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Operative Techniques in

Sports Medicine

Acute Bony Bankarts: Tips and Tricks for Success

Joseph P. Burns, MD,* and Ryan M. Vellinga, MD†

Bony Bankart injuries are common after traumatic glenohumeral anterior instability events. Restoration of glenoid bony integrity is critical to minimizing the risk of recurrence, post-traumatic osteoarthritis, and in recreating normal shoulder kinematics. Surgical repair can be very technically challenging as can the preoperative decisions involved in selecting both a surgical approach (open or arthroscopic) and a method of fixation (suture anchors or screws). With a focus on arthroscopy, we present a review of the current preferred techniques in surgical management of bony Bankart injuries.

KEYWORDS shoulder instability, bony Bankart

Over the past several years, the orthopaedic community has become increasingly aware of the high prevalence and critical importance of instability-associated bony lesions in the glenohumeral joint (glenoid bone loss and Hill-Sachs defects).[1] Osseous glenoid injury is particularly common in patients who have undergone high-energy trauma and patients with recurrent instability, up to 90% of whom have some degree of glenoid bony injury.[2]

During a traumatic dislocation, the humeral head may shear off a portion of bone from the anterior inferior glenoid, creating the so-called "bony Bankart" lesion. When a bony Bankart fragment is present, fixation may be achieved with either open or arthroscopic surgical techniques. Small bony fragments (up to 15% of anterior-to-posterior glenoid diameter) can be secured arthroscopically using techniques similar to standard Bankart repair, in which the bony fragment is incorporated into the capsulolabral repair.[3] Larger bony fragments are more structurally important and often necessitate advanced arthroscopic techniques for reduction and fixation, several of which have been described in the literature.[4-6]

Considerations that guide treatment of bony Bankart lesions include fragment size and resultant glenoid bone stock, union of fragments after fixation, timing of surgery, and absorption of fragments. Jiang et al evaluated outcomes of arthroscopic bony Bankart repair based on glenoid bone stock. In their prospective series of 50 patients, all patients who had a reconstructed glenoid size greater than 80% of the original diameter had successful outcomes and no recurrence at average 32.5 months follow-up, whereas 3 of the 4 failures had less than 80% reconstructed glenoid diameter. Even in the 7 patients who had a mal-reduced fragment, only 2 of those went on to failure, and both had a reconstructed glenoid of less than 80%. The other 5 had a preoperative glenoid diameter of greater than 80%. Their results suggest that a preoperative glenoid bone stock >80% or a reconstructable glenoid (existing glenoid + bony fragment) of >80% is amenable to arthroscopic bony Bankart repair with acceptable outcomes.[7] Park et al in 2018 confirmed these same observations in their series of 223 patients. They noted that patients with bony Bankart defect >20% that had the bone fragment incorporated into the arthroscopic repair had improved clinical outcomes and lower recurrence rates compared to those patients with >20% defect and no fragment incorporation. When the defect was less than 20%, inclusion of the bony fragment did not significantly alter recurrence, rates, clinical outcomes, or sports activity levels.[8]

Several studies have looked at union rates after arthroscopic fixation of bony Bankart lesions with nonunion rates

*Southern California Orthopedic Institute Sports Fellowship, The Southern California Orthopedic Institute, Valencia, CA.
†The Southern California Orthopaedic Institute, Valencia, CA.
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Address reprint requests to Joseph P. Burns, MD, Southern California Orthopedic Institute Sports Fellowship, The Southern California Orthopedic Institute, 24051 Newhall Ranch Rd, Valencia, CA 91354. E-mail: jburns@scoi.com

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reported to range from 0%-17%.[3,5,9-12] Interestingly, nonunion did not always correlate with recurrent instability, that is, even those patients with bony nonunion could be expected to have excellent stability and clinical outcomes through development of a fibrous union.[10-12] However, for large bony defects, bony union is apparently much more important. When evaluating patients with large glenoid defects (>20% of glenoid area), Nakagawa et al showed a 66.7% recurrent instability rate in patients with nonunited fragments, as opposed to a 0% recurrence rate in those patients who achieved complete bony union. They also showed that complete union takes on average more than 7 months, with smaller fragments taking longer than large fragments to completely unite.[12]

Timing of fixation also affects union rates. Plath et al showed only a 5% nonunion rate in acute cases but 40% in chronic bony Bankart lesions, defining acute lesions as those cases that had a hemarthrosis, bleeding at the fracture site, and fresh spongy edges of the fragment at the time of surgery. However, union rates did not correlate to subjective outcomes in their study.[11]

The importance of the timing of surgery is also borne out by Pocellini et al who showed the instability recurrence rate after bony Bankart repair was significantly lower in surgeries performed less than 3 months from injury, compared to those more than 3 months after injury.[9] Shah et al recently reviewed results in perhaps the most at-risk patient population: collision athletes. They reviewed 22 rugby players with bony Bankart lesions less than 25% of the glenoid, all of which were repaired arthroscopically within 4 months of the injury. All patients returned to their preinjury sporting level, and 91% remained stable and asymptomatic at 2 years with the 2 failures occurring after additional traumatic sporting accidents.[13]

While considering the importance of glenoid bone stock before and after bony Bankart repair, it is also imperative to recognize that absorption of fractured bone can occur over time. Nakagawa et al showed bone absorption occurred on all 163 patients of their series of bony Bankart lesions treated *without surgery*. Bone absorption involved both the remaining glenoid and the bone fragment, with the greatest amount of absorption occurring within the first year after initial injury (51.9% of fragment), but also showed progressive absorption over time (70% at 2 years).[14] Jiang et al also showed that bony attrition occurs of both the glenoid and the bony fragment.[7]

Thus, when evaluating for surgery, surgeons should recognize that some degree of permanent bone loss will likely be present. Even after successful repair of a bony Bankart lesion, the reconstructed glenoid bone can still be less than 80% of its native preinjury area, which may increase the risk of recurrent instability. In chronic and sub-acute cases, where total bone stock may fall below 80% of the native area, surgeons should consider obtaining a 3-dimensional CT scan prior to surgery.

