted to our Emergency Department after falling from the stairs at work. He reported head trauma without loss of consciousness and a wrist trauma.

Referred to us for a specialist advice, he detailed a distraction trauma of the left wrist in overextension in an attempt to avoid falling down the stairs, holding himself on the handrail. Then, he felt growing discomfort at the level of the joint associated with painful motility of the thumb. Examination demonstrated a palpable, slightly pulsatile mass on the distal and volar side of the radius. The skin over the lesion was not erythematous [Fig. 1]. It was associated with positive provocative tests for a suspicious carpal scaphoid

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fracture. No signs of vascular and nervous impairment were observed distally to the mass.

There had been obtained plain X-rays of the left hand and wrist, which did not show any direct or indirect signs of fractures [Fig. 2].

We then decided to ask for a vascular surgeon consultation. After performing color duplex ultrasonography (US), it was revealed a large pseudoaneurysm (2,5 × 1,5 cm of diameter) of the radial artery with continuous bidirectional flow over a large aneurysm neck. Pulsed-waved Doppler (Pw-D) showed correct perfusion of the radial and ulnar arteries with a regular Allen test.

Considering the clinical features of a suspicious scaphoid fracture associated, we opted to also perform a computed tomography angiography (CTA) in order to examine both the scaphoid bone and better the vessel lesion [Fig. 3].

It excluded a scaphoid fracture whereas confirming the arterial US findings. Based on these features and the slight alleviation of the symptoms, the vascular surgeon consultant opted for a conservative treatment with a compression bandage. At 1-month follow-up, the patient was asymptomatic, the skin showed no alarming signs and ultrasonography did not reveal any impairment of the perfusion of the hand [Fig. 4].

Discussion

Arterial pseudoaneurysm of the upper limb is an uncommon condition that mostly involve subfascial deep arteries than perifascial and subcutaneous ones and often have an insidious onset.

They can be classified as saccular (resulting from a hematoma or a partial vessel wall injury subsequent a partial, complete or subadventitial rupture artery undiagnosed following a direct penetrating or non-injury) and fusiform (deriving from repeated micro traumatism which leads to a dysplastic lesion of vessels) [1].

Considering the high incidence of upper limb traumatic injuries, it is surprising that pseudoaneurysms are less frequent than the ones presenting in the lower extremities.

The typical pathogenic mechanism involves various types of wounds and iatrogenic arterial injuries (catheterization, osteosynthesis i.e.). Nevertheless fractures, infections and puncture wounds (drug addiction) can also be involved [4,5].

Focusing on radial artery, the reported incidence of pseudoaneurysm is 0.05 % [5] but it is increasing in hospital practice due to the large number of invasive procedures performed.

To the best of our knowledge, this is the first case reporting a pseudoaneurysm resulting from an hyperextension trauma of the wrist.

These lesions can be seen in all ages. The time interval between the formation of the pseudoaneurysm and the trauma varies from a few days to several months [4].

The deep arteries of the upper extremities (subclavian, axillary, brachial, radial and ulnar arteries), seem to be more affected (subclavian, axillary, brachial, radial and ulnar arteries), than the superficial arteries, more vulnerable to penetrating injuries.

In the Emergency Department, patients suffering from this kind of injury are very often referred to the Orthopaedic surgeons.

In addition, it has been also reported the occurrence of a pseudoaneurysm of the radial artery, complicating different procedures or traumatisms in the orthopaedic practice such as:

A plate removal of the distal shaft of the radius previously implanted for radial shaft fracture [6].

A fixation of a distal radius fracture using the AO/ASIF volar distal radius plate system [7].

A mid-shaft radius fracture fixation by ORIF-plating [8].

A wrist fracture following a bicycle fall [2].

A thumb carpometacarpal arthroplasty [9].

Then, despite the rarity of these entities, Orthopaedics surgeons should be aware of them as a prompt diagnosis and treatment are

Fig. 1. Clinical aspect of the lesion.

Fig. 2. The X-rays in two projections demonstrate the absence of acute fractures, but it is clearly visible the lesion contour.

