Fracture of Proximal Humerus in the Lateral Anchor Site after Suture Bridge Repair - A Case Report

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To report the fracture of proximal humerus in the lateral anchor site after suture bridge repair. A 57-year-old female patient with shoulder pain on the right-side was admitted through the emergency room following a car accident. Seven weeks before the accident, the patient had undergone surgery at a different hospital for the repair of supraspinatus tendon rupture on the right-side via suture bridge technique. Humerus surgical neck fracture was confirmed by X-ray, and proximal humerus fracture at the anchor site was confirmed by magnetic resonance imaging. Following 7 months of conservative treatment resulted in satisfactory bone union and motion of the shoulder joint. We report the need of close observation during and after the arthroscopic repair of the rotator cuff in patients with osteoporosis.

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Key Words: Rotator cuff; Suture anchors; Shoulder fracture

The incidence of rotator cuff rupture increases with age, which is reported at a rate from 30% up to 54% in people aged over 60 years old. Although arthroscopic repair of the rotator cuff rupture generally reports improvements in outcomes, associated complications of the surgery are also on the rise. Older patients often have co-morbidities such as osteoporosis, which gives rise to poorer bone quality of the humeral head. This in turn increases the risk of suture anchor-related complications in the arthroscopic repair of the rotator cuff. Such complications include loosening or migration of the suture anchor, as well as giving rise to other unsatisfactory surgery outcomes. However, we do not know of any incidence of proximal humerus fracture following the use of a suture anchor.

The authors report a case where a patient experienced fracture in the lateral anchor site from a previous surgery, a suture bridge repair of a ruptured rotator cuff on the right-shoulder. This fracture occurred after a car accident, which caused the anchor insertion site to act as a stress raiser, thus mediating the fracture. A literature review was also carried out in this case report.

Case Report

A 57-year-old female patient with shoulder pain on the right-side was admitted to the hospital following a car accident an hour earlier. At the time of the accident, the patient was sitting in the front passenger seat and was not wearing a seatbelt. In addition, the driver was not substantially hurt from the accident. From physical examination of the patient, active motion of the shoulder joint was severely restricted, and passive forward elevation of the shoulder joint was possible up to around 90 degrees but the patient complained of extreme discomfort from pain. No other physical injuries were observed, but the patient also complained of pain when the front of the proximal humerus was pressurized.

A surgical scar was detected in the proximal humerus, and a detailed follow-up revealed that the patient had undergone surgery around 7 weeks ago at a different hospital. After consulting the surgical records from this hospital, we confirmed that the patient was undergoing conservative treatment following surgery.
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specifically, acromioplasty and debridement via mini-open treatment to repair the supraspinatus tendon rupture and the biceps tendon partial tear. To repair the supraspinatus tendon rupture, a suture anchor was used to carry out a suture bridge technique.

Simple X-ray confirmed humerus neck fracture. The type of fracture was categorized using A0 and Neer classifications, which were A2 and type 1, respectively. Axial and coronal computed tomography (CT) scans were carried out for a more detailed observation of the fracture, which showed fracture of the humeral surgical neck with impaction (Fig. 1).

In the emergency room the patient was treated by closed reduction, immobilization of the shoulder with a splint and use of a shoulder abduction orthose, and a conservative treatment was agreed on henceforth. On day 2 of admission, an magnetic resonance imaging (MRI) scan of the shoulder was carried out to determine the extent of damage in the surgery area. The coronal and sagittal image of the MRI show an intact supraspinatus tendon but fracture of the humeral surgical neck in the lateral anchor site (Fig. 2). From testing the lumbar anteroposterior bone density, using DEXA (LUNAR, BX-1L; GE Medical Systems, Milwaukee, WI, USA), the patient was diagnosed with severe osteoporosis with a T-score of -3.5. The patient had never been diagnosed with osteoporosis until then.

Following 4 weeks of conservative treatment, the patient’s pain had significantly decreased. At this point, the splint was removed, the shoulder abduction orthose remained, and pendulum motion and forward elevation exercises were started. Following 6 weeks of conservative treatment, the shoulder abduction orthose was removed and full-motion active assistive exercise was started using a pulley and a stick. Following 7 months of conservative treatment, active motion of the shoulder joint was possible in all directions and bone union was observed.
Discussion

The arthroscopic repair of the rotator cuff rupture include single row repair, double row repair, suture bridge technique, as well as mini-open surgeries including open repairs such as transosseous repair. The suture bridge technique is a modification of the transosseous repair which encompasses the use of an arthroscope. The technique uses several suture anchors which are inserted on the medial boundary of the anchor attachment site, thus creating a medial row. Then, a suture is passed through the ruptured rotator cuff, after which a horizontal mattress suture is carried out and a knot is made. The knot is not cut, and a row of suture is collected on each suture anchor, which is then connected onto unknotted suture anchors. This is then inserted at a distal point, around 1 cm laterally of attachment site of the rotator cuff. This way, the suture pressurizes the sutured rotator cuff, giving the general effect of a transosseous repair.

In this case, there were 2 anchor sites, medial and lateral. The fracture occurred in the lateral anchor site and the fracture line accurately passed through both of the insertion sites of the 2 suture anchors. This reflects that the lateral anchor insertion site was weaker than the other sites, and may have acted as a stress raiser, resulting in a fracture. Therefore, the lateral site anchor insertion should be carried out with caution in patients with osteoporosis.

The authors propose the following preventive method. By separating the location of the medial and lateral anchor sites, the area which may act as a stress raiser can be dispersed. This can be achieved by inserting each of the suture anchors so that the longitudinal distance between the two anchors increases. Another method has been proposed by Giori et al., which is the use of bone cement to securely fix the suture anchor during anchor hole augmentation surgery, thereby increasing the bone density.

Arthroscopic surgery using biosuture anchors report several complications, which include joint dissolution, osteolysis, pigmented villonodular synovitis and chondrolysis. Freehill et al. have used a poly-L-lactide acid tack for arthroscopic surgery in 52 patients, out of which 10 (19%) have reported complications. Within 8 months of surgery, the 10 patients reported pain and disability in joint movement. Further, a secondary arthroscopic examination showed that all patients had pigmented villonodular synovitis, 9 patients had fixture debris and 6 patients had evidence of cartilage damage. All 10 patients underwent debridement, out of which 7 patients reported satisfactory outcomes, whilst the 3 patients with cartilage damage did not show improvements in pain. Athwal et al. also used biosutures to treat 4 patients, which was followed-up by arthroscopy for 3 to 18 months after surgery. In the follow-up, all 4 patients had widespread cartilage damage in the joints and the proximal humeral head. However, what is meaningful is that unlike the above examples which report complications, the present case reports a fracture.

Banerjee et al. report the use of biosutures in the labral repair in 3 athletes, which were complicated by osteolysis and the subsequent fracture of the glenoid rim. All 3 patients showed a cyst formation, joint fracture and/or glenoid rim fracture at the suture anchor site, as evidenced by CT and MRI scans. What is different in our case is that the fracture occurred in the proximal humerus in the lateral anchor site.

The authors saw that in patients with osteoporosis, suture bridge repair of the ruptured rotator cuff may cause fracture at the lateral anchor site because of weakening. Furthermore, the authors report that conservative treatment resulted in satisfactory results, reflecting the need for caution during and after the arthroscopic repair of the rotator cuff.

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