While bony glenoid fragments seem to absorb over time if treated nonoperatively, Kitayama et al showed that fragments which were arthroscopically advanced, retensioned and repaired with suture anchors could hypertrophy over time and restore lost glenoid area. Patients had an average of 20% glenoid diameter fractured, but the remaining bony fragments available for repair averaged less than 5% of native glenoid diameter, suggesting absorption had occurred. Interestingly, at 5-8 years follow-up, the repaired glenoids were remeasured and found to have reconstituted their glenoid area back to just over 100% of their preinjury glenoid size.[15]

While the majority of studies support treating bony Bankart lesions with surgery, Macquiera et al showed that large fractures (>5 mm on plain radiographs) which were *concentrically reduced*, even if the fracture was displaced, did well with nonoperative treatment, avoiding instability, apprehension, and osteoarthritis.[16] Spiegl et al recommended nonsurgical treatment for acute small (<5% glenoid) fractures that were concentrically reduced, and recommended surgery for larger lesions as well as those small lesions with subluxation on radiographs.[17]

Based upon the available literature and our personal experience, our preference is to treat very large lesions (>25%) that are concentrically reduced and minimally displaced (<3 mm) conservatively, considering these to be more similar to the category of "glenoid fractures" than to the category of "glenohumeral instability." Very small (<5%) chips off the glenoid can be considered for nonsurgical treatment, but even these injuries are so often associated with recurrent instability, especially in the younger population, that they frequently require surgical repair.[18] As a result, we consider surgery for small and medium (up to 25% glenoid diameter) lesions, as well as for larger lesions that are associated with humeral subluxation or significant displacement (>3 mm). Magnetic resonance imaging is obtained for all patients presenting with instability, and a CT scan with 3-D reconstructions is obtained for any patient with bony involvement of the glenoid. Our preferred surgical techniques will be described below, and it should be noted that our preference for surgical approach is nearly always arthroscopic. Open reduction internal fixation was the original preferred surgical technique, but as arthroscopic techniques have advanced, surgeon ability to comprehensively address the spectrum of most bony Bankart injuries arthroscopically has improved dramatically. The reasons for our arthroscopic preference are as follows:

The Benefits of Arthroscopic Fixation of Acute Bony Bankart Injuries

1. *Glenohumeral joint access*: Bony Bankart injuries are often associated with additional bony fragmentation, loose bodies, extensive labral damage, Hill-Sachs lesions, rotator cuff damage, and biceps anchor/superior labrum anterior to posterior damage. An arthroscopic approach facilitates management of all these conditions, many of which cannot be addressed through an arthrotomy.
2. *Visualization*: The arthroscope allows for excellent clear visualization of the glenohumeral joint that is rarely achieved in an open bleeding field.

3. *Minimally invasive*: An arthroscopic approach avoids opening the deltopectoral interval and, more importantly, avoids violating the subscapularis. In addition, most open approaches will require a glenohumeral capsulotomy anteriorly in order to inspect and reduce the fracture. The capsulotomy will need to be anatomically repaired and heal perfectly or else risk future instability. Arthroscopic techniques do not require iatrogenic capsular damage and can either avoid the subscapularis entirely or safely go through a small trans-subscapularis "5 o'clock" portal with a cannula.[19]
4. *Accurate reduction*: With clear, high-definition, magnified visualization, the fracture can often be reduced within a fraction of a millimeter. Reduction and mobilization of acute bony glenoid fragments is usually fairly easy using standard instruments such as a liberator blade, shaver and arthroscopic grasper.
5. *Favorable biology*: In many areas of the body, rigid fracture fixation is essential for bone healing and clinical success. As discussed above, glenoid fractures have a low nonunion rate, even without rigid fixation. Kim et al reported a 100% healing rate of bony Bankart fragments arthroscopically repaired with suture anchors.[20] Those reduced and stabilized surgically can be expected to have good clinical success, and even the nonunions reported in the literature have been shown to have a high likelihood of clinical success.[8,10]
6. *Minimizing complications*: While an arthroscopic repair of a displaced bony Bankart fragment can certainly be technically challenging, the procedure can usually be performed using standard arthroscopic positioning, portals, implants, instruments, and surgical techniques that are already familiar to shoulder arthroscopists. Through an open approach, the exposure, retractor placement, subscapularis management, and access to the fracture site can be challenging for all but the most experienced of open shoulder surgeons.

Surgical Techniques

Getting Started

The setup is the same for all of the following procedures. We prefer to perform shoulder arthroscopy in the standard lateral decubitus position; however, these procedures can also be accomplished in the beach chair position depending on surgeon preference and experience. Following examination under anesthesia, the patient is positioned in the laterally on a beanbag with the operative arm held in 70° of abduction and 15° of forward flexion with 10 pounds of balanced glenohumeral suspension.

