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Case Report

Double level arterial injury with neuropraxia following anterior shoulder dislocation

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ABSTRACT

Vascular and nervous complications are rare after shoulder dislocation. We report the case of a double level arterial injury with neuropraxia following anterior shoulder dislocation that was diagnosed by MultiDetector-row Computed Tomographic (MDCT) angiography and treated by surgical bypass graft and embolectomy. Our case is original, not only because of the rarity of these complications, but also because of the thromboembolism of brachial artery which could be undiagnosed and could compromise prognosis.

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1. Introduction

Vascular and nervous complications are rare after shoulder dislocation without associated fracture. Axillary artery injuries are estimated at 1%,¹ and brachial plexus injuries are more frequent, estimated at 7%.²

2. Case report

A 74-year-old right-handed man presented to the Emergency Department after falling onto his outstretched right arm complaining of right shoulder pain. He had no previous history of injury to either shoulder.

Clinical examination revealed that the right shoulder was swollen; normal rounded appearance of the shoulder was lost; and the humeral head could not be palpated in its anatomic position. Mobility of elbow, wrist, and fingers was normal, but he had some sensory loss in the median nerve territory, and the radial artery pulse was absent. Shoulder X-ray confirmed an anterior dislocation with no associated fracture (Fig. 1). The shoulder was relocated under intravenous anesthesia. At this point, a repeat shoulder X-ray showed satisfactory reduction of the shoulder and no evidence of fracture but on clinical examination, the radial pulses were still absent.

A MultiDetector-row Computed Tomographic (MDCT) angiography of the right upper limb was performed that demonstrated an abrupt occlusion of the axillary artery distal to the origin of the subscapular branch (Fig. 2) and another

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Fig. 1 – A radiograph showing anterior dislocation of the shoulder.

Fig. 2 – MDCT angiography showing the occlusion of the third part of the axillary artery.

Fig. 3 – MDCT angiography showing the occlusion of the brachial artery.

occlusion of the brachial artery, which was caused by an acute thromboembolism (Fig. 3).

The surgical repair was performed by the vascular team 6 hours after the injury. The axillary artery was approached through an infraclavicular incision. The brachial artery was exposed from the lower border of teres major with a median incision in the line of the sulcus separating the biceps muscle from the triceps muscle. The outer membranes of arteries were not injured. The median nerve was identified at the level of the brachial artery and found to be in continuity, but was contused. A 6-mm polytetrafluoroethylene (PTFE) interposition bypass graft was used to reconstitute the axillary artery, and a brachial embolectomy was performed through a transverse arteriotomy with a Fogarty catheter to clear the outflow (Fig. 4). This restored the circulation to the upper limb with warm hand and palpable radial pulse. Five years after the surgery, neither vascular nor neurologic disorder had appeared in the upper limb.

3. Discussion

The complications of the anterior shoulder dislocation are numerous; however, the vascular injury of the axillary artery is

Fig. 4 – Brachial embolectomy using a Fogarty catheter.

a rare disorder,³ but must be suspected and searched actively, as it was reported in the literature.

This artery is the continuation of the subclavian artery and is divided into three parts. More than 90%⁴ of the reported injuries involve the third part of the artery, which is the portion from the lower edge of the pectoralis minor to the teres major muscle. Milton proposed that the damage occurs in this segment because of its relative fixation by the branches of the circumflex humeral and subscapular arteries.⁵ Vascular complication is more commonly seen in elderly individuals^{6–8} due to the loss of arterial elasticity with atherosclerosis and in recurrent dislocations⁹ due to the scar formation that fix the axillary artery to the shoulder joint capsule. Injury of the artery may be caused by the traction or the contusion by the humeral head that leads to intimal abrasion and arterial occlusion.

Not all classical symptoms of ischemia are present in all patients due to the rich anastomotic network of collateral vessels around the shoulder joint,¹⁰ and this means that the presence of palpable distal pulses does not exclude significant axillary arterial injury.⁴ When weak pulsation of radial artery is observed, the injury of axillary artery must be suspected.

We believe that the ischemia of the upper limb in the presented case did occur as a result of the occlusion of the brachial artery which was caused by an acute thromboembolism.

MDCT angiography is an important diagnostic imaging modality for the evaluation of upper extremity arterial

injuries. It allows rapid acquisition, with minimal invasiveness and with high sensitivity and specificity. The angiography using a catheter has the possibility to repair the artery using a stent graft at the same time.¹¹

Such injuries of the axillary artery with brachial artery emboli have to be repaired by open surgical techniques. The choice of reconstruction is either the use of a saphenous vein or the use of a PTFE graft. Furthermore, saphenous vein interposition graft is the best choice, because it has a better patency rate and better resistance to infection compared to synthetic grafts.¹²

Because of the common fascial investment of the axillary artery and the brachial plexus, symptomatic neurapraxia following anterior shoulder dislocation is associated in as many as 60% of the cases of axillary arterial injury.⁸ Brachial plexus injury is the most important determinant of long-term disability.¹³

Most of these lesions are incomplete nerve injuries. This is because the plexus in the axilla is very mobile and extensible. It was previously thought that the brachial plexus should be explored only if there are no clinical or electromyographic signs of recovery after 3–4 months.^{14,15} However, recent studies suggest that the early exploration of lesions at the time of the vascular repair provides the best chance of recovery. It also avoids the need of re-exploration at a time when the extent of scar tissue makes the surgery more difficult and also risks damage to the vascular repair.⁸

4. Conclusion

Injury to the axillary artery following anterior shoulder dislocation is a rare disorder and must be suspected, especially, in the elderly or those with recurrent dislocation. The presence of palpable distal pulses does not exclude the artery lesion. The brachial plexus injury is also rare, but if present, it should raise the suspicion for an associated vascular complication.

If vascular injury is suspected, early diagnosis and accurate treatment are essential to allow the patient the best possible chance of functional recovery.

Conflicts of interest

All authors have none to declare.

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