

Lateral Decubitus All-Arthroscopic Latarjet Procedure for Treatment of Shoulder Instability



Matthew R. Lewington, M.D., F.R.C.S.C.,
Nathan Urquhart, M.D., M.Sc., F.R.C.S.C., Dip.S.M.,
and Ivan H. Wong, M.D., M.Sc., F.R.C.S.C., Dip.S.M.

Abstract: Shoulder instability can be a challenging condition to treat when it becomes refractory to soft-tissue procedures or when bone loss exceeds 25% to 27% of the glenoid. The Bristow-Latarjet procedure has been developed and popularized to deal with these concerns. Traditionally, the procedure has been performed as an open approach; however, this has been recently supplanted by novel arthroscopic techniques. We present a technique for the procedure performed with the patient in a semi-lateral decubitus position that assists with optimal graft placement on the native glenoid. We use the cannulated Bristow-Latarjet Instability Shoulder System (DePuy Mitek, Raynham, MA). After a diagnostic arthroscopic evaluation, we use multiple arthroscopic anterior portals to debride the rim of the glenoid. The coracoid is prepared and taken down arthroscopically, and the cannulated guide is attached and advanced through an arthroscopically created subscapularis split. With the shoulder held in a reduced position, we are then able to drill and anchor the graft to the native glenoid. The patient is able to begin gentle range-of-motion exercises immediately postoperatively.

Shoulder instability has been evaluated and treated through a variety of modalities and mechanisms. Bankart lesions—avulsions of the anterior inferior labrum and the corresponding glenohumeral ligament—are seen commonly with traumatic anterior instability, and arthroscopic soft-tissue repairs have been shown to provide excellent stability, with good rates of return to prior functional level.¹ Treatment of instability associated with bone loss using soft-tissue repairs alone has been shown to be less successful.^{1,2} To address this issue, a variety of bone augmentations have been described.³

When bone loss exceeds 25% to 27%, bone augmentation of the glenoid is recommended to

increase the success of any stabilization procedure.^{2,4} The Latarjet procedure involves performing an osteotomy of the coracoid at the base and transporting it through a split in the subscapularis.⁵ The Latarjet procedure acts to provide increased joint stability by augmenting the total surface area of the glenoid, as well as acting as a soft-tissue stabilization through a sling effect.⁶

An arthroscopic technique for Latarjet transfer of the coracoid has been described and shown to be technically possible and successful.⁷⁻⁹ To date, all reports have been described using the beach-chair position, which can be challenging regarding viewing graft positioning.⁸⁻¹³ The learning curve for the transition from open to arthroscopic techniques has been described as 15 cases for experienced shoulder arthroscopic surgeons.¹²

Long-term outcomes for the arthroscopic procedure with the patient in the beach-chair position have been encouraging. A retrospective study of 62 patients with a 5-year minimum follow-up has shown that no patients had recurrent dislocation.¹⁴

The decreased morbidity of smaller incisions, as well as smaller splits in the subscapularis, and the ability to evaluate the joint for other intra-articular lesions are advantages to performing this procedure arthroscopically. The other major advantage is that the camera allows for more accurate placement of the graft in the joint. To achieve the best results, it has been

From Dalhousie University and the Division of Orthopaedic Surgery, Capital District Health Authority, Halifax, Nova Scotia, Canada.

The authors report the following potential conflict of interest or source of funding: M.R.L. receives support from Capital Health Research, Canadian Orthopaedic Association Fund, and Smith & Nephew. N.U. receives support from Biomet, Mitek, Linvatec, and Smith & Nephew. I.H.W. receives support from Mitek.

Received September 22, 2014; accepted January 15, 2015.

Address correspondence to Ivan H. Wong, M.D., M.Sc., F.R.C.S.C., Dip. Sports Medicine, Dalhousie University, Second Floor, Room 2106, Camp Hill Veterans' Memorial Building, 5655 Veterans' Memorial Lane, Halifax, Nova Scotia B3H2E1, Canada. E-mail: ivan.h.wong@gmail.com

© 2015 by the Arthroscopy Association of North America. Open access under CC BY-NC-ND license.