Three standard portals are required, with an additional trans-subscapularis 5 o'clock portal if a cannulated screw is to be placed.[21] The arthroscope is initially placed in the standard posterior portal, located 2 cm inferior and 1-2 cm medial to the posterolateral corner of the acromion. Anterior superior and anterior mid-glenoid portals are then placed in outside-in fashion with the aid of a spinal needle for precision. The anterior superior portal is placed 1 cm off the anterolateral corner of the acromion and enters the joint just posterior to the biceps tendon through the superior portion of the rotator interval. The anterior mid-glenoid portal is then established at the level of the upper border of the subscapularis tendon, usually approximately 2 cm distal and 1 cm medial to the anterior superior portal. Prior to incision the spinal needle is used to confirm adequate access to the anterior inferior quadrant of the glenoid for suture anchor placement and suture passage.

A standard 15-point arthroscopic examination of the glenohumeral joint is then performed from both anterior and posterior portals.[22] Any additional injuries can be addressed expeditiously as indicated. With the arthroscope in the anterior superior portal, the fragment is mobilized, clot and debris are removed, and the glenoid fragment is reduced with a grasper. There is nearly always intact labrum spanning the fracture site inferiorly, connecting the fragment to the intact glenoid, the so-called "hinge-point" (Fig. 1 reproduced with permission from Elsevier).

Arthroscopic "Transosseous" Suture Anchor Fixation

Indications

For most medium to larger sized fragments (>10% glenoid diameter), or fragments that are greater than 1 cm in medial-to-lateral depth in their central third, we prefer a transosseous suture anchor approach. This technique uses 3 suture anchors, with the superior and inferior anchors used to suture labrum and the middle anchor to suture the bone via 2 transosseous drill holes.

Implants and Instruments

Three glenoid suture anchors, a 6-inch long 14-gauge hip arthroscopy spinal needle (Smith and Nephew, London,

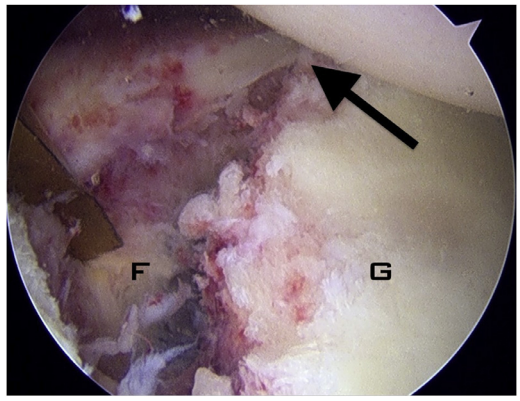

Figure 1 In nearly all bony Bankart injuries, the inferior labrum remains intact between the fractured fragment (F) and the intact glenoid (G): the "hinge-point" (arrow). (Color version of figure is available online.)

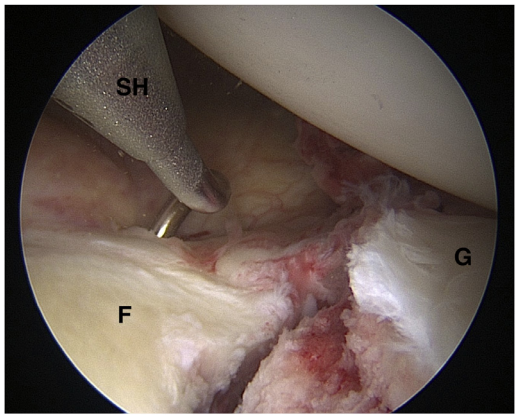

Figure 2 Curved SH are essential for passing "traction sutures" and shuttling sutures around the tissue and bone. Here the suture hook is passing an initial suture at the inferior aspect of the fracture, the "hinge point" between the fracture fragment (F) and intact glenoid (G). SH, suture hooks; (Color version of figure is available online.)

England), a1.6 mm (0.062 inch) k-wire and #1 polydioxanone (PDS) (Ethicon, Blue Ash, OH) suture.

Surgical Steps:

1. Debride and mobilize the fragment (as described above).
2. Pass a "traction suture": A curved spectrum suture passer (Conmed-Linvatec, Largo, FL) loaded with #1 PDS (Ethicon, Blue Ash, OH) suture is passed through the capsulolabral tissues at the "hinge-point," or the junction of the Bankart fragment and the intact glenoid inferiorly (Fig. 2 reproduced with permission from Elsevier). Both limbs of this PDS suture are retrieved out the anterior mid-glenoid portal and then placed outside the cannula, where they may serve as traction sutures to aid in manipulation of the fracture fragment (Fig. 3A reproduced with permission from Wolters Kluwer Health).

