Fig 4: Postoperative radiograph with a press-fit, modular acetabular component.

ene liners from uncemented, modular, press-fit cups is a rare but documented phenomenon. Liner disassociation, however, can occur in both modular and non-modular metal-backed components. This report describes the second case report of a polyethylene liner disassociation of factory-assembled, nonmodular, cemented, metal-backed acetabular component. Eight other cases of nonmodular dissociation have been described, all in uncemented systems manufactured by the same company.

A well-fixed acetabular component is a desirable result, but presents a problem if the polyethylene liner needs to be replaced. As in this case, a nonmodular system had been used. Treatment options consist of acetabular revision with resultant bone loss and risk of fracture or to cement a smaller liner into the preexisting metal shell. The latter option is only possible if a large shell is in place. However, it is mechanically and biologically inferior. Interdigation of the cement into the smooth metal surface is not possible, and multiple interfaces for loosening are created.

We believe that the liner disassociated because of two processes: cold deformation resulting in fatigue failure of the thin polyethylene rim on the metal backing, in combination with forceful impingement from the neck of the femoral component onto the liner during the traumatic dislocation. This may result in a fracture of the already worn polyethylene rim, which secures the liner to the backing, allowing the polyethylene to be levered out of the metal shell.

The eight previous case reports of dissociation of nonmodular, uncemented components were from the same manufacturer (PCA Howmedica, Rutherford, NJ). These failures are believed to be from repeated impingement of the femoral neck on the polyethylene causing cold deformation, fatigue failure of the rim, as well as wear and fracture of the central stabilizing peg of the liner.

We agree with Ferenz and Beaver in that manufacturers should provide radiodense markers for acetabular inserts as this would facilitate diagnosis. In most reported cases, the dissociation often is missed because the femoral head is usually within the acetabulum, albeit asymmetrically.

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SIMULTANEOUS BILATERAL GLENOID FRACURES ASSOCIATED WITH GLENOHUMERAL SUBLUXATION/DISLOCATION IN A WEIGHTLIFTER

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Glenoid fractures are unusual injuries, accounting for only 10% of fractures of the scapula. Ideberg classified glenoid fractures into five types, with type I being the most common—an avulsion of the anterior glenoid. These fractures can be secondary to indirect or direct trauma to the glenoid. According to Ideberg, the type I glenoid fracture is the only type caused by indirect trauma and often will present with an anterior dislocation. Reactive ossification appearing at the glenoid rim in long-standing glenohumeral instability should not be confused with the acute avulsion fractures.

Other authors, however, feel that a small percentage of type I fractures can
be due to direct trauma.\textsuperscript{1,6,7,8} Goss\textsuperscript{1} has attributed true type I fractures to direct trauma to the shoulder and feels that avulsion fractures are another entity entirely. There are only three cases documented in the literature in which the type I pattern of fracture is known to have arisen from a direct lateral blow.\textsuperscript{9} A subclassification of type I fractures has been widely adopted in which type Ia fractures are anterior glenoid fractures, while type Ib fractures are posterior glenoid fractures occurring with posterior dislocation or a posteriorly directed force. The other four types as defined by Ideberg are listed in the Table.

This report presents an unusual case of a weightlifter who sustained simultaneous bilateral Ideberg type Ia glenoid fractures with bilateral dislocation. Bilateral glenoid fractures rarely have been reported in the literature, occurring most often in posterior dislocations due to convulsion.\textsuperscript{9} One case of bilateral glenoid fractures due to trauma was found in our review of the literature; types were not specified.\textsuperscript{3} There is no mention in the literature of any previous report of bilateral glenoid fractures occurring during athletic activity. In the case reported below, the patient's simultaneous bilateral glenohumeral dislocations (as evidenced by bilateral Hill-Sachs lesions) are also rather unusual. Bilateral glenohumeral dislocation is not necessarily uncommon in situations such as seizure or electrocution. However, only two other cases were found in the literature describing simultaneous bilateral glenohumeral dislocation occurring during sports: one a water skier and one a weightlifter.\textsuperscript{10,11}

**CASE REPORT**

A 42-year-old, right-hand dominant, man who was a policeman and martial arts expert presented with bilateral shoulder pain secondary to an injury sustained while weightlifting 2 days prior. On the day of the injury, he was home performing an unspotted inclined bench press of 165 lb with freeweights. As he attempted to replace the bar on the rack at the end of a set, he overshot. This resulted in a position of forward flexion, abduction, and external rotation. At this point, the patient felt a “pop” in both shoulders and “felt his arms go dead.” The bar fell to the floor. He lifted his arms and internally rotated his shoulders and described a jerking motion in his shoulders with a decrease in pain. Sensation quickly returned to both extremities. Pain persisted with abduction and external rotation.