2212-6287/14801

<http://dx.doi.org/10.1016/j.eats.2015.01.013>

recommended that the graft be placed within 1 mm of the articular surface.¹¹

Although the arthroscopic procedure is promising, there are limitations to the procedure. A slight increase in loss of external rotation has been shown for the arthroscopic procedure compared with the open procedure.¹⁵ In addition, cadaveric and biomechanical studies have shown that the open procedure may be more stable in direct abduction and that a high degree of precision is needed to obtain ideal results.^{16,17} Finally, the power of the procedure to restore surface area is limited by the size of the coracoid process; as a result, variations of the procedure using allograft or iliac autograft have been developed but are commonly performed as open procedures.^{3,18,19} Multiple studies have examined potential complications of both open and arthroscopic Latarjet procedures.^{14,15,19-21} The commonly reported complications are presented in Table 1. We present a technique to perform an arthroscopic Latarjet procedure with the patient in the lateral position to better visualize the glenoid.

Technique

Preoperative Assessment

The patient is assessed in the clinic, and a standard history is elicited. Episodes of previous dislocation and provoking factors, as well as previous surgical interventions, are documented. A standard physical examination of the shoulder is then performed. Instability is assessed by use of the anterior apprehension, Jobe relocation, sulcus, and load-and-shift tests. Rotator cuff integrity is assessed by empty-can, drop-arm, lift-off, and resisted internal/external rotation testing. Hypermobility of the shoulder and other joints is assessed. Imaging consists of anteroposterior, axillary, and transscapular Y views of the shoulder. A computed tomography scan with 3-dimensional reconstruction can be used to assess glenoid bone stock and Hill-Sachs lesion volume.

Table 1. Potential Complications of Arthroscopic Latarjet Procedure

Residual instability
Loss of external rotation
Graft malposition
Graft nonunion/fibrous union
Graft lysis/resorption
Loss of fixation
Coracoid/glenoid fracture
Glenohumeral arthritis
Prominent hardware
Nerve injury
Conjoined tendon injury
Subscapularis rupture

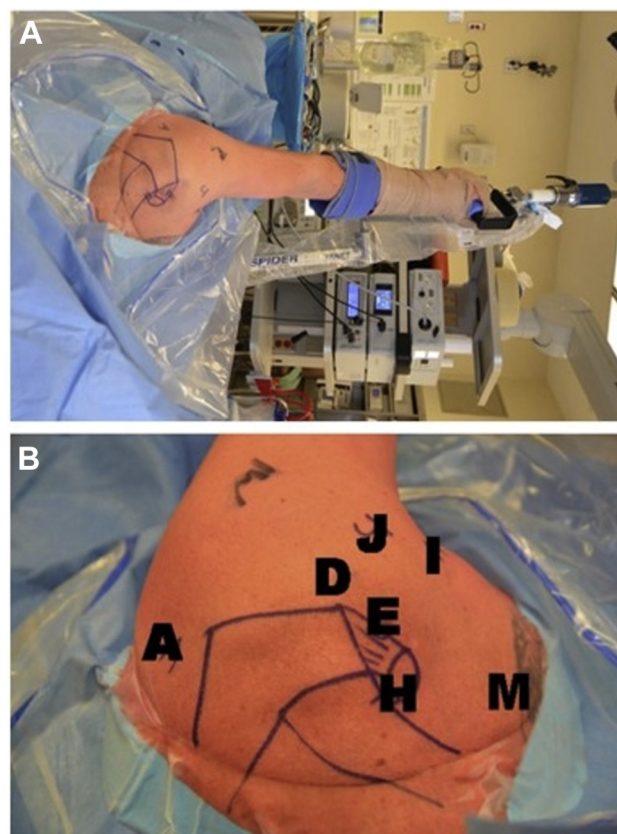


Fig 1. Patient positioning and portal placement. (A) The patient is positioned on a standard articulating operating table. A beanbag positioner is placed under the patient. The patient is in a semi-lateral position at 30° from vertical to make the glenoid parallel to the floor. The patient's arm is placed in a pneumatic positioner (Spider 2) and abducted 60° in balanced traction. (B) Skin landmarks (scapular spine, acromion, clavicle, acromioclavicular joint, and coracoid) and arthroscopic portals are outlined. The arthroscopic portals consist of a standard posterior (A) portal (kept medial to be parallel to the glenoid face), as well as lateral (D), anterosuperior, rotator interval (E), anterosuperior, above coracoid (H), ancillary (I), and anteroinferior (J) portals. A larger medial incision (M) is also made, using outside-in techniques, to be parallel to the glenoid face but lateral to the conjoined tendon to facilitate passage of the graft.

