Results of Modified Latarjet Reconstruction in Patients With Anteroinferior Instability and Significant Bone Loss

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Purpose: The purpose of this study was to analyze the results of the modified Latarjet procedure for shoulder instability associated with an inverted-pear glenoid (bone loss of at least 25% of the width of the inferior glenoid) or an engaging Hill-Sachs lesion. **Methods:** From March 1996 to December 2002, 102 patients underwent an open Latarjet procedure for shoulder instability with an inverted-pear glenoid, with or without an associated engaging Hill-Sachs lesion, by the 2 senior authors (S.S.B. and J.F.D.), and 47 of them were available for follow-up physical examination. The remaining 55 patients were contacted by telephone or letter to see if they had had recurrent dislocation or subluxation. The mean age of the patients was 26.5 ± 6.6 years (range, 16 to 41 years). There were 46 male patients and 1 female patient. Preoperatively, mean forward elevation was 177.2° ± 13.6° (range, 90° to 180°) and mean external rotation with the arm at the side was 55.3° ± 16.1° (range, 0° to 80°). All patients had a positive apprehension sign preoperatively. The median number of dislocations before surgery was 6, with 20 patients having had more than 15 dislocations preoperatively. **Results:** The mean follow-up time for the 47 patients who were personally examined was 59.0 ± 18.5 months (range, 32 to 108 months). Postoperatively, mean forward elevation was 179.6° ± 2.0° (range, 170° to 180°; gain of 2.4°) and external rotation with the arm at the side was 50.2° ± 12.6° (range, 22° to 78°; loss of 5.1°). As for postoperative functional scores, the mean Constant score was 94.4 and the mean Walch-Duplay score was 91.7. None of these 47 patients showed any further dislocation, and 1 of them still had a positive apprehension sign (2.2%) indicating subluxation. However, 4 patients out of the total 102 who underwent the modified Latarjet procedure had a recurrence. With 4 recurrent dislocations and 1 recurrent subluxation, there was a 4.9% recurrence rate. The 4 patients with recurrent dislocations were not among the 47 who returned for personal follow-up evaluation. **Conclusions:** The 2 senior authors (S.S.B. and J.F.D.) have previously reported an unacceptably high recurrence rate (67%) for arthroscopic Bankart repair in the presence of an inverted-pear glenoid with or without an engaging Hill-Sachs lesion. They have recommended an open modified Latarjet procedure in such patients. The present study confirms the validity of that recommendation, because the same 2 surgeons have had only a 4.9% recurrence rate in that same category of patient at a mean follow-up of 59 months. Furthermore, the results of this study show the efficacy of the modified Latarjet procedure in the extremely challenging category of patients who present with such dramatic bone loss that soft-tissue reconstruction, either open or arthroscopic, is not a reasonable option. **Level of Evidence:** Level IV, therapeutic case series. **Key Words:** Shoulder—Shoulder instability—Bankart repair—Bone graft—Latarjet reconstruction—Instability repair.

In our experience arthroscopic stabilization has proven to be a very satisfactory means of treatment for traumatic anteroinferior instability in all but one category of patients: those with significant bone loss involving the glenohumeral joint. We have defined significant glenohumeral bone defects as follows[1]: *inverted-pear glenoid*, in which there is a greater than 25% loss of the inferior glenoid diameter, or *engaging humeral Hill-Sachs lesion* (i.e., a Hill-Sachs lesion that engages the anterior glenoid rim with the shoulder in a position of 90° abduction and 90° external rotation).

The 2 senior authors (S.S.B. and J.F.D.) have previously reported, in a series of 194 patients with arthroscopic suture anchor Bankart repair, a recurrent

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instability rate of 4% in patients without significant bone deficiency.[1] In contrast, the 21 patients in that report who displayed significant bone deficiency had a 67% recurrent instability rate. Given the unacceptably high rate of recurrent dislocation and subluxation after arthroscopic repair in the presence of bone deficiency, the 2 senior authors abandoned arthroscopic repair in bone-deficient patients and began performing their modified version of the Latarjet procedure in this category of patients. The Latarjet procedure,[2-6] devised by Professor M. Latarjet in the 1950s,[2] uses a large coracoid bone graft to extend the glenoid articular arc, stabilizing the shoulder by means of a lengthened bone platform plus the sling effect of the conjoined tendon rather than by soft tissue alone.

The purpose of this study was to investigate the results of open Latarjet reconstruction of a cohort of patients with significant glenoid bone stock deficiency (inverted-pear glenoid) or humeral bone stock deficiency (engaging Hill-Sachs lesion) (or both).

