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Case Report

Case report of a surgical neck humerus fracture due to strength training

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ABSTRACT

The incidence of the surgical neck fractures of humerus is increasing, especially among younger age groups as they place higher demands on their shoulder joints. Resistance training and heavy weight lifting have been implicated in a number of orthopedic upper extremity injuries. Acute sprains or strains are the most common type of reported injuries. Other reported weightlifting injuries includes pectoralis tendon ruptures, distal bicep injury, and shoulder capsulolabral complex injuries. To our best knowledge, there are no reported cases in the literature describing surgical neck humeral fracture in a young adult due to heavy weight strength training without any underlying medical predisposing condition. This case report describes a surgical neck proximal humeral undisplaced fracture in a 44 year old male which was treated conservatively with an uneventful recovery.

Introduction

The incidence of the surgical neck fractures of humerus is reported to be around 85% in people older than 50, with the peak incidence in the 60- to 90-year-old age-group with a female to male ratio of 70:30 [1]. This incidence is increasing, especially among younger age groups as they place higher demands on their shoulder joints as a result of high levels of activity. Management of this common injury is often challenging and controversial [2]. Conventionally, there was a consensus that minimally displaced fractures, poor surgical candidates, and low demand patients should be treated conservatively while displaced, comminuted, or angulated fractures in good surgical candidates should be treated with plating, percutaneous techniques, intramedullary nailing or even arthroplasty. However, the more recent PROFTHER clinical trial (PROximal Fracture of the Humerus: Evaluation by Randomisation) questioned this conventional consensus, stating that there is no clear and rigid dichotomy between surgical and non-surgical indications and that the choice of surgical intervention needs to be considered more carefully [3].

In the younger population, high-energy trauma is a more frequent cause. Additional mechanisms include violent muscle contractions as those from seizures or electrical shock. Resistance training and heavy weight lifting have been implicated in a number of orthopedic upper extremity injuries. Acute sprains or strains are the most common type of reported injuries and accounts for 46.1% of all resistance training injuries [4]. Weightlifting injuries are associated with overuse and are more common in aging athletes who suffer from increased rates of tendinopathy, tendon rupture and degenerative joint disease. The reported weightlifting injuries include pectoralis tendon ruptures, distal bicep injury, and shoulder capsulolabral complex injuries [5].

To our best knowledge, there are no reported cases in the literature describing surgical neck humeral fracture in a young adult due to heavy weight strength training. This case report describes a surgical neck proximal humeral undisplaced fracture in a 44 year old

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Fig. 1. Anteroposterior, axillary and lateral scapular view of the right shoulder of the patient on presentation showing a possible subtle fracture in the axillary view which warranted further MRI imaging.

male which was treated conservatively.

Case report

A 44 year old male presented to the emergency department at our institute (Brighton and Sussex university hospitals – United Kingdom) on October 2018 with acute pain in the right shoulder after free heavy weight lifting (50 kg) in the gym. On examination there was pain on palpation of the right greater tuberosity with minimal swelling and full range of motion despite pain at extremes of motion. His neurovascular examination was intact. An emergency radiograph was requested and was suspicious of a fracture of surgical neck of the right humerus due to slight posterior angulation and radiodensity in the lateral view (Fig. 1).

The patient had a magnetic resonance imaging (MRI) of his right shoulder which further confirmed the diagnosis. The MRI revealed an acute stress fracture of the humeral head and neck with mild displacement at the humeral neck posteriorly and medially and a mild glenohumeral joint effusion. There were also undisplaced fractures of both tuberosities in addition to evidence of a partial tear at the teres major insertion and a low-grade strain of the infraspinatus muscle origin (Fig. 2).

There was no evidence of an underlying pathological bone lesion. Supraspinatus, subscapularis, biceps, teres minor and pectoralis were intact and there were no identifiable labral tears or cartilage abnormalities.

Since the fracture was minimally displaced, a conservative management with only a broad arm sling and non-weightlifting was advised. Patient was kept in a broad arm sling with physiotherapy and was followed up after one month for check radiographs. The

