Journal of Arthroscopy and Joint Surgery xxx (2017) xxx–xxx

Contents lists available at ScienceDirect

Journal of Arthroscopy and Joint Surgery

journal homepage: www.elsevier.com/locate/jajs

Research paper

Surgical outcomes of arthroscopic lateral clavicle excision for osteolysis

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ARTICLE INFO

Article history:
Received 26 April 2017
Accepted 20 October 2017
Available online xxx

Keywords:
Shoulder
Clavicle
Osteolysis
Arthroscopic
Acromiclavicular

ABSTRACT

Background: Lateral clavicle osteolysis has been attributed to repetitive stress; particularly in activities requiring excessive overhead motions such as weightlifting or rugby. Arthroscopic lateral clavicle excision is recommended for symptomatic acromioclavicular joint that has failed conservative treatment.
Aim: The present study aims to assess patient-reported outcomes of arthroscopic lateral clavicle excision for osteolysis.
Methods: Sixteen patients with a mean age of 33.56 ± 12.2 (range 18–59) underwent lateral clavicle excision over a 24 month period, by one senior shoulder surgeon. All patients participated in sport and professional athletes accounted for 56% of the patient cohort. Constant (CS) and QuickDASH (QD) outcome scores were obtained by questionnaire at a mean 21 months following surgery (range 3–40).
Results: A significant improvement in CS ($p < 0.001$) and QD ($p = 0.012$) was noted. Patient satisfaction increased from 3.7 ± 1.7 to 8.8 ± 2.5 on a 10-point visual analogue scale ($p = 0.0024$). 87% of patients were able to return to their former level of sporting activity. The average time to return to sport was 6.3 ± 4.8 months, ranging from 2–18 months.
Conclusions: Acromioclavicular joint excision for lateral clavicle osteolysis is associated with significant improvements in post-operative shoulder outcome scores, while providing adequate pain relief and improving the range of motion of the affected shoulder.
Level of Evidence: IV Case Series

1. Introduction

Osteolysis of the acromioclavicular (AC) joint has been regarded as an increasing cause of shoulder pain.[1] Traumatic lateral clavicle osteolysis was first described by Dupas et al. in 1936,[2] followed by atraumatic lateral clavicle osteolysis two decades later.[3] Recent work has reported similar findings on radiographic and magnetic resonance imaging (MRI) in both traumatic and atraumatic lateral clavicle osteolysis.[4]

Controversy surrounds the pathogenesis of lateral clavicle osteolysis, where Cahill proposed that the osteolytic process was induced by the presence of microfractures in the subchondral bone, caused by a repetitive stress.[5,6] He postulated that repetitive microtrauma activates an inadequate repair and remodeling process, which favours bone resorption over formation. Ultimately, Cahill's pathogenic theory still has a traumatic element, albeit in a more chronic and subacute manner. Numerous case reports have suggested alternative pathogeneses of lateral clavicle osteolysis, including autonomic dysfunction, hypertrophic synovial tissue, ischemic necrosis, and reactive hyperemia.[7–12] However, due of lack of sufficient evidence, Cahill's theory of osteolysis induced by microfractures in the subchondral bone still remains the most accepted.[5]

Lateral clavicle osteolysis, as described above, has been attributed to repetitive stress; particularly in activities requiring excessive overhead motions, reducing the ability of the bone to heal after loading. Therefore, lateral clavicle osteolysis most likely presents in strength and power athletes, such as weightlifters or rugby players, and jobs requiring heavy overhead lifting, such as builders or plasterers.[13] Cahill et al.[5] noted that 98% of radiographs indicating lateral clavicle osteolysis belonged to weightlifters, in which 50% had microfractures in the subchondral bone, and was the first case series detailing this occurrence. Since then, more than one hundred cases have been reported in male weightlifters[13];

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http://dx.doi.org/10.1016/j.jajs.2017.10.006
2214-9635/

highlighting the association between weight training amongst athletes and lateral clavicle osteolysis. Additionally, the increased number of women in weight lifting and sports involving overhead throwing, coincides with an increase of females presenting with lateral clavicle osteolysis.[14]

Early management of lateral clavicle osteolysis consists of rest and activity modification. The use of non-steroidal anti-inflammatory drugs (NSAIDs) are recommended to reduce inflammation, however it has been debated that NSAIDs may reduce bone healing.[15] Additionally, intra-articular corticosteroid injections may temporarily relieve the pain. Worcester et al.[16] have argued that temporary relief of pain provided by a steroid injection may second as a diagnostic tool indicating that the pain is localised to the AC joint; patients who experienced only temporary relief of their symptoms after two injections, were candidates for surgery and noted full relief of their symptoms post-operatively.[16] Surgical intervention is recommended for a symptomatic AC joint that has failed conservative treatment. Typically there is point tenderness of the AC joint, combined with abnormalities on radiographs. The excision of the lateral clavicle has become the mainstay of surgical treatment.

The present study evaluates the outcome of lateral clavicle excision in patients with lateral clavicle osteolysis. The success of the procedure was evaluated based on pre- and post-operative shoulder outcome scores. Other epidemiological factors were also assessed with regards to their effect on surgical outcomes.