Positioning and Preparation

The patient is positioned on a standard articulating operating table (Skytron, Grand Rapids, MI). A beanbag positioner is placed under the patient. The patient is rolled into a semi-lateral position at 30° from vertical to make the glenoid parallel to the floor. This assists with glenoid screw placement later in the procedure. The patient's skin is cleaned with a chlorhexidine solution and draped with 2 split shoulder drapes (Tiburon; Cardinal Health, Dublin, OH). The patient's arm is then placed in a pneumatic positioner (Spider 2; Smith & Nephew, Memphis, TN) and abducted 60° in balanced traction (Fig 1A).

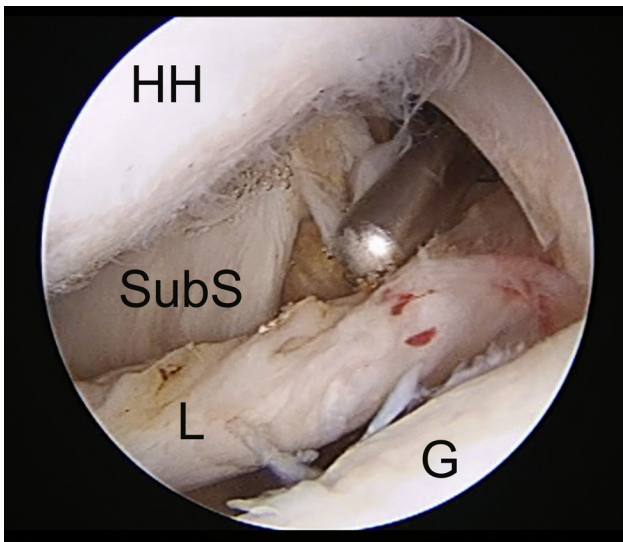


Fig 2. Viewing from the posterior portal, the glenoid (G) is visible at the inferior aspect, with the humeral head (HH) at the superior aspect. The subscapularis (SubS) is visible between the joint surfaces, and the damaged labral tissue (L) can be seen elevated off the glenoid. In addition, the ablator is shown, debriding the rotator interval in preparation for coracoid harvest.

Skin landmarks (scapular spine, acromion, clavicle, acromioclavicular joint, and coracoid) are drawn on the patient. Arthroscopic portals are then located. The standard posterior portal is kept medial to be parallel to the glenoid face. We then identify the lateral, anterosuperior, axillary, and anteroinferior portals. A larger medial incision will also be made, using outside-in techniques, to be parallel to the glenoid face but

lateral to the conjoint tendon to facilitate passage of the graft (Fig 1B).

Evaluation and Debridement

The posterior portal is made in standard fashion. A diagnostic arthroscopy is then performed according to the method described by Millstein and Snyder.²² The amount of glenoid bone loss is assessed and compared with the preoperative computed tomography scan. The Hill-Sachs lesion is also visualized. The shoulder is manually reduced (if dislocated). The anterosuperior portal is then created. This is used to probe the quality of the glenoid bone, Hill-Sachs lesion, and anterior capsule, as well as to excise the rotator interval and debride the glenoid neck in preparation for the graft (Fig 2).

