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Rare brachial artery injury caused by blunt trauma; a case of the brachial artery laceration in an amateur volleyball player

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ABSTRACT

Low-energy blunt brachial artery injury is very rare and can be easily missed. Moreover, brachial artery injury in an amateur volleyball player is extremely rare. A 33-year-old woman was referred to our emergency department with swelling on her left upper arm after playing volleyball. Paresis or paralysis was not observed. The pulse of the left brachial artery was palpable, but relatively weak. An ultrasound examination and a computed tomography, both, revealed a pseudoaneurysm on the posterior wall of the left brachial artery in the antecubital fossa. A massive hematoma was also observed beneath the artery. The examination ruled out any concomitant injuries such as fracture and dislocation of the joints. An emergency surgery was performed. A hockey stick skin incision was made from the distal brachium to the antecubital fossa. The left brachial artery was detected in the hematoma. A 15 mm-long laceration was observed on the posterior wall of the artery. The condition of the vessel wall around laceration was poor. Therefore, we resected the injured lesions. The defect was so long that the lesion was interposed by a reversed saphenous vein graft. Heparin was administered one day after the surgery, which was later changed to apixaban on the sixth day after the surgery. Apixaban was discontinued after a month post-surgery. During the follow-up period, the patient did not report any complications and the graft was unobstructed.

Introduction

Brachial artery injuries due to penetrating injuries or high-energy blunt trauma are common, but those due to blunt injuries are relatively rare [1]. Supracondylar fractures or dislocation of the humerus have been reported as causes of arterial injury related to low-energy trauma [2]. However, low-energy blunt brachial artery blunt injuries among civilians, such as amateur volleyball players are extremely rare.

Case presentation

A 33-year-old woman was referred to our hospital for evaluation of swelling and pain in the left upper arm. She did not have risk factors for arterial sclerotic disease other than smoking history for 20 years. She denied any accidental collision of her arm or unusual pain in her elbow joint, other than her usual game of volleyball played two days earlier. Before her visit to our hospital, she visited a rural clinic with these complaints. At that visit, the diagnosis was mild skin and subcutaneous edema due to impact injury. However, as

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the symptoms worsened rapidly, she was referred to our hospital a day later. Upon examination in our emergency clinic, the pulsation of the left radial artery was weak and the left forearm was relatively cold. However, paresis and paralysis were not observed. A duplex ultrasound examination revealed a hematoma around the left brachial artery and a pseudoaneurysm in the distal brachial artery (Fig. 1a). Enhanced computed tomography (CT) confirmed these findings (Fig. 1b). Concomitant injury, such as a fracture or dislocation of the joint was not seen in the CT.

Emergency surgery was performed. A hockey stick-shaped incision was placed on the left distal brachium and cubital fossa (Fig. 2a). The brachial artery was located in the hematoma. A two-cm long laceration was observed on the artery (Fig. 2b and c). The condition of arterial wall around the laceration was poor, and the lesion was resected (4 cm in length). The defect was long, and it was interposed by a reversed saphenous vein graft (Fig. 2d). The wound was closed after the placement of a negative pressure drain. After confirmation of hemostasis, continuous heparin administration was started 6 h after the surgery, which was later replaced with apixaban (dose:10 mg/day) on the sixth day post-surgery. Apixaban was continued for a month. The patient was discharged a week after the surgery without any symptoms. During the two-month follow-up period, the patient did not show any other symptoms and continued to improve. Apixaban was discontinued a month after the surgery.

Discussion

Professional volleyball players are at risk vascular injury. There have been reports of an aneurysmal and thrombosed proximal posterior circumflex humeral artery in the dominant shoulder, which could lead to ischemic digits [3]. However, blunt traumatic brachial artery injury in amateur volleyball players is extremely rare. In addition, the patient in our case report is a young woman, without significant history or risk factors for vascular disease. The only associated risk was the fact that she was a current smoker. The awareness on etiology of blunt traumatic brachial artery injury, including minor blunt traumatic injuries, are rare. This results in misdiagnosis especially, by primary physician who may lack awareness [1].