METHODS

Data Analysis

Institutional approval was obtained for this study. From March 1996 to December 2002, 102 patients underwent an open modified Latarjet procedure for shoulder instability associated with inverted-pear glenoids or engaging Hill Sachs lesions (or both). These were consecutive cases of anterior instability that satisfied the criteria for significant bone deficiency as defined previously in this report. Forty-seven of these patients returned for follow-up evaluation and examination. We were able to contact all 55 of those who could not return for follow-up, by telephone or mail, to determine whether they had had any recurrent dislocations or subluxations. Except for the report of recurrences, this study deals with the 47 patients who returned for follow-up examination. At follow-up examination, we determined functional status by means of 2 functional scoring systems: the Constant score[7] and the Walch-Duplay score.[8]

The mean age of the patients was 26.5 ± 6.6 years (range, 16 to 41 years). There were 25 right and 22 left shoulders. The dominant side was injured in 28 patients. There were 46 male patients and 1 female patient. Of the 102 patients, 55 were contact athletes (either rugby or American football). The other patients all sustained traumatic dislocations by non-athletic accidents.

Preoperatively, mean active forward elevation was 177.2° ± 13.6° (range, 90° to 180°) and external rotation with the arm at the side was 55.3° ± 16.1° (range, 0° to 80°). Preoperative and postoperative range of motion was measured at various times by one of the authors without the use of a goniometer.

All patients had a positive apprehension sign preoperatively. The median number of dislocations before surgery was 6. Of the patients, 18 (38.3%) had 1 to 3 dislocations, 9 (19.2%) had 4 to 10, 15 (31.9%) had 15 to 50, and 5 (10.6%) had more than 50.

Preoperative Radiographs

Preoperative studies included plain radiographs in the anteroposterior (internal and external rotation), axillary, outlet,[9,10] 30° caudal tilt,[10] Stryker notch,[11] West Point,[12] and Bernageau[13] views. Although the axillary, West Point, and Bernageau views often gave a qualitative sense of glenoid bone loss, that loss could not be quantified radiographically. Similarly, the Stryker notch view and the anteroposterior view in internal rotation gave only a subjective impression of the Hill-Sachs lesion. Bone loss was quantified by arthroscopic assessment done immediately before open surgery. Glenoid bone loss was identified by arthroscopic measurement of the inferior glenoid diameter, as well as comparison of the anterior and posterior radius measurements from the bare spot of the glenoid; engaging Hill-Sachs lesions on the humeral side were identified by dynamic arthroscopic evaluation upon bringing the arm into a position of 90° abduction and 90° external rotation.[1] We noted arthroscopically the most extreme situations of glenoid bone loss that had progressed beyond the inverted-pear glenoid and termed this extremely bone-deficient glenoid a *banana glenoid*.

Surgical Procedure

Each patient in this series underwent diagnostic arthroscopy for the purpose of quantifying bone loss and identifying concomitant pathology (e.g., SLAP lesions) that would need to be addressed arthroscopically before open surgery. Diagnostic arthroscopy was performed with the patient in the lateral decubitus position, by use of the Star Sleeve Suspension System (Arthrex, Naples, FL) with 5 to 10 lb of balanced suspension. Posterior, anterior, and anterosuperior portals were established. Glenoid bone deficiency was quantitatively evaluated while viewing through an anterosuperior portal while a calibrated probe was introduced through a posterior portal. The shape of the glenoid was assessed to see if it approximated an inverted pear. Because we had previously determined that an inverted-pear glenoid could be predictably reproduced by loss of 25% of the major diameter of the inferior glenoid or more,[14,15] we measured the diameter of the widest part of the inferior glenoid with a calibrated probe to quantifiably show the existence of an inverted-pear configuration. Then we measured the distance from the glenoid bare spot to the anterior and posterior glenoid margins, and by comparing these radii, we could precisely determine the percentage bone loss of the inferior glenoid diameter (Fig 1).

On the humeral side, we considered a significant bone deficiency to be represented by an engaging Hill-Sachs lesion—that is, a Hill-Sachs lesion that engaged the anterior glenoid rim in the position of overhead athletic function (90° abduction and 90° external rotation).[1] To assess the humeral side, we took the arm out of the suspension unit and brought it into a 90°-90° position while viewing from an anterosuperior portal. If the Hill-Sachs lesion engaged the anterior glenoid rim in this position, we considered it to represent a significant bone deficiency.