Subscapularis Split

It is important to achieve adequate visualization of the subscapularis. Initial visualization of the articular side of the tendon is obtained through the posterior portal. We then develop the lateral portal, and the arthroscope is placed in this portal. Through this portal, the coracoid and conjoint tendon can be visualized. The ablator (StarVac 90; ArthroCare, Sunnyvale, TX) is used to debride the tissue surrounding the coracoid. The clavicular fascia is then opened with the ablator just lateral to the conjoint tendon and inferior to a point midway down the subscapularis muscle. A switching stick is inserted in the posterior portal. The anterior tip is placed through the subscapularis halfway between the anterior and inferior margins and lateral to the conjoint tendon (Fig 3A). While reduction of the humerus within the glenoid is maintained, the

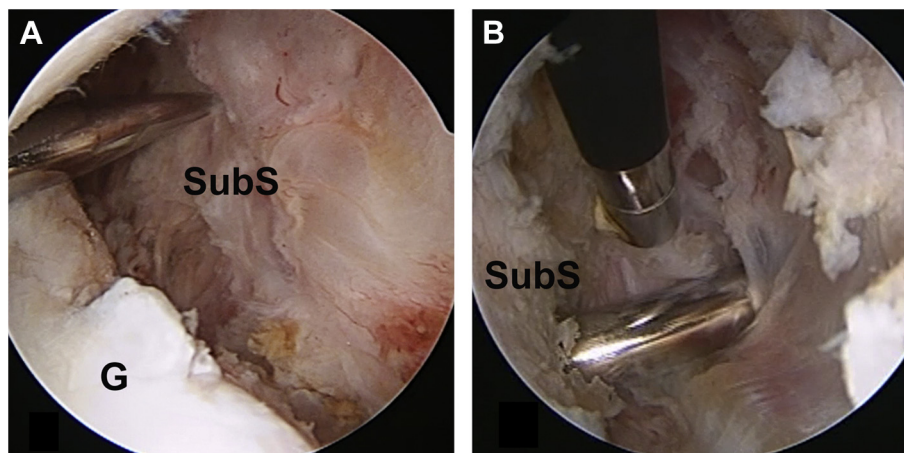


Fig 3. (A) View from the lateral portal with the glenoid (G) visible in the foreground after debridement of the rotator interval. The switching stick is introduced through the posterior portal and is used to pierce the subscapularis (SubS) halfway between the anterior and inferior margins, lateral to the conjoint tendon. (B) Under direct vision from the lateral portal, the subscapularis (SubS) is then split with an ablator (StarVac 90) laterally and medially, with the ablator working from the inferior portal. This is performed both anteriorly and posteriorly to the subscapularis through the rotator interval.