He was evaluated with radiographs at an outside center on the day of the injury and noted to have bilateral glenoid fractures but neither shoulder was noted to be dislocated at that time. Referral to our center was made and he presented to us 2 days later on January 13, 1993.

Physical examination revealed marked restriction of active glenohumeral motion bilaterally due to pain. No neurological deficit was noted. Passive motion produced significant pain, especially with external rotation and abduction. Because the radiographic diagnosis was known, we were not overzealous in our range-of-motion assessment. There was a marked apprehension sign on the left, less so on the right.

Plain radiographs showed bilateral anteroinferior glenoid fractures. The left (Figs 1A-1B) was more displaced than the right (Figs 2A-2B). Computed tomography (CT) scans of both glenohumeral joints assessed displacement, extent of intra-articular involvement, and the possible need for surgical open reduction and internal fixation (ORIF). The CT scans confirmed the displacement (>5 mm) of the left glenoid fracture and the presence of mild Hill-Sachs lesions bilaterally (Figs 1C and 2C).

Due to this patient's high-demand occupa-
tion as a policeman, the clinical instability of the left shoulder, and the displacement of the fracture, it was believed that ORIF was indicated to obtain stability and long-term performance. The right shoulder was felt to have acceptable position of the fracture, and closed treatment was chosen.

On the seventh post-injury day, the patient underwent an examination under anesthesia, diagnostic arthroscopy of the left shoulder, and open reduction and internal fixation of the left glenoid fracture. Examination under anesthesia revealed a dislocatable left shoulder anteriorly/inferiorly. The right shoulder was stable to gentle stress with small excursions from the neutral position. It was not stressed further to avoid the possibility of displacing a nondisplaced fracture.

Diagnostic arthroscopy of the left shoulder was performed in a beachchair position to reduce stress on the right shoulder. The left glenohumeral joint was noted to be dislocated upon entering the joint and would redisclose with minimal external rotation and abduction (i.e., >30/30). Inspection of the humeral head revealed a moderate-sized Hill-Sachs lesion. The displaced glenoid fracture fragment was too large and the shoulder too grossly unstable to allow arthroscopic fixation.

ORIF was performed through a standard anterocoracoid approach, reflecting the inferior half of the subscapularis tendon to expose the fracture. Two small, free-floating pieces of articular cartilage were removed from the joint. The inferior glenohumeral ligament complex was noted to be firmly attached to the fracture fragment. The fracture site was reduced and fixed with two cannulated 3.5-mm AO screws. The capsule and the subscapularis tendon were then repaired with two Mitek suture anchors. No capsular shift was performed. The patient was immobilized in a sling and swathe postop.

Bilateral shoulder rehabilitation consisted of 2 weeks of restricted motion followed by progression through the Neer three-phase protocol. Recovery proceeded uneventfully. After 4 months, he lacked only a slight amount of external rotation on the left side (operative shoulder), but was otherwise doing quite well. He returned to all sports without restriction at 6 months and has continued to do well without complaints since that time. At his 1-year follow-up examination, he had returned to all activities without restriction, including martial arts instruction (Figs 3-4).

**DISCUSSION**

This is an unusual case because of the relative rarity of the lesion, the mechanism by which the injury occurred, and the fact that it was bilateral. Because of fracture displacement, associated instability, and the patient's high-demand career, one of the fractures in this case was fixed operatively.

Each case of glenoid fracture should be evaluated carefully for the need for ORIF. Only those with instability or gross displacement (>5-mm articular step-off) need to be addressed. In the case of Ideberg type Ia fractures, instability may be anticipated if the fracture is displaced >10 mm and at least one quarter of the articular surface anteriorly is involved. If these fractures are not accurately reduced and securely fixed, they can lead to recurrent or chronic dislocation. An anterior approach is appropriate for type Ia fractures and posterior approach for type Ib.