If a significant bone deficiency was identified on either the glenoid or humeral side, we proceeded to an open modified Latarjet stabilization after addressing any superior labral disruption with arthroscopic suture anchor repair.

In performing the modified Latarjet procedure, a standard deltopectoral approach is used. The cephalic

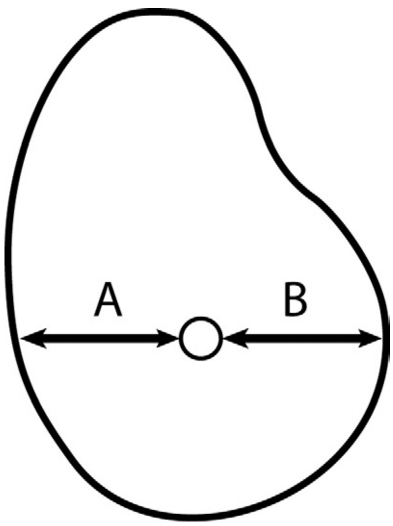

Figure 1. A calibrated probe is used to arthroscopically measure the distance from the glenoid bare spot to the posterior glenoid rim (A) as well as the distance from the bare spot to the anterior glenoid rim (B). If B is less than 50% of A, then there is at least a 25% loss of the inferior glenoid diameter.

vein is protected and retracted laterally with the deltoid. The coracoid is exposed from its tip to the insertion of the coracoclavicular ligaments at the base of the coracoid. The coracoacromial ligament is sharply dissected from the lateral aspect of the coracoid, and the pectoralis minor tendon insertion on the medial side of the coracoid is removed along with a small piece of attached bone by use of an angled saw blade or an osteotome (Fig 2). This medial cut surface of the coracoid is usually the surface that conforms best to the contour of the anterior glenoid where the bone graft will be placed.

Next, the angled saw blade (or curved osteotome) is used to perform an osteotomy of the coracoid just anterior to the coracoclavicular ligaments at the coracoid base (Fig 3). Chandler elevators placed inferior and medial to the coracoid protect the musculocutaneous nerve, the axillary nerve and artery, and the brachial plexus. If the osteotome is used, all medial retractors are removed to allow the osteotome's angle of approach to be anterior to the glenoid, thereby avoiding intra-articular glenoid fracture. An angled saw blade greatly simplifies this osteotomy by allowing an angle of approach that makes intra-articular glenoid fracture much less likely. The conjoined tendon is left attached to the coracoid graft because this provides some blood supply to the coracoid and makes it a vascularized graft[1-3]; the transferred coracoid graft continues to serve as a stable attachment point for the conjoined tendon. Once the osteotomy of the coracoid has been performed, there is a clear view of the anterior shoulder. The upper half of the subscapularis is detached distally and reflected medially in these patients (Fig 4). The insertion of the lower half of the subscapularis is preserved. More recently, one of the senior authors (J.F.D.) has been splitting the subscapularis at the junction of its superior and middle thirds, rather than detaching its insertion, and then developing the plane between the subscapularis and anterior joint capsule. After detachment of the upper subscapularis, the plane between the lower subscapularis and anterior joint capsule is developed.

The capsular incision is begun 1 cm medial to the rim of the glenoid by subperiosteal sharp dissection, to preserve enough capsular length for later reattachment.

The anterior glenoid neck is prepared as the recipient bed for the coracoid bone graft by means of a high-speed bur, being careful to preserve as much native glenoid bone as possible. "Dusting" of the anterior glenoid neck to a bleeding surface is performed with a high-speed bur without actually removing bone.

