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Case Report

Case Report of Subclavian Artery Injury After Reduction of Right Shoulder Dislocation

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Abstract: Shoulder dislocations are common in emergency settings; however, associated vascular injuries are rare, occurring in approximately 1–2% of cases. Among these, axillary and subclavian artery damage is particularly serious, with high morbidity and potential limb loss if not promptly recognized. We report the case of a 79-year-old male, hypertensive and dyslipidemic, who sustained a ground-level fall with right glenohumeral dislocation. Following an attempted closed reduction without sedation, he developed ischemic signs and an expanding hematoma. Initial workup with non-contrast tomography and bedside ultrasound suggested subclavian artery thrombosis. During brachial artery embolectomy, a complete subclavian artery rupture with a 7 cm gap was identified, requiring open repair with a 6 mm Dacron® graft. Postoperatively, the patient developed significant motor deficits of the right upper limb, confirmed by MRI and electromyography as brachial plexus injury. He was discharged for anticoagulation and remains under follow-up with partial functional recovery. This case highlights the importance of systematic neurovascular examination in shoulder dislocation, especially in elderly patients with comorbidities, as collateral circulation may mask early ischemia. Early use of contrast imaging and standardized emergency protocols are critical to improving outcomes. Although rare, subclavian artery injury during shoulder reduction must always be considered, requiring immediate diagnosis and intervention to preserve limb viability and function.

Keywords: Shoulder dislocation; Subclavian artery; Vascular injury; Vascular surgery; Case report.

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1. Introduction

Shoulder dislocations are common injuries managed in emergency departments [1]; however, associated neurovascular lesions are rare, whether due to the dislocation itself or to the reduction procedure. The incidence of axillary and subclavian artery injury associated with shoulder dislocation is reported in approximately 1–2% of cases and carries high morbidity and mortality [2]. Clinical signs of vascular injury may be more evident, such as active pulsatile hemorrhage, expanding hematoma, audible bruit, limb ischemia, and diminished pulses, or more subtle, including hypotension, neurological deficits, and non-pulsatile hematoma [3]. In this context, the threshold for clinical suspicion should be even higher in cases of recurrent shoulder dislocations, atherosclerosis, or age over 60 years [4].

The optimal approach for restoring blood flow to ensure maximum functional recovery of the limb has not yet been fully established. The strategy employed depends on the

extent of vascular damage: extensive injuries are generally managed with open surgical revascularization, although minimally invasive percutaneous endovascular therapies are also an alternative [5]. Vascular lesions require prompt evaluation and treatment to prevent irreversible limb ischemia and functional loss, which in many cases may lead to amputation. In this article, we present a unique case of subclavian artery injury following a forceful shoulder dislocation reduction, subsequently managed with open surgical repair.

2. Case Report

A 79-year-old male patient, hypertensive and dyslipidemic, on losartan and simvastatin, with no previous surgeries and a history of prior right shoulder dislocation, presented after a ground-level fall during the night, sustaining trauma to the right shoulder with severe local pain. He sought care at a local Emergency Care Unit, where X-ray imaging of the affected limb revealed a right glenohumeral dislocation. After evaluation and confirmation of the diagnosis, the traumatology team at Santa Casa do Rio Grande Hospital opted for closed reduction without sedation, still in the emergency department. The justification for performing the procedure without sedation was not recorded in the medical chart, although the use of sedation would have been supported by the literature.

Following the maneuver, the patient continued to experience pain and subsequently developed cyanosis, hypothermia, loss of motor function in the hand and arm, and an anterior shoulder hematoma. A non-contrast CT scan of the limb was performed, showing acromioclavicular arthrosis and superior displacement of the humeral head. Due to the unfavorable evolution, the vascular surgery team was consulted. On clinical examination, they identified a large, painful hematoma in the right axillary region, shoulder bulging, absence of radial, ulnar, and brachial pulses, and non-palpable right axillary and subclavian pulses. Bedside ultrasonography performed by the vascular team demonstrated subclavian artery flow in the proximal segment, with an anechoic image in the mid-segment and absence of distal flow, in addition to deep venous thrombosis of the subclavian vein. A working diagnosis of combined arterial and venous thrombosis was proposed.

The patient was scheduled for surgical embolectomy of the right upper limb via brachial artery access. During the procedure, Fogarty® catheters no. 3 and 4 were advanced into the mid-segment of the subclavian artery without clot retrieval. On the third passage, a large thrombus was removed, followed by massive bleeding from the subclavian artery. The patient developed hypovolemic shock and underwent fluid resuscitation. The vascular team extended the surgical incision and identified a complete rupture of the subclavian artery, likely due to traction, with a gap of approximately 7 cm. A 6 mm Dacron® graft was implanted with end-to-end subclavian-axillary anastomosis.