If the rim fragment is extensively comminuted, it may require excision and reconstruction with a tricortical iliac crest graft or a piece of the coracoid with the conjoined tendon as described by Bristow. Reconstruction with a tricortical autogenous bone graft is preferable to coracoid transfer, due to the higher complication rate associated with the latter procedure. Once a stable reduction has been obtained, rehabilitation proceeds with relatively few modifications from other procedures directed at anterior glenohumeral stability.

**REFERENCES**


EDITORIAL DISCUSSION
ORTHOPEDICS: You mention that the “displaced glenoid fragment was too large and the shoulder too grossly unstable to allow arthroscopic fixation.” Given the preoperative radiographic studies and the examination under anesthesia, what is the current role of arthroscopy in evaluating glenoid fractures? Are there any evolving arthroscopic techniques to address these fractures?

Heggland & Parker: The arthroscope potentially has a role in both the inspection of the joint and the actual reduction and fixation of the fracture. We had hoped that in this case the fracture could have been reduced under arthroscopic guidance, using a probe. Had this been possible, we would have elected to fix it with cannulated screws under arthroscopic control. We suspect that this may be a feasible method for some glenoid fractures, although it was not in this case.

The arthroscope also allows the surgeon to look for associated articular lesions, such as chondral injury to the glenoid or humeral head, loose bodies, rotator cuff tear, labral tears, biceps tendon, and superior labral anterior-posterior lesions.1 We found two small, free pieces of articular cartilage on arthroscopy.

One also can assess the joint for laxity. In this case, there was gross laxity due to fracture displacement, which was corrected by an open approach. If a fracture were fixed arthroscopically, it could be inspected for residual laxity through the arthroscope by looking for such things as a Bankart lesion or signs of capsular stretching or tear.

As available fixation techniques become more advanced and easy to use, more fractures of this type may become amenable to arthroscopically assisted fixation.

Fig 3: AP radiograph of the left shoulder taken 1 year after surgery. Two cannulated cancellous screws have successfully maintained anatomic reduction of the glenoid fracture, which has healed. The two Mitek superanchors were used to reattach the inferior subscapularis and inferior capsule.

ORTHOPEDICS: The patient’s high-demand occupation is cited as influencing the decision for ORIF. How do clinical factors such as age, occupation, and activity level affect your indications for stabilization?

Heggland & Parker: Relatively speaking, the older and more sedentary the patient, the more likely nonoperative treatment will become appropriate. In this case, even a patient with a sedentary lifestyle and low-demand occupation would have required operative fixation. One should take into account hand dominance, occupation, and activity level when deciding which patients to treat operatively. Age by itself is perhaps only a relative contraindication. Closed treatment of a glenoid fracture with associated instability may necessitate accepting stiffness and some degree of long-term decreased functional ability. Acute surgical stabilization may allow faster rehabilitation and greater chance of return to full functional status. However, there is no literature series reporting the difference between closed versus open treatment of this type of fracture.

ORTHOPEDICS: Recent clinical biomechanical investigations have emphasized the importance of capsular stretch as a component of traumatic glenohumeral dislocation. Can you elaborate on your intraoperative findings and what your criteria would be for including a capsular repair?

Heggland & Parker: Because this patient was so grossly unstable due to his fracture, we found it difficult to evaluate for capsular stretching through the arthroscope. There did not appear to be any underlying multidirectional instability. After open fixation of the fracture, the glenohumeral joint had satisfactory stability (not dislocatable or subluxatable). It also was felt that the scarring that would occur after the open procedure would assist in reducing any remaining subtle anteroinferior instability. If the joint were observed to have persistent laxity due to stretching, by direct vision with the arthroscope or by manual examination in the open procedure, we would have undertaken the anterior reconstruction, mini-shift procedure as described by Paulos.2

REFERENCES (EDITORIAL DISCUSSION)
GLENOHUMERAL PYARTHROSIS FOLLOWING ACUPUNCTURE TREATMENT

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Acupuncture recently has enjoyed increased popularity in the Western world. This ancient Asian method of percutaneous needle placement is commonly used to treat a wide variety of symptoms, many of which are referable to the musculoskeletal system. Complications of acupuncture include needle injury to vital structures, such as pleura,13 spinal cord,3,4 and peripheral nerves.14 Infections reported following acupuncture include hepatitis B and HIV infection9 as well as bacterial osteomyelitis,9,10 endocarditis,11,12 and septicemia.13

Izatt and Fairman13 reported a case of knee acupuncture followed initially by septicemia and later by septic arthritis of the elbow and wrist. Isolated septic arthritis after adjacent acupuncture treatment, however, has not been reported previously. We report here a case of glenohumeral joint pyarthrosis following acupuncture about the ipsilateral shoulder.

