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Shoulder Arthroplasty for Posttraumatic Arthritis

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Posttraumatic arthritis is a degenerative arthritis of the glenohumeral joint that develops after previous fracture and is characterized by bony deformity and soft tissue changes. Articular incongruity in the absence of significant deformity is a good prognostic factor, as is the ability to correct all osseous and soft tissue abnormalities. The need for greater tuberosity osteotomy is a poor prognostic factor. Poor results may also be due to irreparable soft tissue deficits, tension on the tuberosities interfering with healing, limited healing potential in the presence of nonunion, poor patient compliance, and prosthetic design not being conducive to tuberosity reattachment.

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Posttraumatic arthritis (PTA) is a degenerative arthritis of the glenohumeral joint that develops after a previous fracture, whether or not surgery was performed. Hemiarthroplasty or total shoulder arthroplasty for the sequelae of fractures is a difficult undertaking because PTA is often characterized by bony deformity and soft tissue changes and compromise. The soft tissue changes are important to understand, because, while osseous changes may be easily seen and appreciated on radiographs, the soft tissue changes may be easily overlooked and underappreciated but are invariably present. Bony deformity may be anywhere on a wide spectrum. There may be mild deformity that results in mild prominence of the tuberosities, mild head varus, or mild retroversion of the head or there may be an extensive malunion, with complete disruption of the bony anatomy. But the soft tissue changes are equally important. Bony deformity can frequently be overcome. A soft tissue problem in this area is more difficult to overcome potentially, whether it is contracture, rotator cuff tear, or some other compromise, or some residual impingement.

Clinical Features

Posttraumatic arthritis tends to be a disorder of older patients, as fractures of the proximal humerus are more common in older age groups. However, fractures and their se-

quelae may occur in any age group. Patients predominantly complain of pain, with variable functional loss due secondarily to pain or any deformity present. Careful history and physical examination, as always, are critical in the assessment of the patient. Previous surgical scars should be carefully noted to plan for an operative approach. Multiple previous operations are indicative of extensive scarring through the surgical field with distortion of the normal anatomy. Examination for possible neurologic injury is important as well (Fig. 1). Nerve compromise as a result of the initial injury or previous surgery can certainly be present. Axillary nerve injury, in particular, can be quite devastating and will compromise the outcome of any treatment.

Preoperative Evaluation

Preoperative evaluation should begin with laboratory studies to evaluate for possible occult infection, always a concern in patients who have undergone a previous operation. General screening studies should include complete blood cell count, erythrocyte sedimentation rate, and C-reactive protein. If there is any concern about potential nerve damage, electromyography and nerve conduction studies should be performed. Preoperative imaging studies begin with a complete set of plain radiographs, including anteroposterior (AP) internal rotation, AP external rotation, and axillary lateral view. The radiographs should be reviewed for bony deformity or deficiency as well as location of any hardware from previous surgeries. These views may be sufficient to fully appreciate the osseous deformity present, but a computed tomographic scan (CT) is often necessary as well (Fig. 2). Three-dimensional reconstructions are now more easily obtained and offer increased radiographic detail and better representation of the

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Figure 1 Patient with previous proximal humerus fracture with an axillary nerve palsy. Note the complete atrophy of the deltoid with increased prominence of the acromion. This patient's outcome is likely to be compromised regardless of the treatment. (Color version of figure is available online.)

amount of deformity present. It is absolutely essential to completely understand the nature of the deformity or have a reasonable understanding of it before going into the operating room, or it is more difficult intraoperatively to understand where the pieces are because of the presence of soft tissues, scarring, and contractures. Thorough preparation before surgery will enable a smoother operation.

Surgical Technique

At the time of surgery, careful handling of the soft tissues is critically important. The general principle in all patients, whether they've had surgery before or not, is one of reestablishing the soft tissue layers. The deltopectoral approach is used in the vast majority of cases. Wide subcutaneous tissue flaps enable better exposure of the deeper tissues. The subdeltoid and subacromial spaces are developed, especially the subdeltoid space posteriorly. Full mobilization of the subacromial and subdeltoid space are important to restore the gliding mechanism of the rotator cuff. The pectoralis major is then mobilized off the conjoined tendon, or strap muscles, followed by mobilization of the strap muscles off the underlying subscapularis.