Blunt injuries commonly occur at the antecubital fossa, proximal to the bifurcation of the brachial artery. In a review by Jonathan et al. the lesion was susceptible because of vascular compression under the bicipital aponeurosis at the antecubital fossa [1]. Marcheix et al. reported a high incidence of brachial artery injuries proximal to the bifurcation. This was due to the relative immobility of the artery, which prohibits a longitudinal excursion to compensate for forearm rotation about the elbow secondary to elbow dislocations and distal humerus fractures [4].

In the present case, the susceptible lesion was injured despite low energy impact.

Ultrasound imaging is useful in diagnosing brachial artery injuries [5,6]. In this case, the ultrasound examination revealed vascular injury and hematoma along with a pseudoaneurysm. Duplex ultrasound is an easy, non-invasive and cost-effective examination. This examination is very useful, especially in emergency room settings. In addition, enhanced CT revealed no injuries other than vascular injury. Enhanced CT also provides information about anatomical features of the injured artery necessary to indicate location for stent grafts.

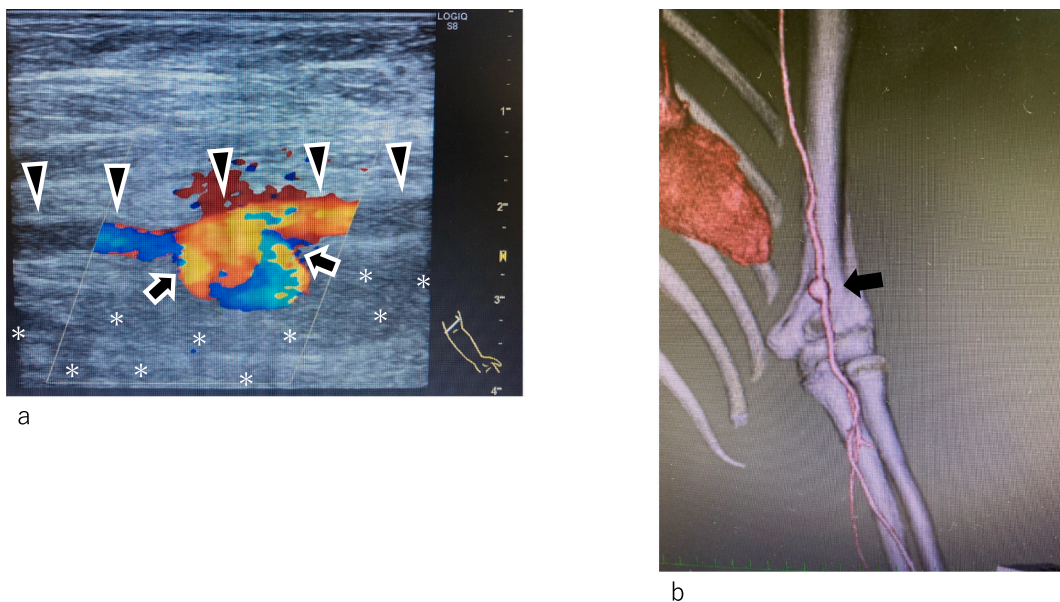


Fig. 1. a. Ultrasound image. Broad entry pseudoaneurysm (indicated by an arrow) was observed posterior to the brachial artery (triangle). A hematoma was present behind the artery (asterisks).
b. Computed tomography image in the emergency room A pseudoaneurysm was located at the antecubital fossa position. The examination revealed no concomitant injuries, such as fractures.

