

CASE REPORT

Axillary artery and brachial plexus injury secondary to blunt trauma

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Abstract

Rupture of the axillary artery in the absence of a fracture of dislocation is a rare traumatic event. An associated injury to the brachial plexus may accompany an axillary artery injury but has rarely been reported in the literature. We present the case of an elderly female, who fell onto an outstretched arm and sustained an axillary artery rupture, combined with a brachial plexus injury. The patient in this case did well post-operatively. The challenge in these cases is early recognition and diagnosis of a vascular injury. A significant mechanism of injury needs to alert the clinician to the possibility of such injuries and if suspected, early investigation and surgical exploration should be initiated to prevent limb ischemia. Subsequently, if the neurological symptoms do not improve, consideration must be given to the possibility of a nerve injury and early recognition and management to prevent long-term functional deficits.

INTRODUCTION

Rupture of the axillary artery is a rare traumatic event and is usually associated with either anterior shoulder dislocation or proximal humerus fracture [1, 2]. A brachial plexus injury may occur during a forceful stretch of the arm or direct impact to the axilla, but a combined axillary artery and brachial plexus injury has rarely been reported in the literature. These cases usually involve older patients who sustain shearing injuries to sclerotic, non-elastic vessels [3]. Injury to the axillary artery is a serious complication requiring urgent surgical exploration and repair to prevent irreversible limb ischaemia while a brachial plexus injury can usually be treated conservatively, but must be diagnosed early to prevent muscle wasting and fibrosis [4]. We present the case of an elderly female who following a fall, sustained an axillary artery rupture combined with a brachial plexus injury and highlight the diagnostic and treatment challenges associated with concomitant injuries.

CASE REPORT

A 72-year-old female with a history of hypertension and hypercholesterolemia presented to the emergency department (ED) via ambulance. She was cleaning her ceiling at home and fell from a height of 1 m onto her outstretched right arm. She did not hit her head, had no loss of consciousness and did not injure her neck. She immediately felt that her right arm became 'heavy' and 'difficult to move'. After 12 h, this did not improve so she presented to the ED.

On examination she had no bony tenderness of her cervical spine, no obvious head injury and her Glasgow coma scale (GCS) was 15/15. There was no bony tenderness or her right upper limb. Neurological examination of her right upper limb revealed decreased sensation to crude and sharp touch from C5 to T1 and her power assessments using the Medical Research Council (MRC) grading were as follows: shoulder abduction 4/5, elbow flexion 4/5, wrist extension 1/5, elbow extension 3/5, finger

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Figure 1: CT angiography (maximal intensity projection 3-mm slices) demonstrating absent flow beyond segment 1 of the right axillary artery (A) with haematoma in the right axilla (H).

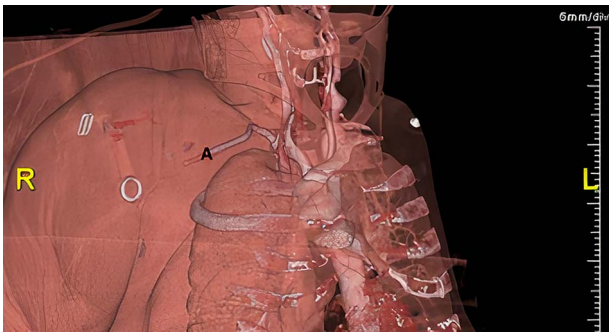


Figure 2: 3D reconstruction of CT angiography showing abrupt cessation of flow beyond segment 1 of the right axillary artery (A).

flexion 5/5 and finger abduction 1/5. She had a cold hand with no radial or brachial pulse palpable but had a capillary refill of < 2 s. The initial impression was a neurovascular injury secondary to a bony trauma. Our differential diagnosis also included a cervical spine injury given the mechanism and age of the patient.

Plain radiographs of the humerus and shoulder did not reveal any fracture or dislocation. A computed tomography (CT) scan of the neck showed no acute fracture. A CT angiogram of the upper limb was performed which showed an occlusion of her axillary artery at the junction of segment 2 going into segment 3 with significant haematoma in the right axilla as shown in Figs 1 and 2.

She was subsequently referred to the vascular surgery team on call who performed an urgent exploration of her axillary artery and right forearm fasciotomy. The large haematoma was evacuated and revealed a rent to the posterior aspect of segment 3 of the axillary artery and avulsion of the subscapular branch. A resection of the injured segment was performed with a reinforced polytetrafluoroethylene interposition and embolectomy. It was noted that the cords of the brachial plexus were displaced posteriorly by the large haematoma intra-operatively, but they were intact on inspection.

There was good limb perfusion post-operatively, but neurologically, her wrist-drop persisted and it was felt that she had

developed a traction brachial plexopathy secondary to compression from the large haematoma. MRI of the brachial plexus and cervical spine 2-week post-operatively subsequently showed no obvious cervical root avulsion. Radiologically, it was felt that the origin of the wrist-drop was felt to arise from the level of the axilla. She was subsequently placed in a wrist splint and underwent rehabilitation. At the time of writing, she has grade 2 power when extending her wrist.

DISCUSSION

An axillary artery injury combined with brachial plexus injury has been reported as having incidence rates of 27–44% in the literature [3]. The axillary artery is the most affected vessel in shoulder trauma and most injuries involve the third segment of the artery, as in this case. The artery is relatively fixed at the lateral margin of the pectoralis minor muscle, and with abduction and external rotation, the artery can become taut and is at risk of rupture [5]. The timing of injury is of utmost importance, with limb ischaemia averted with prompt surgical treatment, with the critical time for ischaemia reported as 4 h for proximal lesions and 12 h for more distal lesions [3, 6]. Prompt diagnosis is therefore required, and vascular injury cannot be ruled out with clinical exam alone and the patency of the axillary artery needs to be assessed with CT angiography [4].

Brachial plexus injury secondary to shoulder trauma usually results in neuropraxia or axonotmesis and rarely requires any surgical treatment, with improvement usually within 3–6 months [4, 5]. However, if nerve rupture is diagnosed, the outcome is far superior if repaired early than late as the denervated muscle becomes fibrotic and functional outcome may remain poor [2]. Neurological investigations are not helpful initially as nerve conduction and electromyography studies may be normal in the acute setting and will not show decreased conduction for 7–10 days [2, 7]. Therefore, a high index of suspicion for significant injury must exist in high velocity trauma with abnormal neurological findings on examination.

In conclusion, diagnosing an arterial injury post trauma can be difficult as patients may have palpable pulses and normal capillary refill due to collateral blood flow. An associated nerve injury can be even more difficult to diagnose as the signs and symptoms may be comparable to that of vascular compromise. A significant mechanism of injury needs to alert the clinician to the possibility of such injuries and if a vascular injury is suspected, early diagnosis should be attained and prompt surgical exploration to prevent limb ischaemia. Subsequently, if the neurological symptoms do not improve, consideration must be given to the possibility of a nerve injury and early recognition and management to prevent long-term functional deficits.

AUTHORS' CONTRIBUTIONS

JF and AE wrote the case and edited the manuscript. BM supervised the writing of the manuscript.

PATIENT CONSENT

Consent for this case report was provided by the patient and documented in the hospital chart.

CONFLICT OF INTEREST STATEMENT

There are no conflicts of interest to report in this case.

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