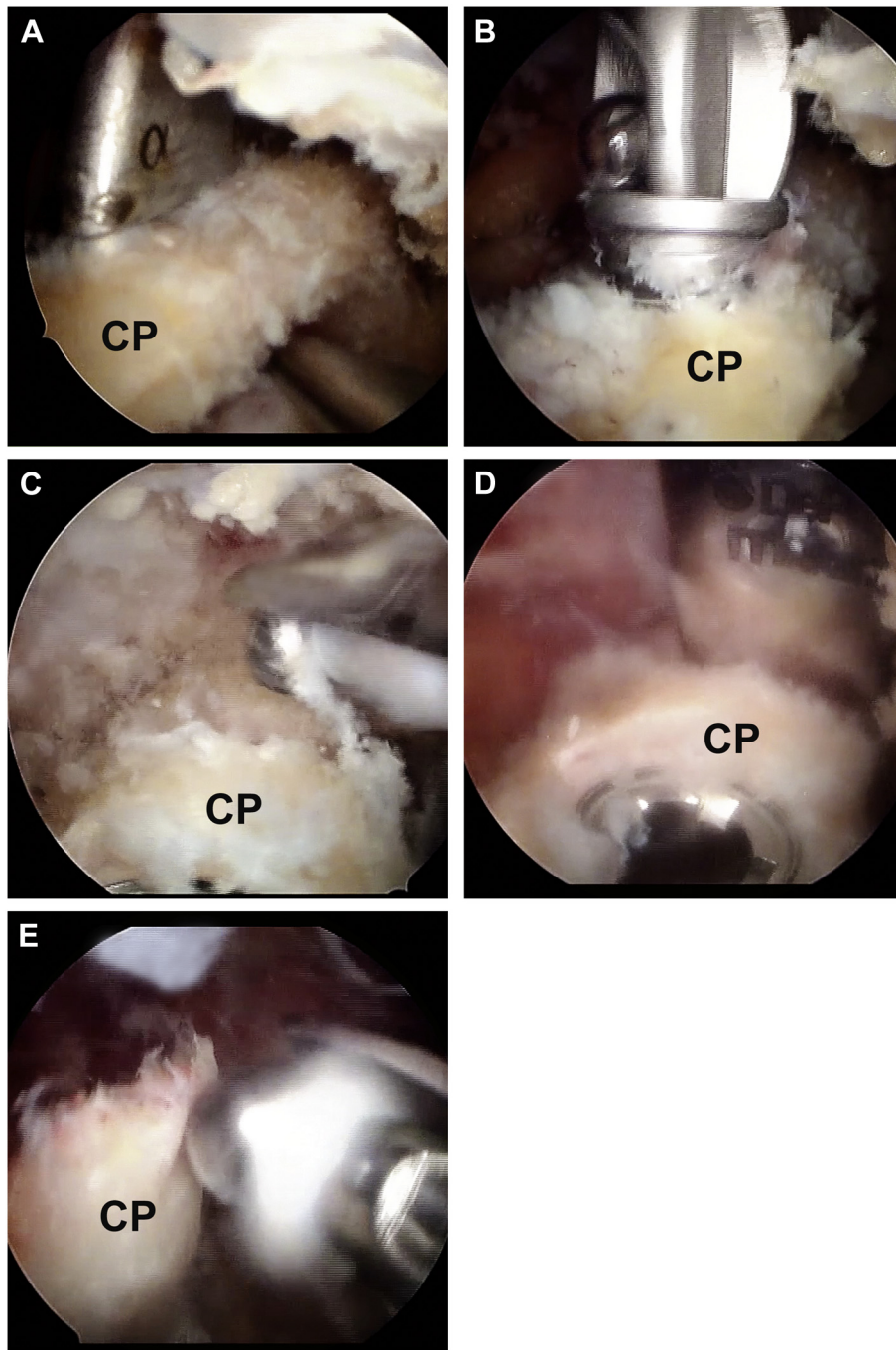


Fig 4. (A) The anteroinferior portal is used to visualize the coracoid process (CP). The pectoralis minor tendon has been taken down, and a new coracoid portal has been established directly over the CP to place the α - β coracoid drill guide. (B) Two 1.5-mm K-wires have been drilled at the midline of the coracoid, 1 cm proximal to the tip. A step drill has been used prior to a tap for insertion of top-hat washers that secure fixation into the CP. (C) Viewing from the anteroinferior portal, the base of the CP is circumferentially decorticated with a round burr. (D) With the arthroscope in the anteroinferior portal, a curved osteotome is inserted from the coracoid portal and used to osteotomize the base of the CP. (E) Viewing from the anteroinferior portal, the CP is mobilized and a round burr is used to decorticate and shape the inferior surface to match the glenoid for an accurate fit.

subscapularis is then split laterally and medially with the ablator working from the inferior portal (Fig 3B). This is performed under direct vision from the lateral portal both anteriorly and posteriorly to the subscapularis through the rotator interval. Our final portal is the medial portal, which serves as our incision through which to align and fixate the graft. A spinal needle is used to establish a landmark of this from outside to inside. The goal is to make a portal that will allow the double cannulated graft holder to be positioned parallel and just medial to the glenoid face. The

elbow is flexed to take tension off the conjoined tendon to allow this portal to be inserted lateral to the conjoined tendon and to access the anterior rim of the glenoid. The spinal needle is entered into the skin in an area usually located along the deltopectoral groove. The camera is used to visualize the spinal needle as it is introduced through the deltoid muscle superficial to the conjoined tendon to be sure that the neurovascular structures are safe. A switching stick introduced from the posterior portal can also be used to estimate the portal starting point and alignment.