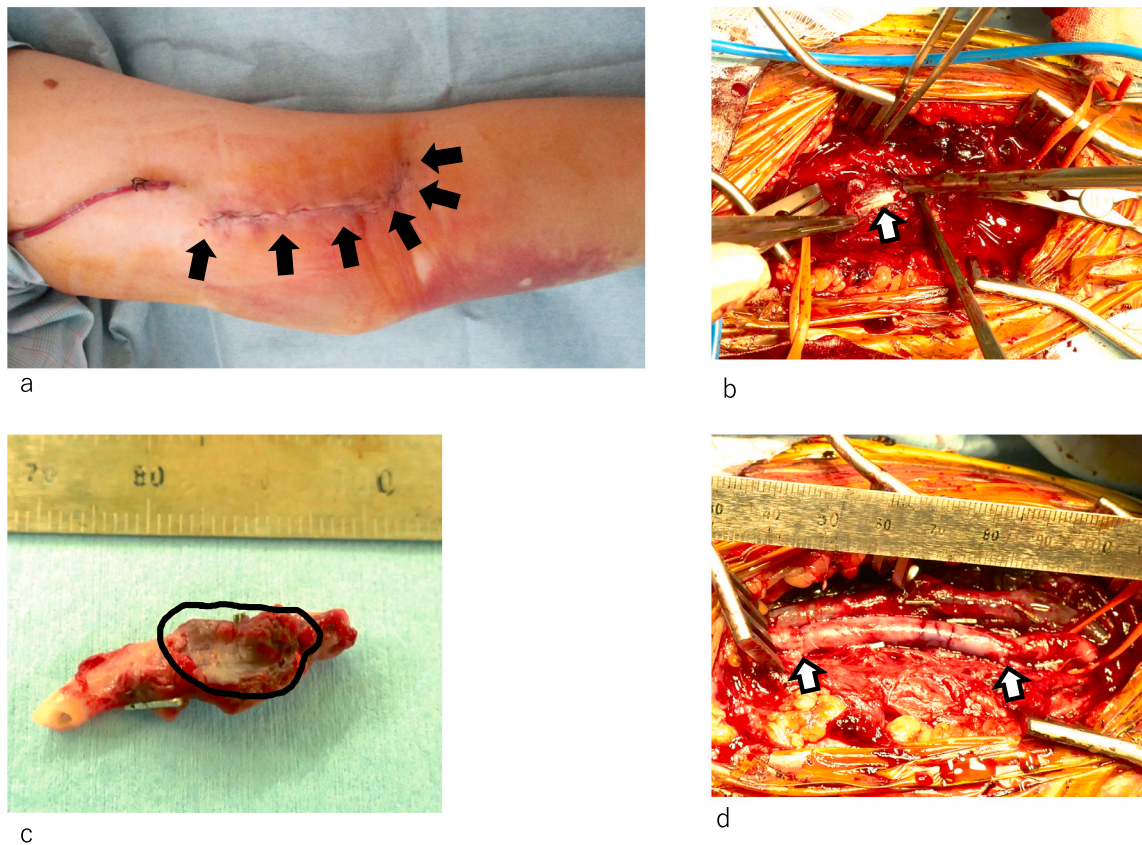


Fig. 2. a. A photograph just after the surgery. The humerus was swollen. The surgery was performed through hockey stick incision beyond distal brachium and antecubital fossa.
 b. A photograph during the surgery. A laceration was observed on the posterior wall of the brachial artery (arrow mark).
 c. A photograph of resected brachial artery injured lesion. Laceration on the artery is observed (circle).
 d. A photograph after interposition.

There are various operative techniques for managing brachial artery injuries. The most preferable choice is resection with end-to-end anastomosis if the technique can be performed without tension. The second choice is saphenous vein interposition, which has good outcomes [7]. However, post-operative thrombosis during the early period needs to be carefully managed. Post-operative occlusion is known to occur within a week of surgery. Insufficient anticoagulation therapy is a risk factor for early graft occlusions. In addition, late occlusion is rare and asymptomatic [7]. Thus, heparin was administered as early as possible after surgery. Heparin was altered to apixaban, which was continued for a month after surgery. The anticoagulant was discontinued after a month as the patient was a young fertile woman, and the risk of early thrombosis was reduced enough. Stent grafting using the VIABAHN endoprosthesis (W. L. Gore & Associates, Flagstaff, AZ, USA) can be a good option for brachial artery injury especially if the characteristics of injury are suitable for use of stent grafts [6]. In our patient's case, the injured lesion was over the elbow joint, which affected the patency. Thus, we concluded that saphenous vein graft interposing was the best option.

Conclusions

We encountered a case of blunt trauma of an amateur volleyball player who needed surgery. There should be an increased awareness about blunt vascular injury even though high-velocity traumatic mechanisms or penetrating episodes are absent.

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