Technical Note

Fixation of Greater Tuberosity Fractures

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Abstract: The authors describe arthroscopic reduction and percutaneous fixation of greater tuberosity fractures of the humerus with displacement of more than 0.5 cm. Arthroscopy for reduction and fixation of this fracture presents the same difficulties and advantages as arthroscopic repair of rotator cuff tears. **Key Words**: Humerus fracture—Arthroscopy—Treatment of fractures—Greater tuberosity fracture.

Displacement of the greater tuberosity fracture of the humerus has been less and less accepted because of the functional changes resulting from this injury.[1] We indicate reduction of the fractured fragment in displacements greater than 0.5 cm (Fig 1).[2] In case of doubt regarding displacement of the fragment, computed tomography or magnetic resonance imaging is indicated.[3]

SURGICAL TECHNIQUE

The patient is placed in the lateral decubitus position with longitudinal traction of the affected upper limb and given general anesthesia together with brachial plexus block.[4] The arthroscope is introduced posteriorly and the surgical instrument anteriorly to examine the intra-articular region. The fracture is identified and if some scar tissue is already present at the site it is undermined from the humerus to facilitate its recognition in the subacromial region. After examination of the articulation for associated injuries,[5] the arthroscope and instruments are inserted into the subacromial region. A lateral approach is made in the subacromial region (similar to that used for repair of the rotator cuff) to simplify manipulation of the fragment.

The fractured fragment is identified in the subacromial region. When fractures are older than 5 days, it may be necessary to debride scar tissue around the fractured fragment as well as around the site corresponding to its separation. The fractured fragment is reduced under arthroscopic visualization[6] to the corresponding site through the lateral portal.

A percutaneous Kirschner wire is now introduced that acts as a guide for introduction of a threaded screw with a washer, in the direction of the fractured fragment and at an angle of 45° in relation to the humeral diaphysis. The site of introduction of the Kirschner wire should be previously determined with the aid of a percutaneous needle under arthroscopic guidance (Fig 2). The fracture is reduced and maintained by the grasping forceps and the Kirschner wire. If the quality of the reduction is doubtful, an image intensifier can be used to confirm the position of the fragment and its fixation.[6]

Now, through a small incision at the site of insertion of the Kirschner wire, the threaded screw is introduced (Fig 3). Tightening of the screw should be accompanied by arthroscopic visualization so as to

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0749-8063/04/2008-4337$30.00/0

doi:10.1016/j.arthro.2004.07.017

FIGURE 1. Displaced greater tuberosity fracture.

prevent excessive tightening of the tissue that is being fixed.[6] Generally this tissue is friable and of poor quality, and can tear if tightened too much. If the fragment can tolerate more than 1 screw for fixation, the procedure can be repeated. Fixation is tested by rotation of the shoulder. The arthroscope and instruments are removed and the incisions closed.

Postoperatively, the operated upper limb is placed in a sling and passive exercises are started after 2 or 3 days or as soon as pain permits.[6] Assisted active exercises begin 15 days postoperatively with discharge after the third week. Return to physical activity is recommended after 6 weeks.

DISCUSSION

Greater tuberosity fractures of the humerus have proved to be very debilitating when not properly treated.[1,7] The standard of accepting a displacement of up to 0.5 cm before indicating surgical reduction of the fracture is based on the poor results achieved with this type of fracture, particularly in young adults when displacement over that described is permitted.[2]

Reduction of the fracture and open fixation by a deltoid-pectoral approach promotes a major anatomic aggression. The same procedure through a small longitudinal incision lateral to the deltoid reduces this aggression. We used these same approaches until we learned to repair the rotator cuff using arthroscopy. Therefore, following the same rationale, we began to treat fractures of the greater tuberosity by the arthroscopic approach.[6,8,9]

Reduction of the greater tuberosity fracture of the humerus should be as anatomic as possible because its displacement is not well tolerated.[1,2] Nevertheless, the surgical aggression for its reduction should not exceed the injury of the fracture itself. When we began to treat this fracture arthroscopically, our expectations were confirmed—the degree of difficulty is similar to that of repairing the rotator cuff and morbidity is less than in open surgeries.