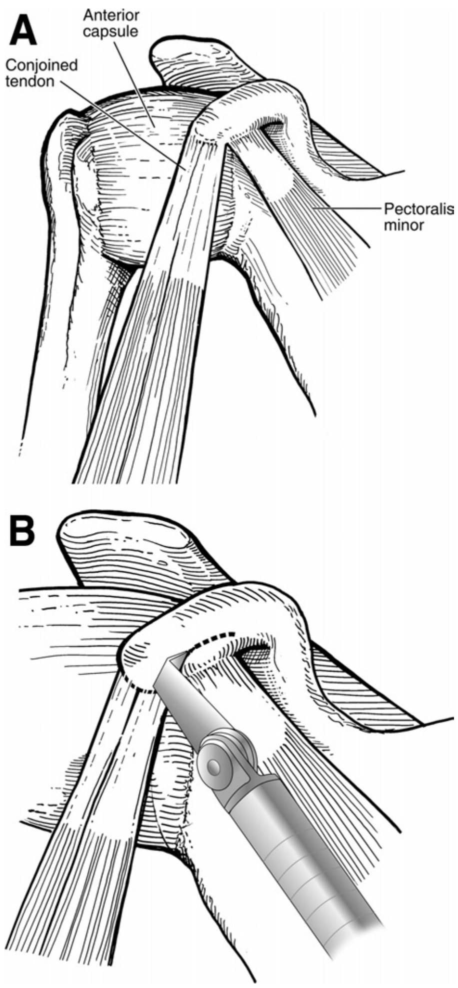

FIGURE 2. (A) Tendon attachments onto coracoid before coracoid osteotomy. (B) The pectoralis minor (insertion at dotted line) is removed with a small piece of bone so that the final coracoid osteotomy can be made proximal to the "elbow" of the coracoid.

Next, 3 suture anchors (Bio-FASTak or Bio-Suture-Tak; Arthrex) are placed in the native glenoid at 3, 4, and 5 o'clock (in a right shoulder) for later capsular repair.

Proper positioning of the coracoid bone graft relative to the glenoid is critical. The long axis of the coracoid graft is aligned in a superior-to-inferior orientation and positioned against the anterior glenoid neck. The graft is rotated around its long axis as necessary and trimmed as necessary for a good fit, and the best fit usually involves placing the medial surface of the coracoid (where the pectoralis minor insertion had been) against the glenoid neck (Fig 5A and 5B). The original inferior surface of the coracoid then lines up with the glenoid surface, and these surfaces have virtually the same radius of curvature. Care is taken not to place the graft too far laterally or medially. It is not intended to be a bone block, and therefore it is placed so that it functions as an extension of the glenoid articular arc (Fig 5C). In fact, Allain et al.[3] have shown that placement of the bone graft too far laterally, where it acts as a bone block, leads to an increased rate of postoperative degenerative arthritis. On the other hand, fixation of the graft too far medially places the shoulder at increased risk for recurrent subluxation or dislocation. The coracoid graft is fixed in place with 2 cannulated AO 4.0-mm or 4.5-mm cancellous screws (Synthes, Paoli, PA). These usually measure 34 to 36 mm in length.

The capsule is then repaired to the native glenoid

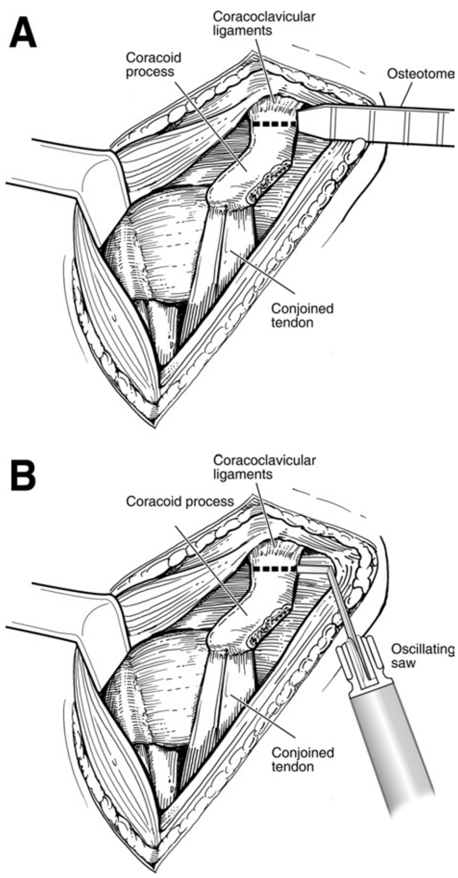

FIGURE 3. (A) Osteotomy of coracoid. It should be noted that the osteotomy is made proximal to the "elbow" of the coracoid. The osteotomy must not angle too steeply toward the glenoid or it may create an intra-articular glenoid fracture. From a technical standpoint, it is much easier to make the osteotomy at the proper angle if the surgeon removes the medial retractor and allows the osteotome itself to rest on the skin edge and act as its own retractor. (B) An angled saw blade simplifies the osteotomy by more easily achieving the proper angle of approach (in comparison to use of an osteotome as in A).