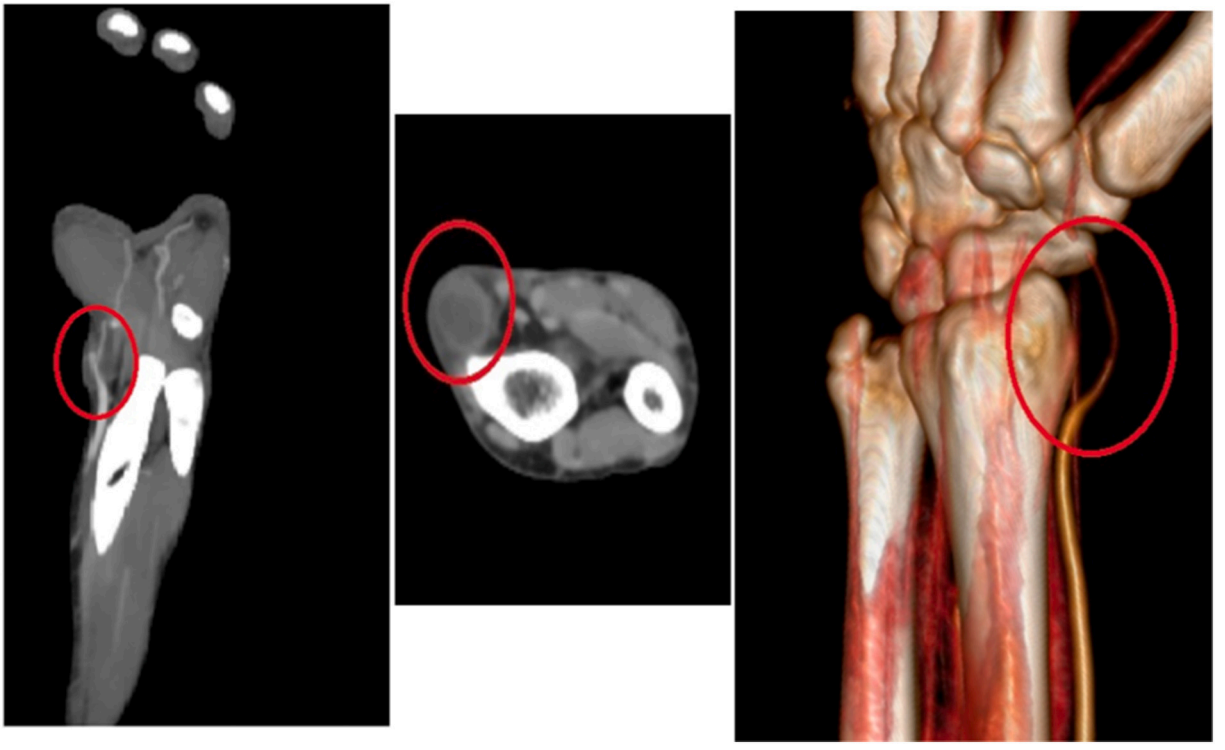

Fig. 3. CT-scan with contrast confirm the absence of fractures and explores the mass, suggesting the presence of a completely thrombosed pseudoaneurysm of the radial artery. You can use the below QR code to view the various CT scans.