CASE REPORT

A 76-year-old Chinese man presented to the emergency department with fever and left shoulder pain. He previously had been in good health and denied any history of prior joint disorders, recent illness, or trauma to the left shoulder. However, his family members reported that 6 days earlier he had received acupuncture treatment for intermittent left shoulder pain of several months' duration. Two days following that treatment, he received oral dicloxacillin from a local physician for erythema around one of the acupuncture points. Pain in his left shoulder increased over the ensuing 4 days, and on the day of admission he developed a high fever and shaking chills.

On admission, the patient's temperature was 102.6°F. His left shoulder was diffusely swollen, warm, and tender to palpation. No discrete puncture wound was present. Active and passive range of motion of the left shoulder were markedly diminished by severe pain. The neurovascular examination of the left upper extremity was remarkable for diffuse swelling but was otherwise normal. The remainder of the musculoskeletal examination was unremarkable. No cardiac murmur was present.

Laboratory evaluation revealed a white blood cell count of 15,500/mm3 with 80% segmented PMNs and 6% bands. Serum chemistries were unremarkable. Plain radiographs of the left shoulder revealed a widened glenohumeral joint. There were no signs of glenohumeral or acromioclavicular joint arthrosis. No foreign bodies were visible.

Arthrocentesis of the left shoulder produced thick, purulent fluid. Gram's stain revealed numerous gram-positive cocci in clusters.

An emergent anterior left shoulder arthroscopy revealed a tense pyarthrosis and abundant synovitis. No adhesions were noted within the joint, and the articular surfaces appeared normal. Debridement, partial synovectomy, and irrigation with 9 L of saline treated with bacitracin were performed. The wound was closed over suction drainage.

Cultures taken at surgery grew Staphylococcus aureus sensitive to oxacillin and cephalothin on the first postoperative day. Intraoperative acid fast bacillus cultures and blood cultures taken on presentation were negative on final report.

Postoperatively, the patient received intravenous bacteriostatic antibiotics for 3 weeks, during which time his fever resolved. His elevated white blood cell count also normalized during this period. An echocardiogram after surgery revealed cardiac valves free from bacterial vegetations. He was discharged home 24 days after surgery and completed an additional 18 days of oral antibiotics.

After removal of the drain on the second postoperative day, the patient began aggressive passive, active assisted, and active range-of-motion exercises aimed at restoring left shoulder range of motion. At follow up 18 months after surgery, he had full, symmetrical active range of motion of both shoulders without pain (Figs 1-4) and no recurrence of fever. Plain radiographs at that time demonstrated no evidence of glenohumeral arthrosis. No other joints had become symptomatic.

DISCUSSION

The patient's history may be particularly important to timely diagnosis and treatment when infection develops following acupuncture. However, as in this case, a history of recent acupuncture treatment may not be sought or volunteered initially. Eisenberg et al14 found that 23% of United States patients who sought care from a physician for a serious health problem also had used an unconventional therapy for the same problem. Seventy percent of those patients did not report using an unconventional therapy to their physicians. Because patients may be reluctant to admit prior unconventional therapies to a physician, diagnosing septic arthritis following acupuncture requires obtaining a detailed history of previous treatments used by the patient.

Infections caused by S aureus may present as early as 2 days after acupuncture treatments.12,13 Initial symptoms began in this case on the second day, making the timing consistent with acupuncture-related infection. Because of previous reports of endocarditis following acupuncture,11,12 we attempted to exclude concurrent cardiac valve infection. A cardiac murmur suggestive of endocarditis was absent, and no findings consistent with peripheral emboli were noted by an infectious disease consultant. The negative blood cultures and absence of valvular vegetations on echocardiogram similarly argue against an underlying diagnosis of endocarditis with subsequent seeding of the glenohumeral joint. It seems more likely, given the temporal course and the proximity of the reported acupuncture sites to the infected joint,