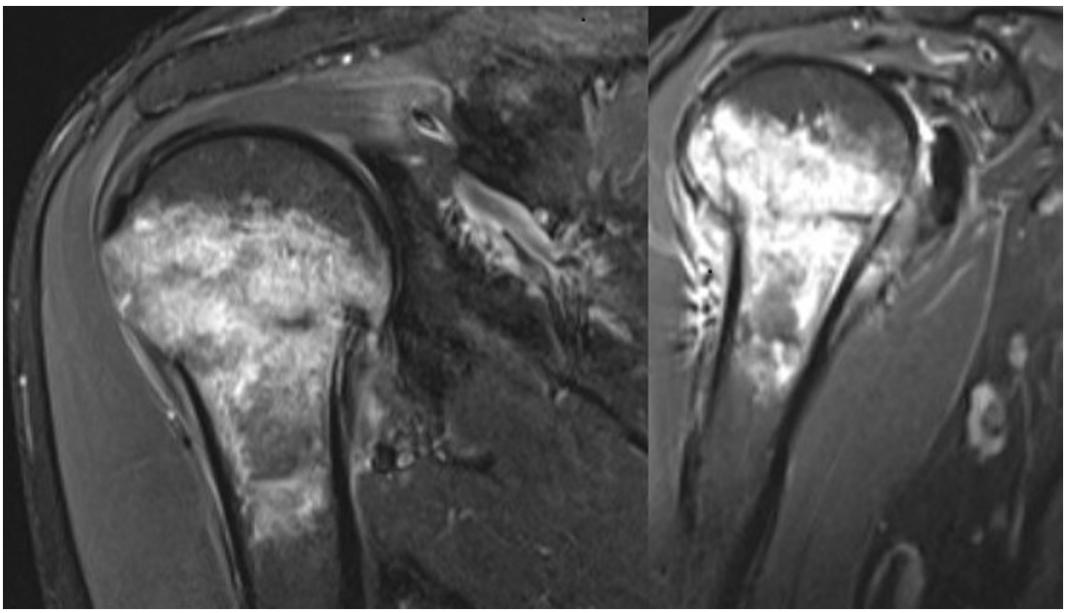

Fig. 2. MRI T2 coronal and sagittal images showing bone marrow edema consistent with an undisplaced stress fracture of the surgical neck of right humerus.

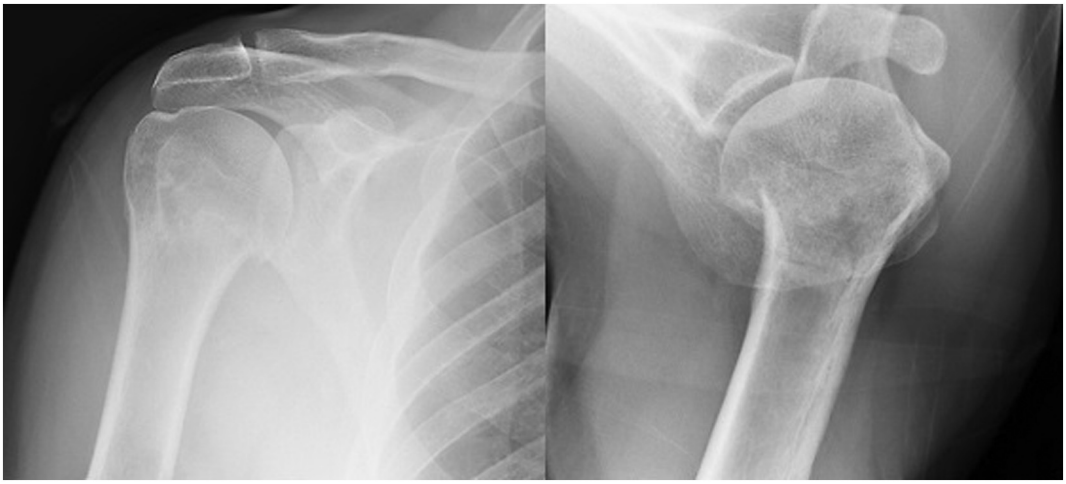

Fig. 3. Anteroposterior and axillary view of the right shoulder of the patient after one month showing no displacement of the fracture and acceptable position.

follow-up radiographs revealed no displacement (Fig. 3).

On examination, the patient had full painless range of motion. The arm sling was removed and patient advised to refrain from heavy weightlifting for another one month.

Discussion

Strength training can place considerable stress across the shoulder by essentially causing the shoulder joint to become a weight bearing joint. This can result in a myriad of overuse complaints including strains of all the major muscle groups around the shoulder, including the deltoid and the rotator cuff. Injuries sustained during resistance training are mostly mild strains that resolve conservatively with appropriate rest.

In more severe cases there is even a radiographic evidence of distal clavicular osteolysis. Fractures around the shoulder due to strength training also have been reported. A stress fracture at the bony insertion of pectoralis major muscle has been reported in a weightlifter which was treated conservatively with an uneventful recovery [6]. Shoulder dislocations associated with strength-training exercises have also been reported in the literature [7]. Also an associated glenoid fracture was reported [8]. Tendon ruptures of the pectoralis major especially as a result of bench pressing, biceps, and triceps is a recognizable complication of improper heavy weight lifting technique and has been described [9].

Stress fractures of the distal clavicle, humerus, radius, and ulna; traumatic fractures of the distal radius and ulna in adolescent weightlifters; and compressive and stretch neuropathies [10]. These more severe injuries are usually the result of improperly performing a strength training exercise.

To our best knowledge, despite these reported injuries, there are no reported cases in the literature describing a surgical neck humeral fracture as a result of strength training. Clinicians should be aware of the potential for a fracture of the humerus when examining patients involved in strength or resistance training. Physical examination signs include tenderness to palpation at the site of the fracture. Shoulder and elbow range of motion is typically full but pain may be present at the ends of motion.

Due to the low sensitivity for radiographs in stress fractures, magnetic resonance imaging (MRI) may be necessary to identify early changes within bone and a low threshold should be kept for requesting such imaging. Treatment includes non-weight bearing of the affected upper extremity and cessation from all sport and exertional activity involving the upper extremity for four to six weeks.

Conclusion

Educating athletes regarding proper strength-training techniques serves to avoid the related injury patterns. Recognizing the association of anabolic steroid use to several of the injury patterns further reinforces the need for medical specialists to counsel athletes against their use. Greater enthusiasm towards competitive performance of younger athletes emphasizes the importance of proper supervision of these young athletes by knowledgeable persons. It is predicted that there will be ample opportunity to continue to catalog the injury patterns associated with this activity as the popularity of strength training grows.

Conflict of interest statement

The authors declare they have no conflicts in interests. An informed consent was taken from the patient for publication of this case report.

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