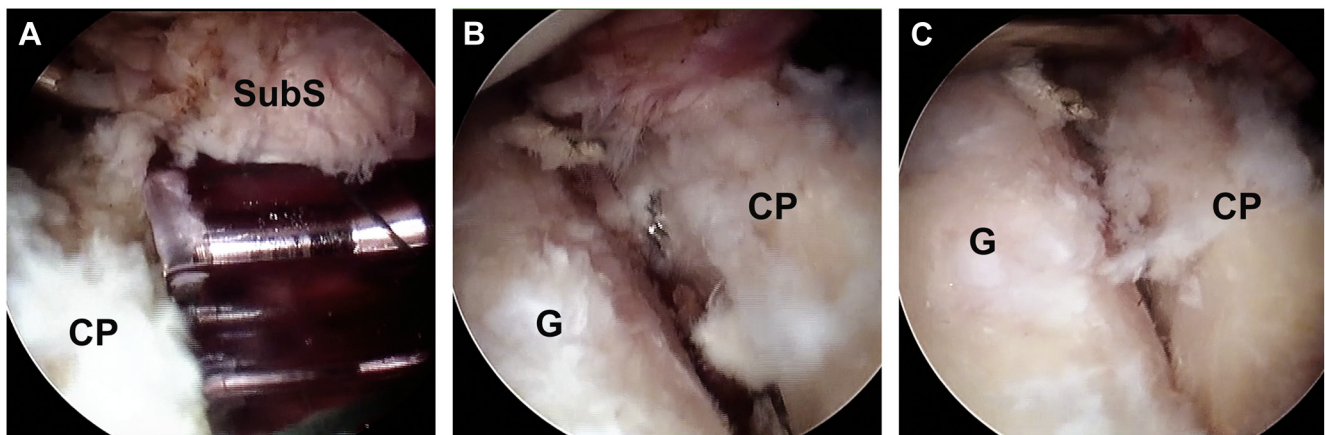


Fig 5. (A) View from the lateral portal showing the switching stick retracting the subscapularis (SubS) to allow passage of the double-barrel cannula attached to the osteotomized coracoid process (CP) onto the glenoid. (B) Viewing from the lateral portal, the glenoid (G) is visible on the left with the osteotomized CP docking with it on the right. Centrally, the screw threads are visible, beginning to engage the glenoid prior to final tightening. (C) Final view through the lateral portal showing the CP compressed and anchored onto the residual glenoid (G).

Coracoid Graft Harvest

The anteroinferior portal is used to visualize the coracoid. The pectoralis minor tendon is taken down, and a new coracoid portal is established directly over the coracoid to place the α - β coracoid drill guide (DePuy Mitek, Raynham, MA). It is important to angle the portal to be perpendicular to the curve of the coracoid (approximately 30° from vertical). Two 1.5-mm K-wires are drilled at the midline of the coracoid, 1 cm proximal to the tip (Fig 4A). Visualization of the K-wires on the inferior surface of the coracoid is important. A step drill (DePuy Mitek) is then used prior to a tap for insertion of “top hat” washers (DePuy Mitek) that secure fixation into the bone (Fig 4B).

A medial portal is created using an outside-in technique to be parallel to the glenoid face, lateral to the conjoint tendon, and in line with the switching stick that is through the subscapularis split. The skin incision is extended to 3 cm to accommodate the double-barrel clear cannula (DePuy Mitek), and the deltoid muscle is bluntly dissected with the wide 3-cm obturator (DePuy Mitek). It is important to be sure that the path of this wide obturator allows passage lateral to the conjoint tendon and sits parallel to the face of the glenoid on the anterior rim. This obturator is then replaced with the double-barrel cannula in preparation of capturing the osteotomized coracoid.

The base of the coracoid is circumferentially decorticated with a round burr (Dyonics; Smith & Nephew) prior to use of a curved osteotome (DePuy Mitek) from the coracoid portal (Fig 4 C and D). Two cannulated guides (DePuy Mitek) are placed into the double-barrel clear cannula in the medial portal. These guides are threaded into the coracoid through the top-hat washers to securely fix the coracoid on the double-barrel

cannula. With the coracoid mobilized, the burr is used to remove sharp edges and decorticate and shape the inferior surface to match the glenoid shape for an accurate fit and increased healing potential (Fig 4E).