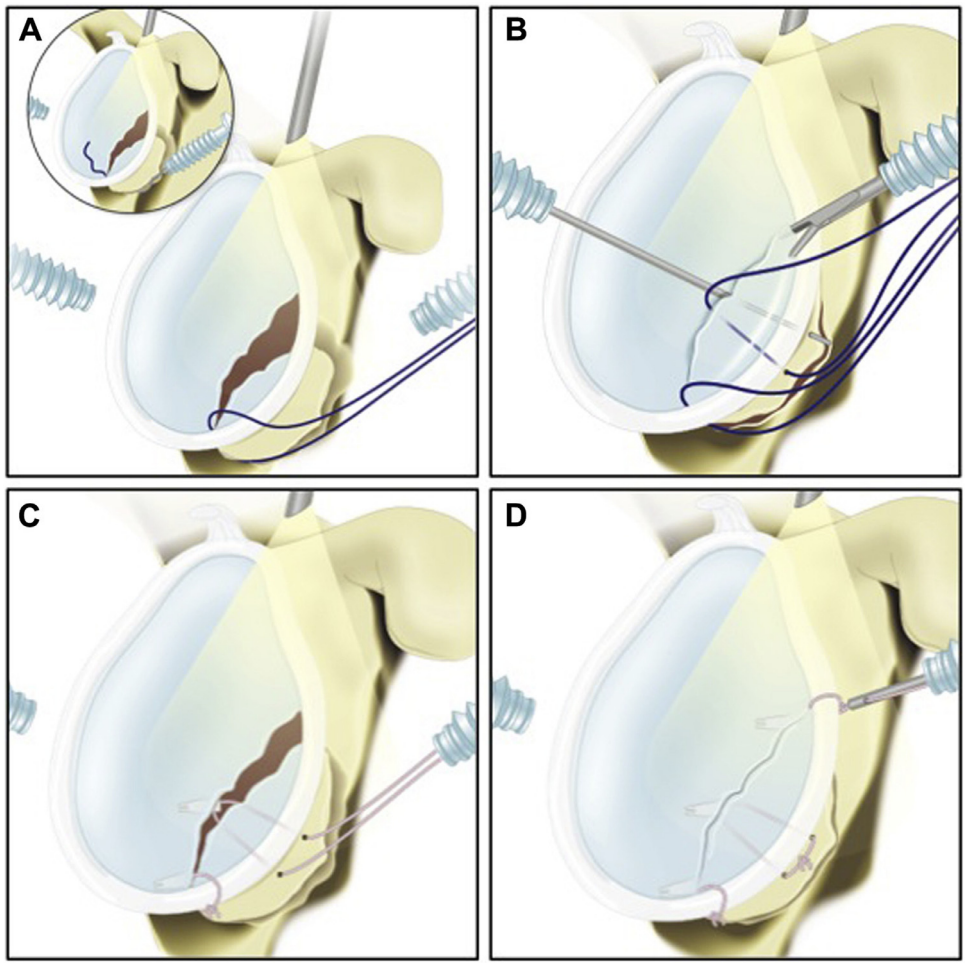

Figure 3 A-D: When performing an arthroscopic transosseous bony Bankart repair, the first suture placed serves as a traction suture at the hinge-point (A) and is taken outside of the anterior mid-glenoid cannula. Next a long spinal needle is used as a drill guide for a Kirschner wire to pierce the bone in 2 spots along the fragment, 4-5 mm apart. Monofilament sutures as passed through both tunnels (B). Suture anchors are placed and both suture limbs from the middle anchor are shuttled through the transosseous tunnels, creating a bony mattress suture (C). A third and final suture anchor is placed superiorly, and the fixation is completed by passing a suture and tying a knot around the superior labrum on the fragment (D). (Color version of figure is available online.)

3. Expose the bone anteriorly: A radiofrequency device is used to clear soft tissue from the anterior surface of the fracture fragment, medial to the capsule and labrum (Fig. 4 reproduced with permission from Elsevier). This step facilitates visualization of transosseous tunnels and suture passage through these tunnels, as described below.
4. Drill the bone: Before the anchors are placed, 2 tunnels are drilled from posterior to anterior through the middle third of the fracture fragment. The previously placed traction suture and a grasper introduced through the anterior mid-glenoid portal are used to manipulate the fracture fragment laterally, exposing the fragment's subchondral bone for tunnel drilling. A 14-gauge, 6-inch hip arthroscopy needle (Smith and Nephew, London, England) is introduced through the posterior portal and into the subchondral bone of the fracture fragment slightly inferior to its center (Fig. 5 reproduced with permission from Elsevier). A 0.062 inch (1.6 mm) Kirschner wire is then passed through the needle and drilled across the fracture fragment from posterior to anterior, thus creating the first tunnel. The Kirschner wire is removed, taking care to leave the spinal needle in position within the bony fragment. A #1 PDS suture is then passed through the needle and across the fracture fragment from posterior to anterior, and then both limbs of the PDS are retrieved out the anterior cannula. These steps are repeated, creating a second tunnel and passing a second PDS suture approximately 4-5 mm superior to the first tunnel (Fig. 3B reproduced with permission from Wolters Kluwer Health). These sutures are also stored outside the anterior mid-glenoid cannula for later shuttling.
5. The first suture anchor is placed inferiorly at the edge of the intact articular cartilage adjacent to the hinge-point. The posterior limb of the previously placed traction suture is used to shuttle 1 high strength suture from the anchor around the anterior inferior capsulolabral tissue, which is then secured with a sliding locking knot and 3 alternating half-hitches. This results in approximation and stabilization of the fracture fragment inferiorly and aids in subsequent final reduction.
6. The second anchor is then placed in the center of the intact side of the fracture bed, between the 2 transosseous tunnels, at the osteochondral junction, not on the face of the glenoid. The anterior and posterior limbs of the PDS suture in the inferior tunnel are then retrieved into the anterior mid-glenoid and posterior cannulas, respectively, and are used to shuttle 1 suture limb from the anchor via the posterior portal through the inferior tunnel from posterior to anterior. The other limb of the anchor suture is then shuttled through the more superior tunnel in similar fashion, resulting in a mattress stitch capturing the bony fragment (Fig. 3C reproduced with permission from Wolters Kluwer Health). The fragment is then secured with a sliding locking knot and 3 alternating half-hitches, taking care to adequately reduce the bone fragment prior to locking the initial knot.
7. Finally, a third anchor is placed at the superior margin of the fracture site and a soft tissue repair is performed here with 1-2 additional simple stitches placed using a curved suture passer and standard shuttling technique (Fig. 3D reproduced with permission from Wolters Kluwer Health). The completed bony repair can thus have an anatomic reduction arthroscopically (Fig. 6A reproduced with permission from Elsevier) and radiographically (Fig. 6B and C reproduced with permission from Elsevier).