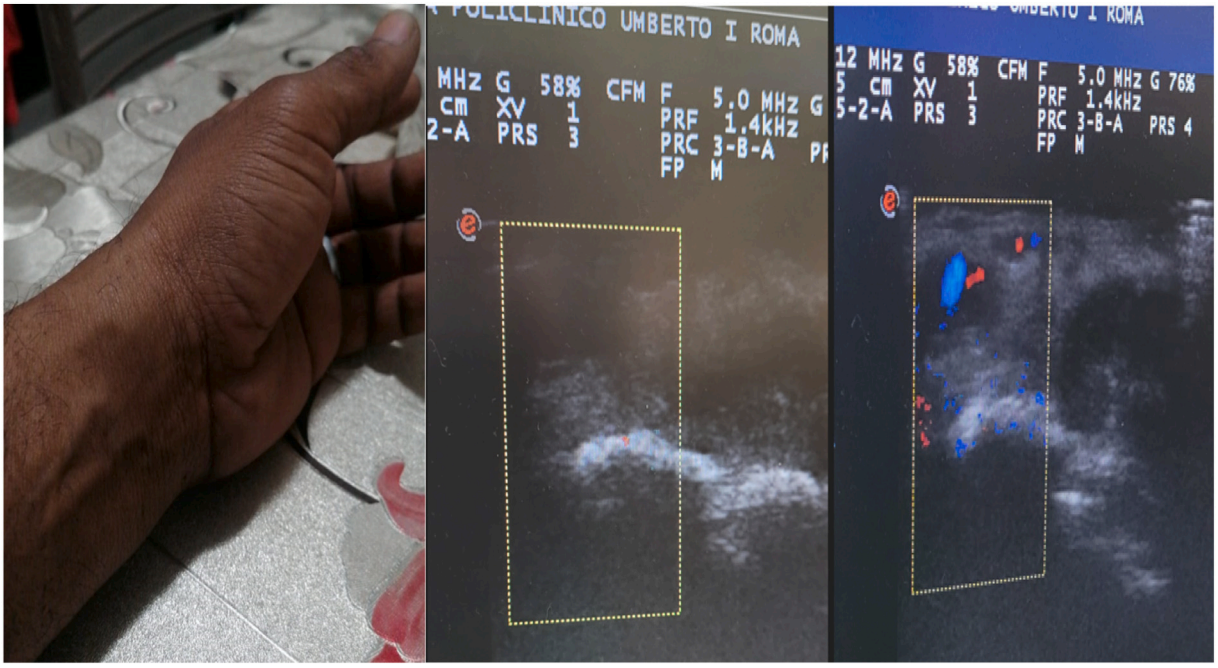

Fig. 4. the photos show the total clinical and ultrasound resolution of the clinical picture.

paramount to avoid even lethal sequelae, such as thrombosis, rupture, remote emboli [5].

They usually present as a painful, palpable and pulsatile mass. The pain is typically of low intensity and progressive but may appear suddenly and be unbearable. The swelling, usually elastic, isolated, well limited, of variable volume, reducible and depressible occurs on the path of the injured vessel.

In the case of an old trauma, the skin can show features of an impending ulceration, typical of an imminent rupture [4].

The mass beats rhythmically and isochronously with the pulse and is completely abolished by the compression of the humeral artery. When the blood clots invade the aneurysmal sac, the beats could not be noticeable. Sometimes it is associated with signs of a typical Raynaud syndrome or signs of compression of the surrounding nerves [4].

In our case, we observed a palpable not pulsating mass that did not compromise the distal limb, and had no further signs.

The physical examination usually shows an Allen's test with the arterial pulses present distal to the mass in pseudoaneurysm [3].

In suspicious cases, clinical assessment is routinely completed by medical imaging. With specificity of 97 % and sensitivity of 94 %, together with other intrinsic features, US is the preferred imaging modality [4].

An experienced physician would be able to observe its typical features (the “yin-yang” and the “to-and-fro” signs), together with the presence of a hematoma and possibly an enlarging pulsation. Standard treatment does not exist and depends on many variables such as the primary cause, the vessel injured, the associated symptoms, the anastomotic network status [4].

Treatment options include observation, compression bandages, US-guided compression, US-guided thrombin injection and surgical repair [10].

In our case, the consultant opted for conservative treatment by compression bandage.

Some authors claim that surgical treatment is always the best approach. Whereas in the presence of a painful mass with vascular or neurological signs, surgical management is no longer questionable, in other situations, alternative procedures can be considered [4].

In non-complicated cases, prolonged compression seems to be a safe and repeatable procedure [5]. Operative repair should promptly be considered for expanding or stable lesions that fail to thrombose within 4 weeks of compressive bandage [11]. In the case described it was not necessary to achieve surgery. At the moment the patient does not present any symptoms.

Conclusion

In case of upper limb extremity mass, Orthopaedic surgeons must be mindful of the potential occurrence of an arterial pseudoaneurysm, even if rare, as it can complicate both acute traumas (most often penetrating) and surgical procedures of the upper extremities.

In suspicious cases, an early diagnosis allows a prompt treatment, thus avoiding even lethal complications. The best treatment option should be case-specific and in any case decided by an expert consultant.

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Ethical approval

Not required.

Informed consent

All the patients gave their approval via informed consent to publish their clinical and laboratory data, within utterly lawful respect of privacy.

CRediT authorship contribution statement

All authors have made substantial contributions to draw this study, in particular: M. Dell'Orfano and Francesco Maria Milella made conception, enrolled, evaluated and treated the patient in the emergency department and wrote the paper, P. Braidotti made design and critic revision. All the authors gave the final approval of submitted version.

Declaration of competing interest

None.

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