Postoperatively, the limb was kept warm with orthopedic cotton and bandage, and the patient was anticoagulated. He was transferred to the ICU, hemodynamically stable on room air. However, he remained with significant motor impairment of the right upper limb, presenting grade 1 strength at the arm level and grade 0 at the hand, in addition to absence of hand sensitivity. On postoperative day 1, neurosurgical evaluation revealed grade 1 strength at C5 and plegia from C6 to T1. Electromyography and MRI of the right brachial plexus were recommended. MRI of the right shoulder revealed advanced tendinosis of several shoulder muscles, glenohumeral joint effusion, periarticular soft tissue edema, and muscle atrophy.

The patient remained on anticoagulation and was discharged for outpatient follow-up with vascular surgery and neurology. At two months postoperatively, he had regained some arm and hand movement, though persistent difficulty with finger mobility remained, with preserved perfusion.

3. Discussion

Although shoulder dislocation is a common condition, vascular injuries are rare, whether due to the dislocation itself or its reduction. The risk of vascular injury increases

in cases of recurrent dislocations (due to adhesions between the vessel and joint capsule, which render the artery more vulnerable to shear forces [5, 6]), advanced age (loss of arterial elasticity and compliance secondary to atherosclerosis also reduces tolerance to shear forces, increasing predisposition to vascular rupture [7, 8]), and when reduction is performed forcefully without sedation (arterial injury risk is higher when performed crudely rather than under anesthesia in the operating room). In our case, the patient had both predisposing factors, raising questions about the choice of reduction technique and whether a different approach might have led to a better outcome.

All patients with shoulder dislocation require a complete neurovascular examination [9], since failure to recognize an underlying arterial injury can result in persistent functional impairment and causalgia. These injuries are often accompanied by damage to the subclavian vein, brachial plexus nerves, and clavicle or rib fractures, which may lead to repeated hospitalizations and even elective amputations, regardless of prior arterial repair [10, 11]. In more severe cases involving extensive arterial and venous injury, hemorrhage, ischemia, hemothorax, stroke, and possibly death may occur [12, 13].

Early diagnosis is a key predictor of outcomes in vascular injuries secondary to shoulder dislocation. However, the extensive collateral circulation in the region can delay the appearance of ischemic signs, such as reduced temperature, decreased strength and endurance, finger contractures, and muscle necrosis, making imaging essential for early diagnosis before clinical signs appear. Often, these signs are only evident once tissue necrosis has already occurred, which may result in residual limb deficits despite surgical treatment [13, 14].

The most used imaging modalities include Doppler ultrasonography, used in our case, and CT angiography. Doppler is rapid and non-invasive but operator-dependent, while CT angiography provides precise localization of the lesion, aiding surgical planning, although it is not always available in emergency settings [14, 15]. Once a vascular lesion is identified, prompt repair is necessary, either via open surgery or endovascular techniques. The choice depends on factors such as mechanism and extent of injury, patient stability, anatomical location, and surgical team expertise [14, 16, 17]. In patients with significant hemorrhage, open fractures, or reduced consciousness, open surgery is generally preferred to ensure hemostasis and prevent compartment syndrome [18]. Endovascular management is increasingly reported even in extensive penetrating or blunt trauma to major shoulder vessels [18].

In our case, the subclavian artery rupture likely occurred during the reduction, as ischemic signs appeared afterward. Delays in identifying the arterial lesion and in involving the vascular team, along with the use of non-contrast CT, may have hindered diagnosis. Bedside ultrasonography alone could not confirm complete rupture, suggesting either thrombus mimicking arterial integrity or progression of a partial lesion to complete rupture during embolectomy. A standardized protocol for such cases could improve surgical planning and patient outcomes. Open surgery, though the standard recommendation for complete arterial lesions [10], was performed here based on acute arterial occlusion diagnosis, allowing effective arterial repair. Endovascular repair could have been considered if the appropriate materials and equipment were available, which was not the case.

4. Conclusion

Subclavian artery injury during shoulder dislocation reduction, though rare, carries high morbidity and mortality. Early diagnosis, often with imaging since initial clinical signs may be subtle and slowly evolving, is essential. Pre-established protocols in emergency and urgent care settings can significantly improve patient outcomes.

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Conflicts of Interest: The authors declare no conflicts of interest.

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