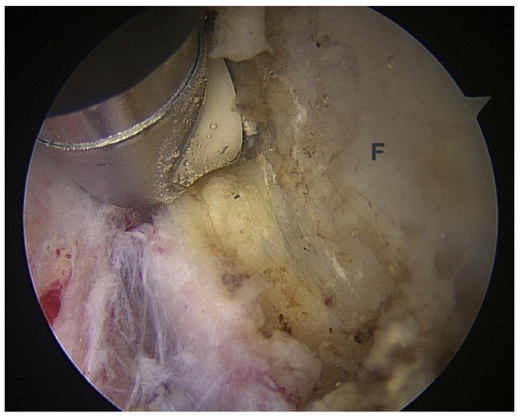

Figure 4 When preparing a large bony fragment for transosseous repair, a radiofrequency device is necessary to expose the anterior cortex of the fragment (F) medial to the labrum, where Kirschner wires and sutures will be passed. (Color version of figure is available online.)

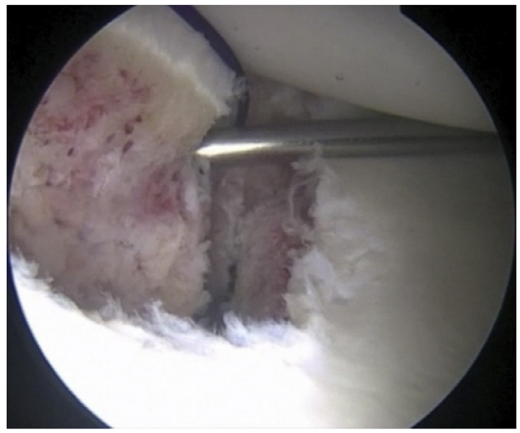

Figure 5 A long 14-gauge spinal needle is passed from posterior to anterior, into the bony fragment, and can be used as a drill guide for bony tunnel creation. (Color version of figure is available online.)

Arthroscopic "Circumferential" Suture Anchor Fixation

Indications

For all small (<10% glenoid diameter involvement) and many medium (up to 25% involvement) fragments, an

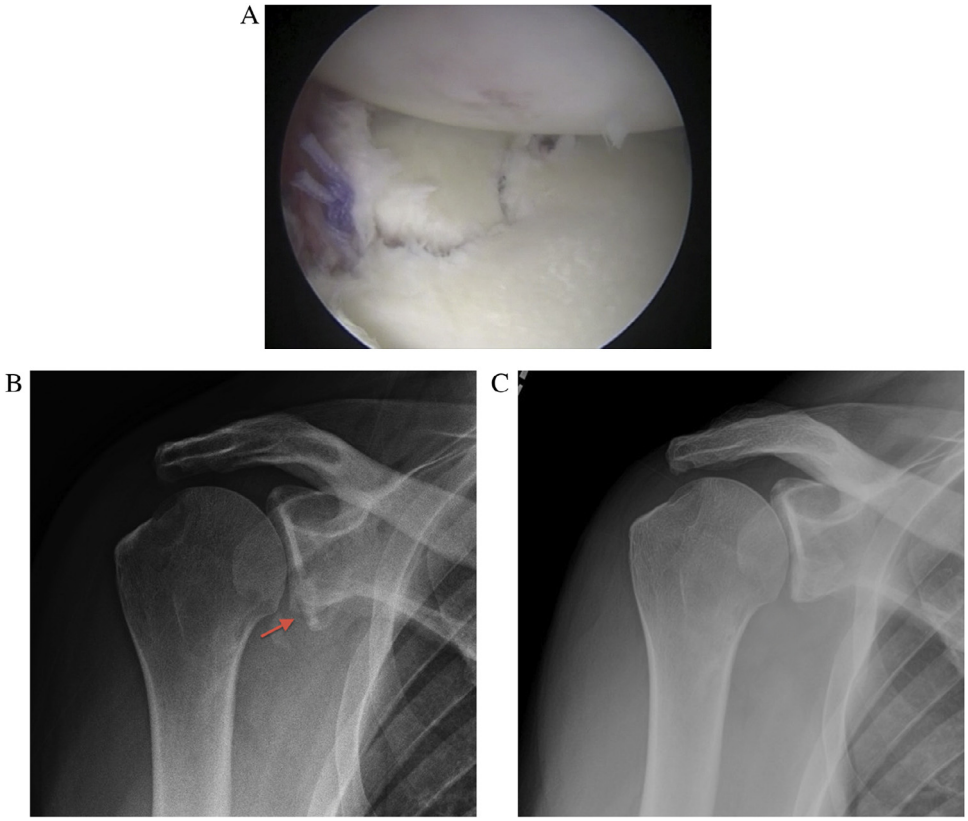

Figure 6 (A-C) Arthroscopic view after transosseous bony Bankart repair of a large fragment with 3 suture anchors. Sutures from the middle anchor are passed through the fragment. Preoperative (A) radiographs of a large bony Bankart fracture reveals significant displacement (arrow), whereas postoperatively, the fracture is well-reduced after an arthroscopic transosseous repair (B). (Color version of figure is available online.)