Management of the lesser tuberosity is less of a concern than the greater tuberosity; therefore, the lesser tuberosity may be osteotomized if the surgeon prefers as his or her method for opening the joint. Our preference is to elevate the subscapularis directly off the lesser tuberosity, avoiding the osteotomy. The lesser tuberosity is then reshaped and trimmed to remove any prominence and improve exposure. At the end of the procedure, the subscapularis is then reattached directly to bone.

Once the joint is exposed, mobilization of the rotator cuff continues from the intraarticular side. Soft tissues adjacent to

the glenoid are circumferentially released to enhance the gliding of the rotator cuff.

Management of the greater tuberosity is challenging. Previously, the senior author would frequently osteotomize the greater tuberosity in an attempt to return the tuberosity to its proper, anatomic position. However, problems with tuberosity healing, loss of fixation, and resorption of the tuberosity were not uncommon and have led to a change in philosophy.

Currently, our preferred approach is to accept some degree of residual deformity and even suboptimal component position whenever possible to avoid a greater tuberosity osteot-

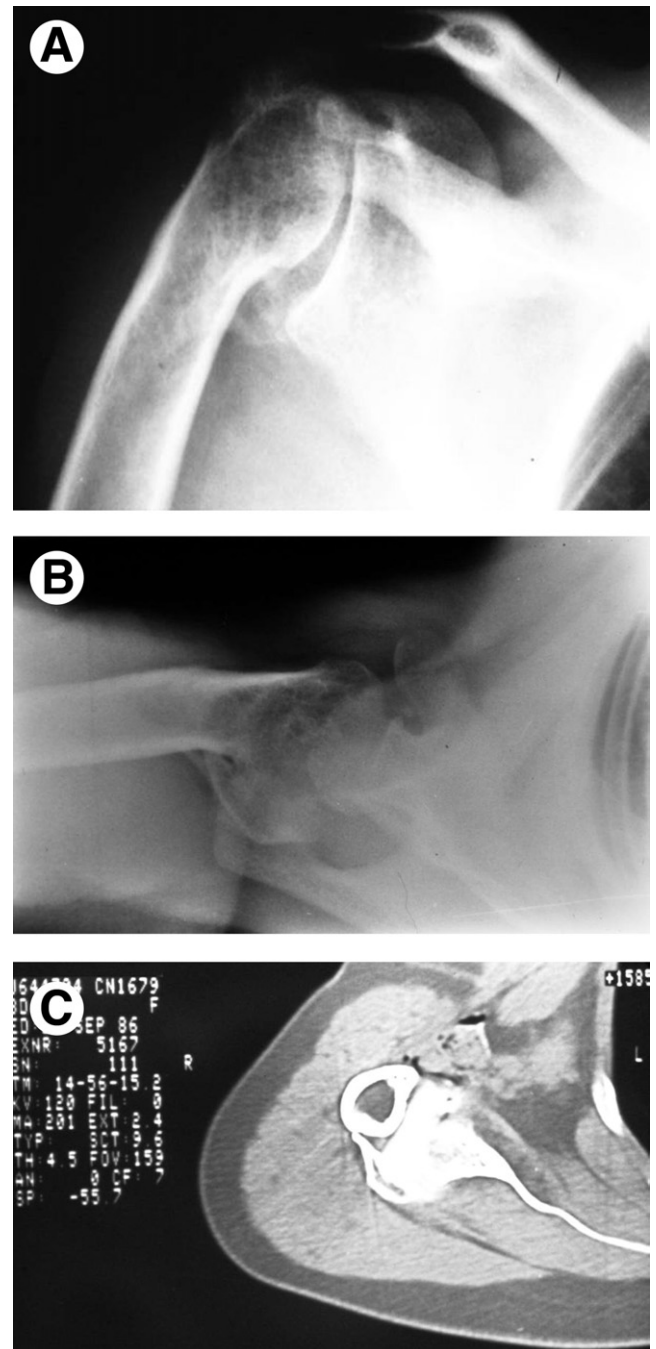


Figure 2 Plain radiographs clearly show deformity present, but the CT helps to better show the true extent of the malunion.

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