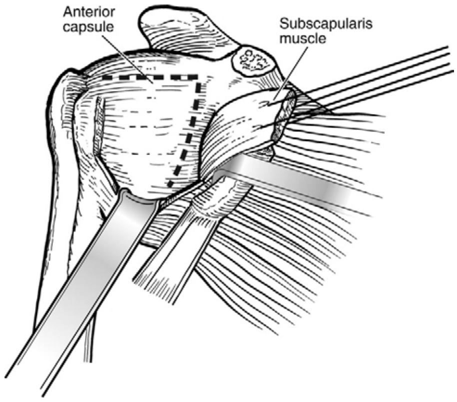

FIGURE 4. Management of subscapularis. The superior half of the tendon is detached, and then a plane is developed between the inferior half of the subscapularis and the capsule. A capsulotomy is made (dotted line). The capsule should be dissected 1 cm from the glenoid rim before it is detached from the glenoid neck to preserve as much capsular length as possible for later reattachment.

by means of the previously placed sutures anchors, thereby making the coracoid graft an extra-articular structure and preventing its articulation directly with the humeral head. This precludes any abrasive effect of the graft against the articular cartilage of the humerus.

Next, the upper subscapularis is repaired. The conjoined tendon, still attached to the coracoid graft, passes through the split between the upper and lower halves of the subscapularis (Fig 6).

Finally, a standard closure is performed. The patient uses a sling for 4 to 6 weeks, with external rotation restricted to 0°. At this point, the sling is discontinued, and overhead motion is encouraged. Gentle external rotation stretching is begun at 6 weeks postoperatively. Our goal at 3 months postoperatively is for the external rotation on the operated shoulder to be half that of the opposite side. Strengthening exercises are delayed until 3 months postoperatively, at which time the bone graft usually shows early radiographic evidence of consolidation with the glenoid. Contact sports and heavy labor are generally allowed at 6 months postoperatively. If the bone graft does not show radiographic consolidation at 6 months, contact sports and heavy labor are delayed until 1 year postoperatively.

RESULTS

The mean follow-up time for the 47 patients with in-person postoperative physical examinations was 59.0 ± 18.5 months (range, 32 to 108 months). For the full cohort of 102 patients, information about recurrent dislocations or subluxations was obtained at a mean of 52 ± 18.6 months postoperatively (range, 32 to 108 months). Postoperatively, mean forward elevation was 179.6° ± 2.0° (range, 170° to 180°; gain of 2.4°) and external rotation with the arm at the side was 50.2° ± 12.6° (range, 22° to 78°; loss of 5.1°). There was no evidence of scapular dyskinesis or static scapular malpositioning in any patient at final follow-up

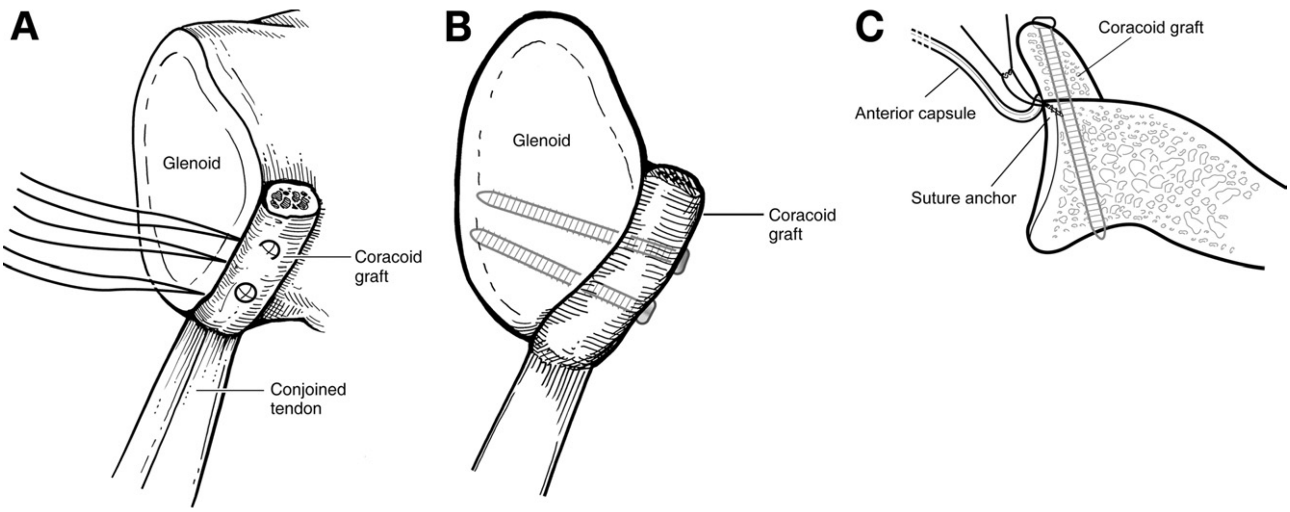

FIGURE 5. (A) The coracoid graft is fixed to the glenoid with 2 bicortical screws. The raw bone surface where the pectoralis minor was removed will usually provide the best fit against the glenoid, and the graft can be further contoured with a power bur to fit the curve of the anterior-inferior glenoid. (B) It should be noted how the coracoid graft restores the pear shape of the glenoid by widening its inferior diameter. (C) The graft is placed so that it becomes an extra-articular platform that acts as an extension of the articular arc of the glenoid.