arthroscopic repair using suture anchors is preferred. This is the most common technique and utilizes only a few variations on standard soft tissue Bankart repair technique. The fragment is inspected and reduced with a grasper. If the fragment is less than 1 cm wide in its middle third and this reduction holds the humerus reduced on the glenoid, a circumferential suture anchor fixation technique is utilized. For larger fragments larger than 1 cm in their central third, or those involving >25% of the glenoid diameter, transosseous fixation is selected.

Surgical Steps:

1. Debride and mobilize the fragment (as described above).
2. Once the fragment has been appropriately mobilized, a grasper is used to confirm it can be appropriately reduced. Next, a "traction suture" is placed around the *mid-point* of the fragment with a curved suture hook. To achieve this, the tip of the hook is passed under the fragment and visualized medially along the glenoid neck. A large amount of #1 PDS suture is fed into the space between the fragment and the glenoid neck. For small or very mobile fragments, the suture hook may be able to lift the fragment up to the edge of the glenoid and pass the shuttle directly across the articular surface (Fig. 7A reproduced with permission from Wolters Kluwer Health). After sending the shuttle into the joint, the stitcher can be removed from the cannula, and a grasper can then be used to retrieve the PDS limb back out the same anterior mid-glenoid portal. A simple knot is placed at the tip of the retrieved end of the suture. This knot identifies the limb of PDS that can be used as a shuttle limb later in the case. This PDS traction stitch is then taken outside the cannula where it is used to help reduce the fragment initially, and later to be used as a shuttle to pass a suture limb around the entirety of the fragment (Fig. 7B reproduced with permission from Wolters Kluwer Health). (At that time, the shuttling end of the PDS can be easily identified as the end with the knot on it.) We prefer to pass this encircling stitch first because the fracture fragment is most mobile, and visualization is at its best before any other sutures have been placed or tied.
3. A suture anchor is now placed at the inferior aspect of the fracture, adjacent to the "hinge-point." Using standard shuttling technique, 1 or 2 sutures are placed around the labrum and tied down, securing and reducing the inferior aspect of the fragment anatomically.
4. A second anchor is then placed on the edge of the articular surface at the midpoint of the fragment. This anchor should be double-loaded. The first limb is shuttled around the labrum at the junction of the bone

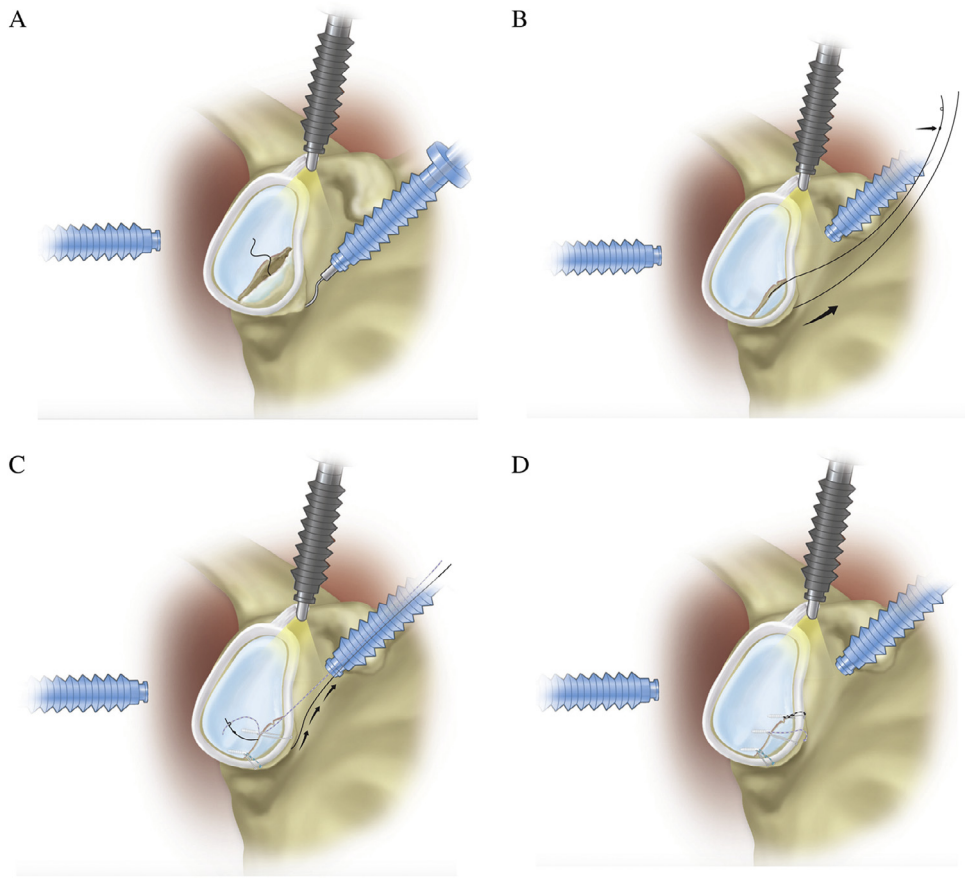

Figure 7 Circumferential fixation of small and medium sized bony Bankart fragments begins with passage of a suture hook around the fragment (A), followed by passage of a traction suture that is taken outside the anterior mid-glenoid cannula (B). Inferior and middle suture anchors are placed and the traction suture is later used to shuttle a suture from the middle anchor around the fragment circumferentially (C). Sutures are tied sequentially from inferior to superior, including a third anchor superiorly (D). (Color version of figure is available online.)