Glenoid Preparation

The arm is placed in the adducted position with the elbow flexed to 90° to release tension on the conjoint tendon. Traction is removed from the shoulder, and the humerus is manually reduced onto the glenoid under direct vision. The split subscapularis is retracted inferiorly from the switching stick in the posterior portal and superiorly using a slotted cannula through the medial portal to gain direct visualization of the anterior glenoid neck with no soft tissue to interpose.

Coracoid Graft Positioning

By use of the double-barrel cannula, the coracoid graft is placed through the subscapularis split onto the anterior glenoid rim (Fig 5A). Care is taken to view the positioning of the graft through the lateral, anteroinferior, and posterior portals to ensure accuracy. Two long K-wires are placed through the guides in the double-barrel cannula and penetrate through the skin posteriorly parallel to the posterior portal. Care is taken to be sure that the K-wires are parallel to the glenoid face and do not penetrate into the cartilage.

A 3.2-mm calibrated cannulated drill is used over the K-wires and the length of the screws is measured using a sleeve guide. We insert 3.5-mm screws (DePuy Mitek) over both K-wires and tighten them alternately to maximize compression of the coracoid on the glenoid (Fig 5B). It is important to directly visualize the screw heads when inserting the screwdriver for final compression because it is easy to strip the titanium threads (Fig 5C). A

Table 2. Pearls and Pitfalls of Arthroscopic Latarjet Procedure

Ensure that a careful physical examination and imaging review are performed prior to the procedure.
Position the patient at 30° from vertical to make the glenoid parallel to the floor.
Ensure adequate soft-tissue debridement of the glenoid to assist with optimal graft position.
Debride the rotator interval sufficiently to allow for passage of the graft.
Pierce the subscapularis with a switching stick to allow for retraction, and split under direct vision.
Flex the elbow and adduct the arm to de-tension the conjoint tendon and allow for easier graft passage.
Work laterally to the conjoint tendon to avoid the neurovascular structures.
Adequately debride the coracoid to allow for the placement of K-wires using direct vision.
Visualize the superior, inferior, medial, and lateral borders of the coracoid using multiple portals.
Once osteotomy has been performed, contour the coracoid fragment with a burr to match the glenoid and improve the fit.
Avoid lateralization of the coracoid on the glenoid; slight medialization is acceptable.
Visualize the screw heads as they tighten to avoid stripping the soft titanium.

final view of the construct should be obtained through all portals, especially the lateral portal, to see that the humerus can no longer be dislocated from an anteriorly directed force on the humerus (Video 1).

Postoperative Care

The arthroscopic portals are closed. The patient is placed in a sling (neutral with a wedge) (SlingShot; Breg, Carlsbad, CA) and protected for the first 2 weeks postoperatively. The patient is instructed to avoid any lifting for 12 weeks to avoid excessive stress on the coracoid graft. Range-of-motion exercises and scapular stability exercises are started immediately. Active-assisted and open/closed kinetic chain exercises, as well as unweighted side-lying external rotation exercises, are begun at 5 to 6 weeks. If the patient has become pain free, endurance training may commence at 8 weeks. Strengthening exercises are begun at 10 weeks if the patient is still not having pain (Table 2).