examination. In the full series of 102 patients, 5 complications resulting from the surgical procedure were observed: 2 hematomas, 1 of which required drainage; 2 loose screws, which did not require removal or revision; and 1 fibrous union of the bone graft (for which no revision was necessary). The loose screws and fibrous union were diagnosed radiographically. Because they were asymptomatic, revision was not performed.

On arthroscopic examination, 10 patients had what we term a banana glenoid. None of the patients with a banana glenoid have had a recurrence. There were 4 recurrent dislocations out of the 102 surgeries, and all occurred in the early postoperative period. One recurrence was the result of a grand mal seizure at 3 months postoperatively; two others resulted from a return to contact sports (rugby) at less than 3 months postoperatively, against medical advice; and the fourth occurred when an inebriated patient tried to tackle a light post at 1 month postoperatively. None of these 4 patients were in the group of 47 who returned for final follow-up examinations. Among those 47 patients, there were no recurrent dislocations or subluxations, although 1 patient still had a positive apprehension sign (2.2%). However, we are reporting these 4 recurrent dislocations within the overall group of 102 patients to give a true picture of the recurrence rate. We were able to contact all 102 patients by telephone, mail, or personal examination, and these are the only recurrences in the overall group.

In the 47 patients who returned for postoperative examination, we calculated 2 functional scores: the Constant score[7] (maximum, 100 points) and the Walch-Duplay score[8] (where results are categorized as excellent, 91 to 100; good, 76 to 90; fair, 51 to 74; or poor, <51). In these 47 patients, we found a mean postoperative Constant score of 94.4 (range, 82 to 100) and a mean Walch-Duplay score of 91.7 (range, 75 to 100).

Of the 102 patients, 55 were contact athletes (rugby or American football). Of these, 53 returned to their previous contact sport for at least 1 season postoperatively. Two patients elected not to return to contact sports.

One must recognize that these patients represent a worst-case prognosis for recurrent dislocation because of their significant bone loss, and the 4.9% recurrence rate is far better than we had anticipated in this salvage situation.

DISCUSSION

It has long been the impression of the 2 senior authors that recurrence rates after soft-tissue instability repairs are much higher in patients with significant bone loss than in those without significant bone loss. This impression was confirmed by a review of 194 of our patients who had undergone arthroscopic Bankart repair.[1] These patients fell naturally into 2 major categories: those without significant bone loss (173 patients) and those with significant bone loss (21 patients with either an inverted-pear glenoid or an engaging Hill-Sachs lesion). After arthroscopic Bankart repair, there was an incredibly large difference in the recurrence rate in patients without significant bone loss (4%) compared with patients with significant bone loss (67%).

A large number of these patients (101) were contact athletes. Even so, we did not think that contact sports were solely to blame for the high recurrence rate. In fact, in our group of contact athletes without significant bone deficiency who underwent arthroscopic Bankart repair, there was only a 6.5% recurrence rate, which we considered to be perfectly acceptable in this high-risk category.

The Latarjet reconstruction for anterior instability has been a source of confusion in the English-language orthopaedic literature.[1-6] In fact, there are only two English-language reports of this procedure's results.[3,6] Part of the confusion stems from the fact that some prior studies have reported on the results of a procedure termed the *Bristow-Latarjet*, as if the Bristow and Latarjet procedures were the same.[16,17] In each of these studies, the procedure described was a standard Bristow operation and had nothing to do with the Latarjet procedure.

The Bristow procedure transfers only the tip of the coracoid, along with the attached conjoined tendon, to the anterior glenoid neck.[18-20] In contrast, the Latarjet procedure transfers most of the coracoid as a bone graft that usually measures 2.5 to 3 cm in length.[1-6] This large bone graft more than makes up for most cases of glenoid bone loss. By extending the concavity of the glenoid's bony articular arc, this procedure dramatically increases the shoulder's ability to resist off-axis loads (Fig 7). If a simple Bankart repair is done in the face of significant bone deficiency, an off-axis load will be resisted only by soft tissue. On the other hand, a Latarjet reconstruction extends the glenoid's articular arc so that the off-axis loads are resisted by bone. This obviously provides a stronger construct than a purely soft-tissue constraint. Intu-