fragment and tied down, stabilizing the tissue at the height of the glenoid. Most small and medium-sized fragments do not have functional articular cartilage, and therefore this step also serves to advance the labral tissue over the exposed bone on the fragment. The anchor's second suture is then shuttled around the entire fragment using the *traction suture* as a shuttle: the knotted PDS limb is brought out the posterior portal along with 1 limb from the anchor, where they are tied together. The other end of the traction PDS is brought up into the anterior mid-glenoid portal and used to shuttle the suture around the glenoid fragment (Fig. 7C reproduced with permission from Wolters Kluwer Health). The suture is then tied, supporting the height of the bone. The bone cannot be over-reduced, as the first suture from this anchor has been tied and fixed the level of the fragment.

5. A third anchor is then placed at the superior aspect of the fragment. One or 2 sutures are placed around the soft tissue and bony tip of the fragment and tied down, completing the repair (Fig. 7D reproduced with permission from Wolters Kluwer Health).

Arthroscopic "Bridging" Suture Anchor Fixation

The advent of small knotless push in style suture anchors that can be loaded and tensioned in vivo has provided the option of doing a bridging repair across the fragment. A small single loaded anchor is placed medially along the glenoid neck first, and its sutures are taken outside of the cannula. Inferior and superior anchors are then placed, sutures are passed around the labrum and tied, stabilizing the fragment and preventing rotation. The sutures from the medial anchor are then loaded into a push in type anchor, which can then be placed into the glenoid, encircling the fragment (Fig. 8 reproduced with permission from Wolters Kluwer Health). A 70° arthroscope is helpful for this technique, as access to the medial glenoid neck can be difficult.

Arthroscopic Screw Fixation

For very large fragments that have functional articular cartilage, arthroscopic screw fixation can often be achieved.

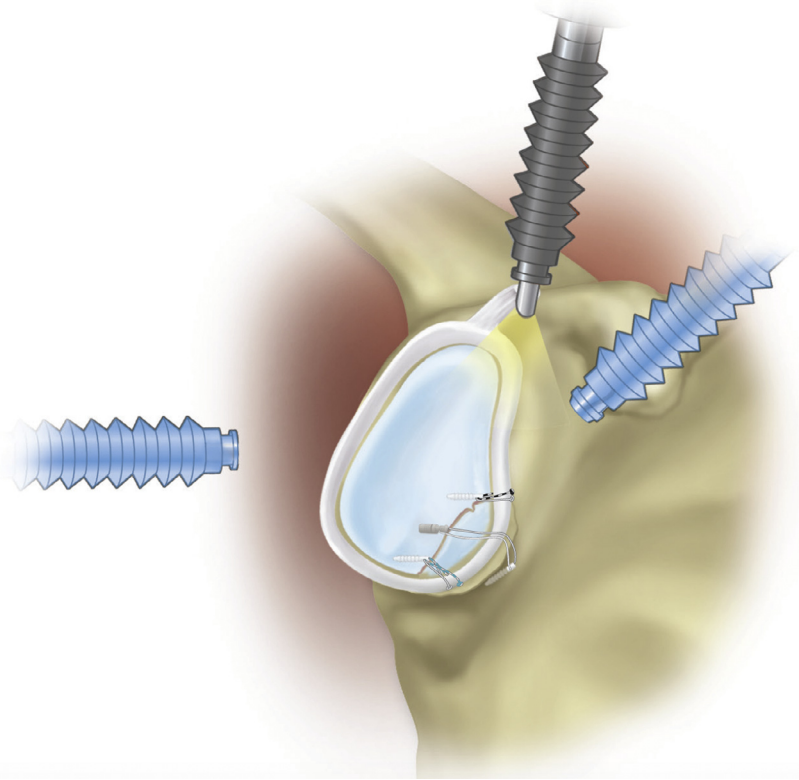

Figure 8 For some larger fragments, a "bridging" technique can be used by placing a double row of anchors at the midpoint of the fragment: 1 anchor on the glenoid face and another on the medial neck. (Color version of figure is available online.)

Screw fixation for bony Bankart fractures should be necessary only in very rare cases: very large displaced fractures of approximately >40% of the glenoid that are not amenable to other techniques. The reason for this is that screw fixation, in its current state of technological development, is very difficult, with several pitfalls that can complicate the case.

