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RESEARCH ARTICLE

Late onset brachial plexus paresis due to sub-clavian artery pseudo-aneurysm after closed fracture of clavicle

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Abstract

Late onset brachial plexus paresis caused by compression of sub-clavian artery pseudo-aneurysm has been reported but rarely. We present a 75 year old male with eight months old post traumatic fracture of right clavicle, complicated by pseudo-aneurysm formation of right sub-clavian artery with brachial plexus paresis. Initially the fracture clavicle was managed conservatively in a shoulder arm pouch for three weeks. 8 months later however the patient developed a progressively increasing swelling in the right supra-clavicular fossa with numbness and weakness of right upper extremity. He was managed by removal of pseudo-aneurysm and bridging the arterial defect along its length with end to end anastomosis. Clavicle was fixed with clavicular locking plate.

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Introduction

Brachial plexus palsy due to clavicle fractures is unusual in adults, with a reported incidence of approximately 1%¹. Brachial plexus palsy can be caused by nonunion, mal-united fragments, hypertrophic callus, or pseudo-aneurysm of the sub-clavicular artery or vein. Onset of symptoms can occur months or years later^{2,4,5}. Brachial plexus palsy in acute fractures caused by direct fragment compression is exceptional, and has rarely been reported in the literature^{1,6}. This article presents a case of a patient with late brachial plexus palsy due to pseudo-aneurysm formation of sub-clavian artery.

Case report

A 70 year old male presented to our outpatient department in November 2012 with complaints of progressively increasing pulsatile swelling at the right supra-clavicular fossa with coldness, numbness and weakness of right upper extremity [Fig1]. Patient had a history of fall while walking with injury to right shoulder 8 months back which was managed by shoulder arm pouch for 3 weeks. On examination patient revealed a palpable pulsatile swelling with dilated veins over its surface at the right supra-clavicular fossa. There was hypoaesthesia and weakness of flexion and extension of elbow, wrist and finger joints. Right side radial pulse was slightly diminished, but circulation was not impaired. A postero-anterior radiograph of right shoulder was done which showed displaced fracture of right clavicle at the junction of middle third and lateral third [Fig 2]. Colour Doppler and CT angiography were also done which showed right sub-clavian artery pseudo-aneurysm [Fig 3]. Later on patient was operated under general anaesthesia. With a single incision cardiovascular surgeon removed the pseudo-aneurysm after controlling the proximal portion of right sub-clavian artery and bridged the arterial defect along its length with end to end anastomosis. After removal of pseudo-aneurysm we did the fixation of fracture clavicle with AO clavicular locking plate. The radial pulse was restored and range of motion exercise was initiated immediately post-operatively. The patient's numbness and coldness resolved and muscle power gradually returned.

Discussion

Conservative treatment of non-displaced and displaced mid-clavicle fractures in adults usually produces a satisfactory outcome, although it has been suggested that wide displacement and excessive shortening are risk factors for residual functional deficits^{7,8}. The conventional indications for surgical intervention include: (1) open fractures, (2) nonunion, (3) intolerance of conservative management, (4) severe angulation or comminution, and (5) neurovascular compromise resulting from displacement and impingement of the bony fragment². The anatomical space between the clavicle and the first rib, where these neurovascular structures exit from the thorax towards the upper extremity, can be narrowed by exuberant callus formation, pronounced fracture displacement or pseudoarthrosis of the clavicle.

Brachial plexus injury caused by direct compression is also known as neurogenic thoracic outlet syndrome² and mostly occurs in patients with mid-clavicle fractures⁹. The distal fragment of the fracture tends to displace inferiorly due to the weight of the arm, the downward pull of the latissimus dorsi and pectoralis major muscles on the distal fragment, and the upward pull of the sternocleidomastoid muscle on the proximal fragment⁶.

Because the costo-clavicular space varies from individual to individual, the risk of brachial plexus palsy located postero-inferior to the clavicle is unpredictable⁴. Brachial plexus palsy can also be caused by post-trauma edema or a tight bandage¹⁰. Our patient was initially treated with a simple sling and no neurological or circulatory symptoms were present. However, the fracture might have displaced secondarily and encroached on the brachial plexus, resulting in progressive neurological deficits.

Clavicular fractures in which bony fragments encroach on the brachial plexus should be carefully reduced, and the bony fragments removed if they are causing nerve compression. Rigid fixation of the fracture is typically required to prevent fracture redisplacement and facilitate early postoperative rehabilitation. Rumball et al⁶ reported good results with closed reduction using a figure-of-eight bandage in a patient of clavicle fracture and brachial plexus palsy; however, the brachial plexus palsy was not proved to be caused by the clavicle fracture by any image study or operative finding. As for fixation methods, it has been reported that intramedullary rod fixation may lead to brachial plexus palsy because of increased soft tissue tension during reaming¹¹.

Brachial plexus palsies associated with clavicle fractures are usually supra-clavicular lesions caused by traction injuries⁶, and surgery of the clavicle fracture has no effect on the neurological outcome. Consequently, correct diagnosis is important in choosing the treatment method for a fracture with concomitant brachial plexus palsy. Brachial plexus lesions at infra-clavicular levels caused by external compression usually have favourable prognosis¹⁰. However, Kitsis et al¹³ reported that a majority of patients with brachial plexus palsies caused by chronic compression due to fracture callus or aneurysm formation may experience persistent pain, dysesthesias, and cold intolerance post-operatively. Prompt surgery can lead to a complete neurological recovery and forestall later complications^{1,2}.



Fig1. Clinical photograph showing swelling in the right supra-clavicular fossa.

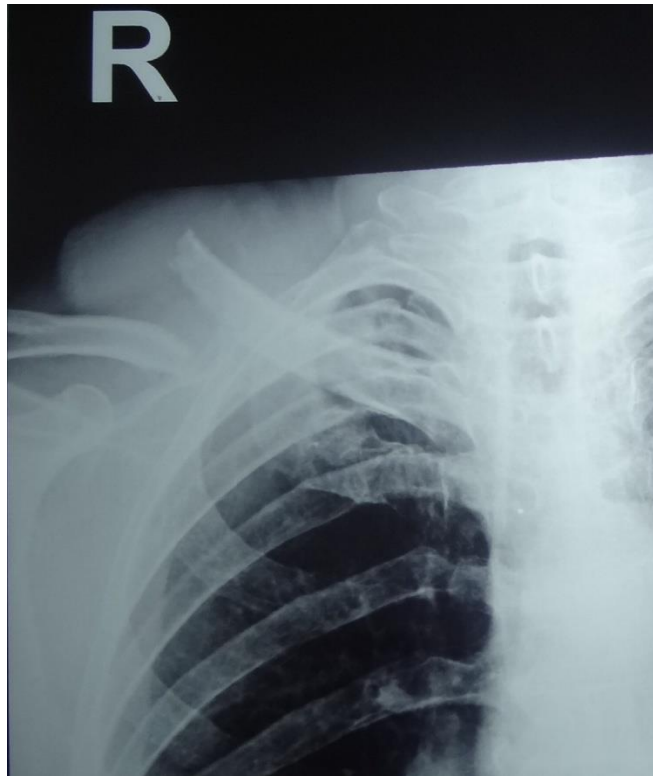


Fig 2. Radiograph showing fracture of right clavicle.



Fig 3. CT angiography showing pseudo-aneurysm of right sub-clavian artery.

Conclusion

Fractures of the clavicle should be considered a spectrum of injuries with diverse functional outcomes, each requiring careful assessment and individualized treatment.

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