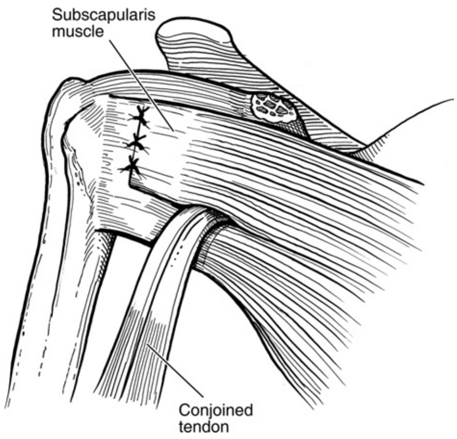

FIGURE 6. The upper half of the subscapularis is repaired to its tendon stump. The conjoined tendon, attached to the coracoid bone graft, exits anteriorly between the upper and lower subscapularis.

itively, this mechanically optimized construct should result in a lower recurrence rate, and it may be particularly important in contact athletes. Patte et al.[21] proposed a "triple effect" to explain the efficacy of the Latarjet procedure:

- Extension of the bony glenoid concavity (bone effect)
- Preservation of the lower third of the subscapularis (muscle effect)
- Repair of the capsule (capsular effect)

Although other studies have reported low recurrence rates after open Bankart repair,[22-24] these studies do not quantify bone loss and therefore do not support the concept of soft-tissue repairs for instability in the face of significant bone loss. Itoi et al.[25] biomechanically confirmed the importance of glenoid bone defects in the etiology of severe instability. Clinical reports have also shown the necessity for bone grafts in instability repairs with bone-deficient glenoids.[1,26,27]

It is fortuitous that the Latarjet procedure also provides a means of stabilizing the shoulder with an engaging Hill-Sachs lesion, either with or without an associated glenoid bone deficiency. The reason that a glenoid bone graft can prevent engagement of a humeral bone lesion is that the graft extends the glenoid arc to such a degree that the shoulder cannot externally rotate far enough to engage the Hill-Sachs lesion over the front of the graft (Fig 8). Furthermore, the tethering effect of the transferred conjoined tendon restricts external rotation to some extent, and the posterior capsule limits anterior translation. All 3 of these mechanisms (bone platform extension, musculotendinous tethering, and posterior capsular constraint) act to prevent engagement of the Hill-Sachs lesion even before the anterior capsule is repaired. In general, the surgeon will be unable to manually dislocate the shoulder on the operating room table after the coracoid graft has been placed even with an unrepaired anterior capsule. This dramatic improvement in stability as a result of noncapsular constraints underscores the potential advantages of this procedure over purely capsular procedures.

An important factor that affects stability (in the 90°-90° position) after a Latarjet procedure is the sling effect of the conjoined tendon.[19] Just as in the Bristow procedure, the conjoined tendon forms a sling across the anterior-inferior capsule when the shoulder is in 90° abduction and 90° external rotation, providing an additional soft-tissue buttress anteriorly. Furthermore, the transfer of the conjoined tendon over the top of the lower subscapularis causes increased tension in the inferior fibers of the subscapularis, thereby enhancing anterior stability, particularly in the position of abduction and external rotation (Gilles Walch, M.D., personal oral communication, 1999).

Our modifications to the original Latarjet procedure were made in an attempt to improve on the original procedure. In the modified procedure only the upper half of the subscapularis is reflected medially in an attempt to maintain normal function of the anatomically intact lower subscapularis. Furthermore, the capsule is reattached to suture anchors in the native glenoid to keep the graft extra-articular. In this way, the bone graft still functions as a bony platform but cannot abrade the humeral articular surface.

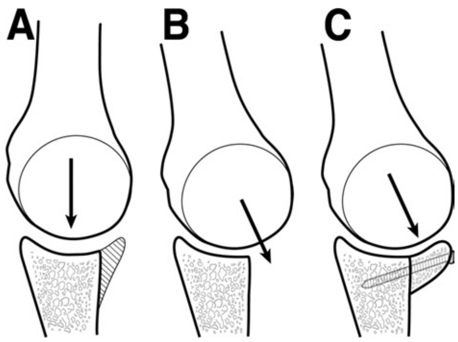

FIGURE 7. (A) An axial force from the humerus applied centrally on the glenoid will not create a Bankart lesion or failure of a soft-tissue Bankart repair. (B) If an axial force is applied through a point beyond the edge of the deficient glenoid, failure of a soft-tissue Bankart repair is likely because the load must be borne by the soft tissues. (C) The Latarjet reconstruction extends the glenoid articular arc so that off-axis loads are resisted by bone rather than soft tissue.