Pearls and Pitfalls to Screw Fixation:

1. Obtaining the proper angle for screw fixation will usually require a trans-subscapularis approach (aka "5 o'clock" portal), which will be distal and medial to a standard anterior portal. This access is very difficult in larger and swollen patients, as the soft tissue track passes very medial, often through the pectoralis.
2. A 5 o'clock portal through the subscapularis can improve the screw angle, which is essential, but the portal needs to be as medial as possible. We recommend no more than a 30-degree angle medial to the glenoid face. If the angle is too steep, the screw head may be prominent on the face of the glenoid edge, damaging humeral cartilage. If the surgeon tries to compensate and moves the guide wire and screw over the edge and off the glenoid face, the purchase will be poor due to the steep neck of the glenoid sloping away. In addition, a screw placed along this oblique angle may displace the fragment medially when tightening, potentially ruining results just as the case is nearly finished.
3. The fragment should be at least 1.5 cm in length to accommodate 1 or 2 screws.
4. Guide wires and cannulated screwdriver are often *too short*. Using a standard cannulated screw set from most operating rooms, the guide wires are usually not long enough to pass through a cannula and the bone, nor is there a drill guide to stabilize the flexible wires. Some companies provide specialized longer instruments (Bone Loss Set, Arthrex, Naples, FL), and this planning will need to be performed ahead of time for most surgical facilities.
5. Preliminary stabilization and reduction of the fragment can be achieved by placing a k-wire percutaneously through the subscapularis at the far medial aspect of the fragment, or by firmly holding the fragment reduced with a drill guide such as the Nesting Guide Sleeve (Bone Loss Set, Arthrex, Naples, FL).
6. Ablate soft tissue from the edge of the fragment in preparation for the screw head(s). Remember there will be labrum and capsule attached to the anterior fragment. This tissue blocks direct contact with the underlying bone and must be ablated prior to placing a guide wire.
7. We recommend that suture anchors still be placed at the inferior and superior aspects of the fragment for added fixation and rotation prevention.
8. Cannulated, partially threaded 4.0 mm screws are used most commonly, but 3.75 mm screws, bioabsorbable

and headless compression have been reported as well. The guide pin and therefore the head or top of the screw must be placed several millimeters *medial* to the labrum, away from the articular surface.

9. If an arthroscopic approach to a large fragment is not possible, open reduction and internal fixation through a deltopectoral approach is performed.

Surgical Steps:

1. Debride and mobilize the fragment (as described above).
2. Place a traction suture (as in the above techniques) around the fragment hinge-point, take it outside the anterior mid-glenoid portal, and use it to assist with fracture reduction.
3. Using a spinal needle, a 5 o'clock portal is placed as medial as possible through the subscapularis. A cannula is placed through which a drill guide and screw will fit.
4. At this point a suture anchor is placed at the inferior aspect of the fracture line, into the intact glenoid. Sutures are passed around the soft tissue attached to the inferior fragment. The labrum is usually still attached. Sutures are tied, stabilizing the inferior aspect of the fragment.
5. If possible, then place a superior suture anchor adjacent to the superior tip of the fragment and sew it down if there is adequate capsule or labrum. This superior fixation can help prevent rotation during screw placement.
6. Lastly, 1 or 2 screws are placed. If the superior and inferior suture anchors have strong and effective purchase, 1 screw is usually sufficient. The drill guide is placed through the 5 o'clock cannula, at no more than a 30-degree angle, and a guide pin is placed medial to the labrum and the edge of the articular surface. This guide wire is then over drilled, and a screw is carefully placed to provide firm fixation without cracking the fragment, that is, "two finger tight" (Fig. 9 reproduced with permission from Wolters Kluwer Health).

Conclusion

When the glenohumeral joint is symmetrically reduced, very large bony Bankart glenoid fractures can often be treated nonoperatively. For the majority of bony Bankart injuries, however, patients will have better functional outcomes with surgical repair compared to nonsurgical treatment. Acute surgical fixation takes advantage of the biological healing environment and can be expected to have low nonunion and low recurrent instability rates. In addition, nonoperative observation in a displaced position has been shown to lead to fragment absorption over time, whereas reduction and stabilization can lead to regeneration of glenoid surface area. Whenever possible, early intervention is preferable.

Arthroscopic bony Bankart stabilization can be expected to have very successful clinical results, although a single ideal technique for all types of fractures has not yet been developed. Using somewhat different techniques for different kinds of fractures, nearly all bony Bankart fractures can be effectively managed arthroscopically.

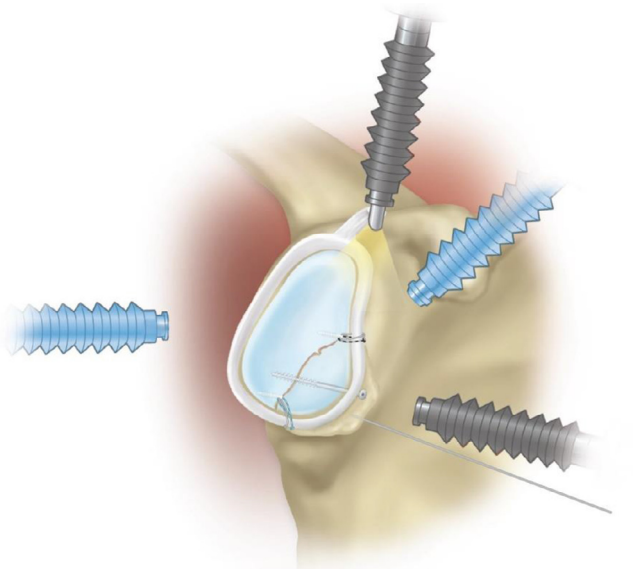

Figure 9 For large fragments, a 5 o'clock cannula through the subscapularis can provide an acceptable angle of approach for placement of a cannulated screw. A stabilizing Kirschner wire in the fragment can temporarily be placed to resist fracture displacement during screw insertion. (Color version of figure is available online.)

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