The materials and instruments used for this procedure are the same as for any other arthroscopic procedure. The threaded screw can be small or large depending on the fracture. A washer should be used for fixation because the tissues are usually friable and not very resistant to tightening of the screw. Even if the bone tissue of the fracture is of poor quality or reduced in quantity, the washer provides sufficient fixation to maintain reduction of the fracture in a stable manner. The screw is approximately 30 mm in size.

Arthroscopic reduction of the fracture permits adequate preparation of the fractured fragment and of the region where it will be reduced and fixed, removing all the scar tissue that has formed if the fracture is old.

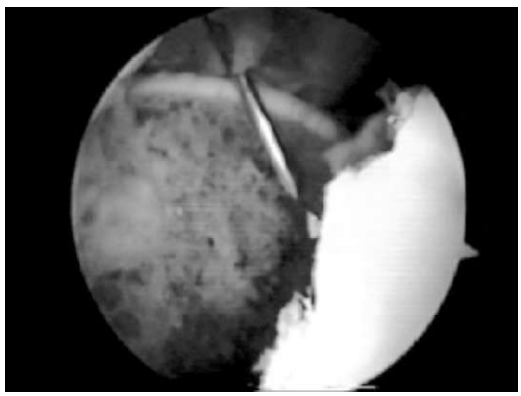

FIGURE 2. The percutaneous needle used to determine the point of introduction of the Kirschner wire to fix the greater tuberosity.

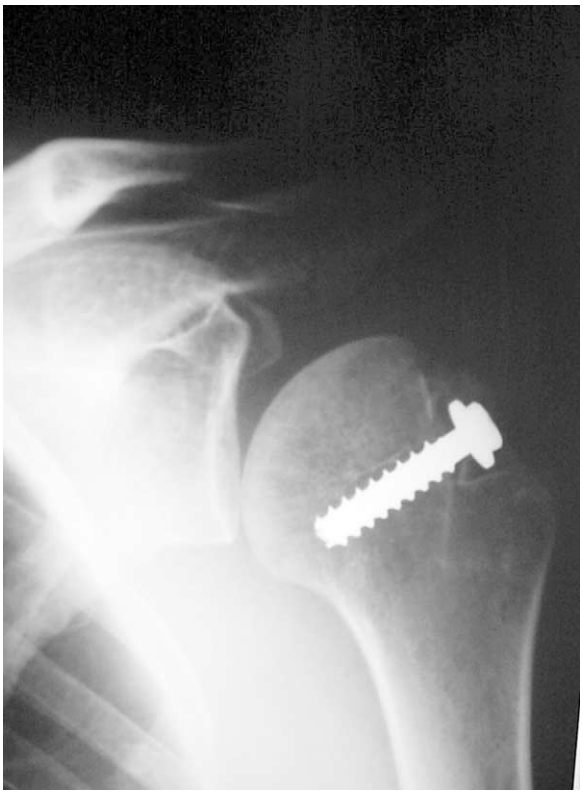

FIGURE 3. Arthroscopic percutaneous fixation.

In addition, it is possible to examine all the glenohumeral articulation to discover other associated injuries.[5]

Initially we may need to use the image intensifier to confirm reduction of the fracture,[6] but as experience increases the need to employ it is reduced. The time necessary for this procedure is similar to that used for arthroscopic repair of rotator cuff tears.

Postoperative recovery of motion is quick because patients begin passive movement as soon as they can withstand the pain. This usually occurs within 2 or 3 days.[6] Injury to the deltoid muscle is less than with any open procedure. This is one of the advantages of the arthroscopic technique.

The technique for reduction of the greater tuberosity fracture of the humerus should progress as we acquire more experience, chiefly with regard to the specific instruments and materials used for the procedure.

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