In our overall series of 102 Latarjet reconstructions, we had only 4 recurrent dislocations and 1 recurrent subluxation, for a 4.9% recurrence rate. Our 4 recurrent dislocations occurred in the early postoperative period. Three failures had significant trauma in the early postoperative period (<12 weeks postoperatively), and one had a grand mal seizure at 12 weeks postoperatively. All 4 recurrent dislocations exhibited traumatic displacement of the coracoid graft. Revision was accomplished by internal fixation of the coracoid graft in 3 cases and by substitution of a fractured coracoid graft with iliac crest graft in the fourth case. Healing has occurred in all 4 patients, and they have returned to full activities without any further episodes of subluxation or dislocation. The 1 patient with recurrent subluxation was categorized as such because of a positive apprehension sign in 90° abduction and full external rotation. However, he has not had any symptomatic subluxations with his daily activities and has not required further surgery. In the 47 patients who we have personally followed up, the shoulder's range of motion and strength have been restored to normal or near normal in every case.

The low recurrence rate (4.9%) in this study is particularly striking in view of the fact that many of these patients represented a worst-case scenario of bone deficiency. In fact, 10 of these patients had what we term a banana glenoid (Fig 9). This is a glenoid that is so deficient that it has progressed beyond the inverted-pear configuration to an even narrower banana configuration. None of the patients with banana glenoids have had a recurrence, and all are able to use their arms overhead with confidence. We believe that the sense of well-being required for confident overhead use is possible only if the width of the bony glenoid has been restored.

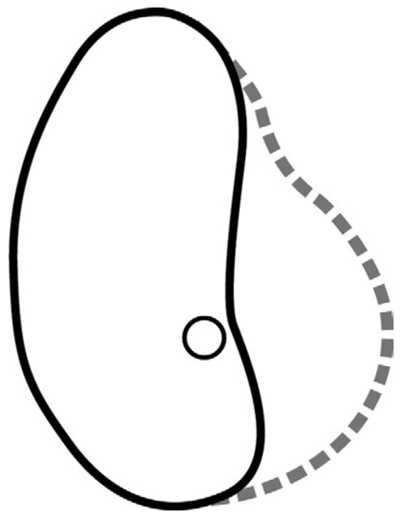

FIGURE 9. Banana glenoid. Such a glenoid is so compressed and eroded that it assumes the shape of a banana.

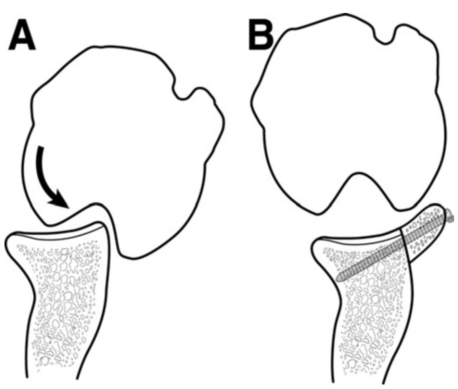

FIGURE 8. (A) Engaging Hill-Sachs lesion. (B) The Latarjet procedure extends the glenoid arc to such a degree that the humerus cannot externally rotate enough to cause engagement of the Hill-Sachs lesion over the front of the graft.

Although there were no overhead athletes in this series, one might anticipate that the mild to moderate loss of external rotation that we found postoperatively would affect performance in overhead sports. Even so, in cases of significant bone loss, we would still recommend this procedure for overhead athletes because we believe that residual bone deficiency would be extremely disabling.

The 2 senior authors (S.S.B. and J.F.D.) have previously reported an unacceptably high recurrence rate (67%) for arthroscopic Bankart repair in the presence of an inverted-pear glenoid with or without an engaging Hill-Sachs lesion.[1] In that study we recommended an open modified Latarjet procedure for such patients. The present study validates that recommendation, because the same 2 surgeons have had only a 4.9% recurrence rate in that same category of patients (with 102 patients in total) at a mean follow-up of 52 months.

CONCLUSIONS

The open modified Latarjet reconstruction can successfully restore stability and function in more than 95% of patients with significant bone defects (inverted-pear glenoid or engaging Hill-Sachs lesion). The open modified Latarjet reconstruction is effective in restoring stability in most worst-case bone loss situations (banana glenoid, massive Hill-Sachs lesion) in which arthroscopic soft-tissue reconstruction is not a reasonable option.

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