Acromioclavicular Joint Separation With Coracoid Process Fracture in an Adolescent Treated by Headless Compression Screw: A Case Report

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ABSTRACT

Injuries to the acromioclavicular joint are exceedingly rare in paediatric and adolescent populations, with only 37 cases reported in the literature. Of these, coracoid process fractures have been documented in just ten instances. We present the case of a 15-year-old male diagnosed with a Wahal's type II acromioclavicular joint separation and a Mondori's type I coracoid fracture, sustained during an ice hockey match, which was treated using two headless compression screws. The patient resumed unrestricted hockey activity six months post-injury, with no limitations in shoulder function. To the best of our knowledge, this case represents the only documented instance of headless compression screws being utilised in such a scenario.

Keywords:
coracoid process fracture, scapula fracture, paediatric traumatology, acromioclavicuar joint injury

INTRODUCTION

Injuries affecting the acromioclavicular joint (AC) are exceedingly rare among children and adolescents, with only 37 documented cases in previous literature, sparking ongoing discussion regarding the optimal management strategies. This scarcity is attributed to the notably stronger nature of coracoclavicular ligaments in paediatric population[1]. Concurrent occurrences of coracoid process fractures alongside AC separations are infrequently reported in the literature[2].

In this report, we present a case of 15-year-old male presenting at our emergency department with a type II acromioclavicular joint injury, as per the classification system described by Wahal *et al*[1]. Notably, this is the first case in which treatment was administered utilising headless compression screws in conjunction with K-wire transfixation.

CASE REPORT

A 15-year-old male patient presented to our emergency department following shoulder injury sustained to his dominant right limb during an ice hockey match. Clinical evaluation revealed a gross deformity around the acromioclavicular joint, accompanied by a positive piano key sign. No neurological or vascular deficit were observed. Radiographic examination revealed a fracture of the coracoid process and apparent separation of acromioclavicular joint (Fig 1a). CT imagining was subsequently conducted to further delineate morphological characteristics of the fracture, classifying it as a Wahal's type II acromioclavicular joint separation and Mondori's type I coracoid fracture (Fig 1b and 1c). Consequently, surgical intervention was advised and scheduled for the following day.

Prior to surgery the patient was positioned in a beach-chair position with C-arm on the injured side. Despite initial attempts for closed reduction and pinning of the acromioclavicular joint with K-wires, achieving sufficient closed reduction of the gross deformity was unattainable. Subsequently, an open approach via saber cut incision was undertaken. While preparation volar to clavicle was straightforward, perpendicular insertion of K-wire to achieve optimal compression at the fracture site was not possible. Preparation dorsal to the clavicle posed significant difficulty, with a concern for safety of the dorsal scapular nerve and

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Fig. 1: Fracture of the coracoid process and apparent separation of acromioclavicular joint – (a) apparent on AP radiograph, (b and c) on CT scan.

Fig. 2: Post-operative images: (a) Post-operative image showing osteosynthesis with two headless compression screws and transfixation of the AC joint with K-wires. (b) Minor protrusion of the headless compression screw apparent on the CT scan. (c) Healed fracture on radiograph takes during a follow-up 6 months after the surgery.

artery. One K-wire was deployed from both dorsal and volar approaches. Despite challenges encountered in optimal radiograph positioning, adjustments were made to the placement of one of the K-wires. Two headless compression screws [HCS 3.0, DePuy Synthes, Switzerland] were subsequently applied to provide slight compression, effectively reducing the gross deformity of the acromioclavicular joint leaving only slight residual deformity. Two additional K-wires were inserted to transfix the acromioclavicular joint into the corrected position, resulting in complete resolution of the deformity.

On post-operative day two, a follow-up radiograph was conducted, followed by a CT scan to enhance visualisation of the screws (Fig. 2). This imaging revealed a minor protrusion of the screw tip beyond the scapula. The patient was discharged on post-operative day four and was prescribed an orthosis to be worn for four weeks, until the removal of the Kirschner wires. Physiotherapy was initiated following wire removal, and the patient returned to unrestricted hockey activity after six months. At the final follow-up, six months post-surgery, the patient demonstrated a full range of motion in the shoulder without pain. The patient declined further follow-up evaluations.

DISCUSSION

The surgical management of acromioclavicular joint separation associated with coracoid process fractures in adolescents is both rare and technically challenging, with no consensus on optimal treatment. In this report, we present a case of internal fixation using a headless compression screw.

The headless compression screw was selected to minimise the soft tissue irritation, particularly of the supraspinatus muscle. Mechanical irritation and subsequent edema could predispose young, active patients to subacromial impingement syndrome. Additionally, the reduced diameter of the headless screw provides a safe trajectory through the neck and narrow body of the scapula, thereby reducing the risk of cortical breach. While a half-threaded cancellous screw may achieve adequate compression, its larger head increases the risk of hardware-related symptoms.

Surgical exposure, particularly in the region posterior to the clavicle, posed notable challenges but facilitated the optimal perpendicular orientation of the headless compression screw. Theoretically, an adjustment in the screw trajectory towards the wider aspect of the glenoid may decrease the risk of screw protrusion through the body of the scapula; however, such screw orientation could elevate the risk of shoulder

joint penetration, particularly considering challenges associated with C-arm positioning and perioperative radiographic visualisation.

Wahal *et al* conducted a systematic review on acromioclavicular joint separations, encompassing 37 cases and proposing a new classification. The injury we present corresponds to the Type II - AC ligament rupture concomitant with the coracoid fracture, described in ten cases[1]. An additional 13 cases were described by Mondori *et al*, who also proposed a classification for coracoid process fracture in adolescents. According to the classification, our case represents a Type I: a fracture of the base of the coracoid process[2]. It is important to note that this classification does not preclude an appropriate treatment method, as excellent conservative results are described in the literature. The decision regarding the surgical intervention should be based on the severity of the AC displacement.

Among the 23 cases reported in the literature, surgical intervention was pursued only in seven instances. Predominantly, a combination of a screw with a washer alongside K-wire or pin transfixation was employed, observed in five cases; followed by the use of nonabsorbable suture in one case and K-wire and anchor fixation in another. To the best of our knowledge, our case represents the sole instance within the extant literature wherein headless compression screws were employed[2].

This case report supports the feasibility of using headless compression screws for coracoid process fracture in adolescent patients, particularly when minimising hardware prominence and maximising bone purchase are critical. Based on the reported literature, surgical fixation is typically reserved for cases with significant displacement or instability. Conservative treatment, most often with sling immobilisation, has shown favourable outcomes in less severe dislocations[3].

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CONFLICT OF INTEREST

The authors declare no potential conflict of interest.

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