2. Materials and methods

2.1. Patient demographics

Data was extracted over a 24 month period from patients who required a lateral clavicle excision due to osteolysis. All patients were in the care of one senior shoulder surgeon and procedures carried out at one day-case unit. Nineteen patients were identified as eligible for the study, with a minimum follow up period of 3 months. Three patients could not be contacted to evaluate their post-operative outcomes and were subsequently excluded from the present study. As a result, 16 patients were included in this study; where 15 patients had unilateral surgery and one patient, bilateral.

The patient cohort consisted of two females and fourteen males, with a mean age of 33.56 ± 12.17 (range 18–59). Professional athletes accounted for 56% of the patient population (n = 9); where 50% of patients were professional rugby players (n = 8). Additionally, the current series included one professional water polo player and a semi-professional rugby player. The remaining patients participated in sports at a recreational level; ranging from weight lifting, triathlons and football. The diagnosis of osteolysis was made on MRI in 87.5% of cases and plain radiography alone in the remainder.

2.2. Surgical technique

Surgery was performed under general anaesthesia, with an interscalene brachial plexus block. The patient was placed in a beach chair position.[17] Following arthroscopic examination of the glenohumeral joint, the subacromial bursa was entered and the AC joint exposed inferiorly. Instruments were inserted into the AC joint via direct anterosuperior and posterosuperior portals to deride the lateral end of clavicle. Bony resection was kept to minimum due to the osteolysis of the lateral clavicle, in order to avoid any ligament damage and instability. The anterior, superior and posterior capsule and AC ligaments were not breached. After resection, the joint was then examined arthroscopically from both the anterior and posterior portals, to check for any loose bone fragments and the lateral clavicle was stressed to assess for any excess mobility after resection.[13]

2.3. Outcome measures

To investigate the efficacy of lateral clavicle excision for osteolysis, shoulder outcome scores were utilised both pre- and post-intervention. The present study employed Constant Shoulder Score[18] and QuickDASH[19] scoring instruments. Additionally, all patients were asked to rate their satisfaction with their affected shoulder. This was carried out using a visual analogue scale (1–10) both pre- and post-operatively.

2.4. Statistical analysis

Statistical analysis was conducted using IBM SPSS software version 20. Nonparametric statistics were used in the present study. Wilcoxon matched pairs tests were performed to assess the pre and postoperative difference between outcome scores and patient satisfaction. When $p < 0.05$ data is deemed as significant and highlighted with an asterix (*).

3. Results

In the present study, 81% of patients present with lateral clavicle osteolysis as a result of a sport (n = 13); 50% rugby, 12.5% lifting weights (n = 2), while 1 injury was related to cricket, water polo and cycling respectively (Fig. 1).

Prior to lateral clavicle excision surgery, 87.5% of patients received an AC joint corticosteroid injection (n = 14). Of those who had injections, 36% noted slight improvement (n = 5), 29% reported a significant improvement (n = 4), while 14% of patients reported no improvement at all (n = 2) (Table 1). The effect of the injections on a further 3 patients (21%) was not recorded.

The mean time taken from symptoms to surgery was 9 months (1–36 months). All patients were reassessed for shoulder outcome scores at mean follow-up time of 21.38 ± 10.69 months (range 3–40). A significant improvement in the Constant Shoulder Scores was noted, as depicted in Fig. 2A. The mean pre-operatively score improved from 52.3 ± 12.1 to 87.3 ± 17.8 post-operatively ($p < 0.001$), with a 95% confidence interval (CI) of 23.41 to 46.6. Improvement in QuickDASH scores were noted following lateral clavicle excision as depicted in Fig. 2B, from 30.5 ± 6.4 to 6.8 ± 1.2 ($p = 0.012$), with 95% CI of 39.97 to 7.51. The work module of the QuickDASH score averaged 25.0 pre-operatively and 0.0 post-operatively. Despite the decrease of 25.0 points, this improvement

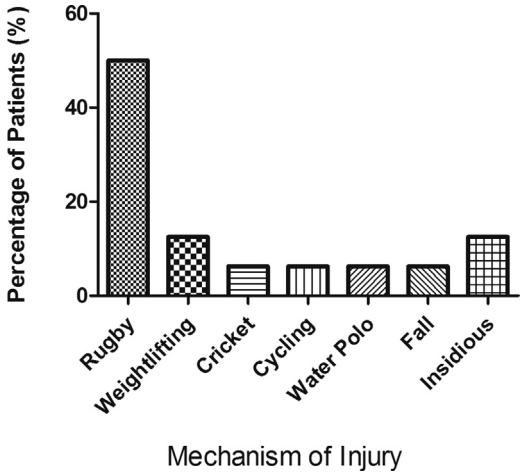

Fig. 1. Aetiology for lateral clavicle Osteolysis.

Please cite this article in press as: E. Torrance, et al., Surgical outcomes of arthroscopic lateral clavicle excision for osteolysis, J Arthrosc Jt Surg. (2017), https://doi.org/10.1016/j.jajs.2017.10.006