References

- Boileau P, Villalba M, Héry J-Y, Balg F, Ahrens P, Neyton L. Risk factors for recurrence of shoulder instability after arthroscopic Bankart repair. *J Bone Joint Surg Am* 2006;88:1755-1763.
- Burkhart SS, De Beer JF. Traumatic glenohumeral bone defects and their relationship to failure of arthroscopic Bankart repairs: Significance of the inverted-pear glenoid and the humeral engaging Hill-Sachs lesion. *Arthroscopy* 2000;16:677-694.
- Bigliani LU, Newton PM, Steinmann SP, Connor PM, McIlveen SJ. Glenoid rim lesions associated with recurrent anterior dislocation of the shoulder. *Am J Sports Med* 1998;26:41-45.
- Lo IKY, Parten PM, Burkhart SS. The inverted pear glenoid: An indicator of significant glenoid bone loss. *Arthroscopy* 2004;20:169-174.
- Helfet AJ. Coracoid transplantation for recurring dislocation of the shoulder. *J Bone Joint Surg Br* 1958;40:198-202.
- Yamamoto N, Muraki T, An K-N, et al. The stabilizing mechanism of the Latarjet procedure: A cadaveric study. *J Bone Joint Surg Am* 2013;95:1390-1397.
- Allain J, Goutallier D, Glorion C. Long-term results of the Latarjet procedure for the treatment of anterior instability of the shoulder. *J Bone Joint Surg Am* 1998;80:841-852.
- Lafosse L, Boyle S. Arthroscopic Latarjet procedure. *J Shoulder Elbow Surg* 2010;19:2-12 (suppl).
- Lafosse L, Lejeune E, Bouchard A, Kakuda C, Gobeze R, Kochhar T. The arthroscopic Latarjet procedure for the treatment of anterior shoulder instability. *Arthroscopy* 2007;23:1242.e1-1242.e5. Available at www.arthroscopyjournal.org.
- Ee GWW, Mohamed S, Tan AHC. Long term results of arthroscopic Bankart repair for traumatic anterior shoulder instability. *J Orthop Surg Res* 2011;6:28.
- Taverna E, Golanò P, Pascale V, Battistella F. An arthroscopic bone graft procedure for treating anterior-inferior glenohumeral instability. *Knee Surg Sports Traumatol Arthrosc* 2008;16:872-875.
- Castricini R, De Benedetto M, Orlando N, Rocchi M, Zini R, Pirani P. Arthroscopic Latarjet procedure: Analysis of the learning curve. *Musculoskelet Surg* 2013;97:93-98 (suppl 1).
- Boileau P, Mercier N, Roussanne Y, Thélou C-É, Old J. Arthroscopic Bankart-Bristow-Latarjet procedure: The development and early results of a safe and reproducible technique. *Arthroscopy* 2010;26:1434-1450.
- Dumont GD, Dumont GD, Fogerty S, et al. The arthroscopic Latarjet procedure for anterior shoulder instability: 5-Year minimum follow-up. *Am J Sports Med* 2014;42:2560-2566.
- Griesser MJ, Harris JD, McCoy BW, et al. Complications and re-operations after Bristow-Latarjet shoulder stabilization: A systematic review. *J Shoulder Elbow Surg* 2013;22:286-292.
- Gracitelli MEC, Ferreira AA, Benegas E, Malavolta EA, Sunada EE, Assunção JH. Arthroscopic Latarjet procedure: Safety evaluation in cadavers. *Acta Ortop Bras* 2013;21:139-143.
- Schulze-Borges J, Agneskirchner JD, Bobrowitsch E, et al. Biomechanical comparison of open and arthroscopic Latarjet procedures. *Arthroscopy* 2013;29:630-637.
- Provencher MT, Ghodadra N, LeClere L, Solomon DJ, Romeo AA. Anatomic osteochondral glenoid reconstruction for recurrent glenohumeral instability with glenoid deficiency using a distal tibia allograft. *Arthroscopy* 2009;25:446-452.

19. Sayegh ET, Mascarenhas R, Chalmers PN, Cole BJ, Verma NN, Romeo AA. Allograft reconstruction for glenoid bone loss in glenohumeral instability: A systematic review. *Arthroscopy* 2014;30:1642-1649.
20. Sastre S, Peidro L, Méndez A, Calvo E. Suprascapular nerve palsy after arthroscopic Latarjet procedure: A case report and review of literature. *Knee Surg Sports Traumatol Arthrosc* in press, available online 18 May, 2014. doi:10.1007/s00167-014-3075-5.
21. Bhatia S, Frank RM, Ghodadra NS, et al. The outcomes and surgical techniques of the Latarjet procedure. *Arthroscopy* 2014;30:227-235.
22. Millstein ES, Snyder SJ. Arthroscopic evaluation and management of rotator cuff tears. *Orthop Clin North Am* 2003;34:507-520.