

Technical Note

Indirect Arthroscopic Rotator Interval Repair

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Abstract: Repair of the capsular rotator interval has become a successful adjunct to arthroscopic procedures that address glenohumeral instability. This technical note presents a procedure that allows imbrication of the rotator interval in an indirect fashion regardless of pre-existing arthroscopic portals. A monofilament suture is passed percutaneously using a No.18-gauge spinal needle through the inferior portion of the rotator interval capsule. A soft tissue penetrator is passed through the anterior superior portal to retrieve the suture through the superior portion of the rotator interval capsule. A braided suture is then shuttled in the standard fashion. An arthroscopic knot pusher is placed on the inferior limb of the suture and drives this limb below the deltoid and anterior to the capsule to join the second limb for extracapsular fixation. The technique also provides for direct arthroscopic visualization of the repair and does not necessitate entry into the subacromial space. This is a reproducible procedure that allows efficient repair of the rotator interval. **Key Words:** Shoulder—Rotator interval—Instability—Arthroscopy—Repair.

The rotator interval is an important anatomic region with respect to shoulder stability. The rotator interval is defined as the articular capsule bordered superiorly by the anterior portion of the supraspinatus, inferiorly by the superior portion of the subscapularis, medially by the base of the coracoid process, and laterally by the long head of the biceps tendon. The capsular tissue is reinforced by the coracohumeral ligament and the superior glenohumeral ligament.

The rotator interval has been shown to play a role in the biomechanical stability of the glenohumeral joint. Cole et al.¹ showed that the rotator interval is variable in size and is present in the fetus as well as the adult. Harryman et al.² found that sectioning the rotator

interval in cadaveric specimens resulted in increased glenohumeral translation in all planes tested. Imbrication of the rotator interval lesions resulted in decreased posterior and inferior glenohumeral translation as compared with the intact state. The rotator interval is usually repaired as an isolated defect or to supplement other stabilization and capsular reconstruction procedures. Gartsman et al.³ found that repair of the rotator interval was a critical factor in 14 of 53 shoulders treated arthroscopically for anteroinferior glenohumeral instability and contributed to the improved clinical outcomes observed in that study.

A study of 10 patients with traumatic tears of the rotator interval showed relief of pain and return to full function after suture repair of the rotator interval lesion.⁴ Field et al.⁵ reported good or excellent results in 15 patients who underwent surgical repair of isolated rotator interval defects. The authors recommend routinely examining the rotator interval at the time of shoulder stabilization procedures and advocate an appropriate repair if a defect is noted.

Various arthroscopic techniques of rotator interval repair have been reported. Treacy et al.⁶ described a technique of arthroscopic rotator interval repair with visualization and knot tying from within the subacro-

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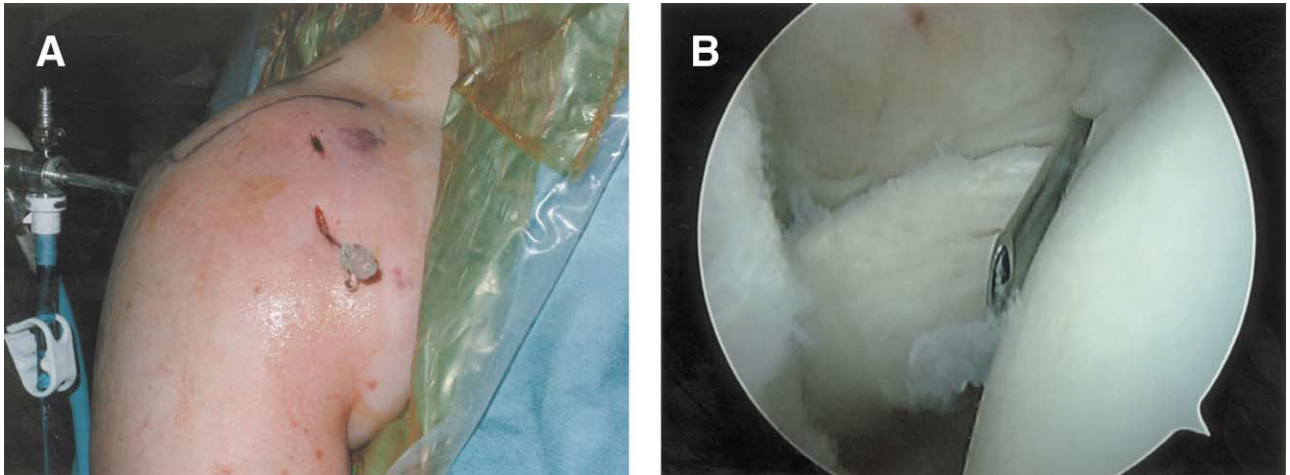


FIGURE 1. (A) An 18-gauge spinal needle in anteroinferior portal. (B) Intra-articular view of the spinal needle through middle glenohumeral ligament.

mial space. Gartsman et al.⁷ recently reported an arthroscopic technique that uses direct intra-articular visualization of the rotator interval repair, suture shuttling via multiple canulae, and extracapsular knot tying, eliminating the need to enter the subacromial space.⁷ We report our technique of arthroscopic rotator interval repair, which uses intra-articular visualization of suture placement and imbrication of the capsular tissue with an indirect passage of the extracapsular suture limb deep to the deltoid. This technique also avoids entering the subacromial space for visualization and minimizes the suture shuttle passage within the glenohumeral joint.

OPERATIVE TECHNIQUE

The patient is identified in the preoperative holding area, and the proper extremity is appropriately marked. The patient is given prophylactic intravenous antibiotics and an interscalene regional block if appropriate. The patient is then placed under general anesthesia and placed in the beach-chair position. The range of shoulder motion and stability in all planes is sequentially examined. In addition to the degree of anterior and posterior glenohumeral translation, the examination under anesthesia provides an assessment of inferior translation (sulcus sign) in shoulder adduc-

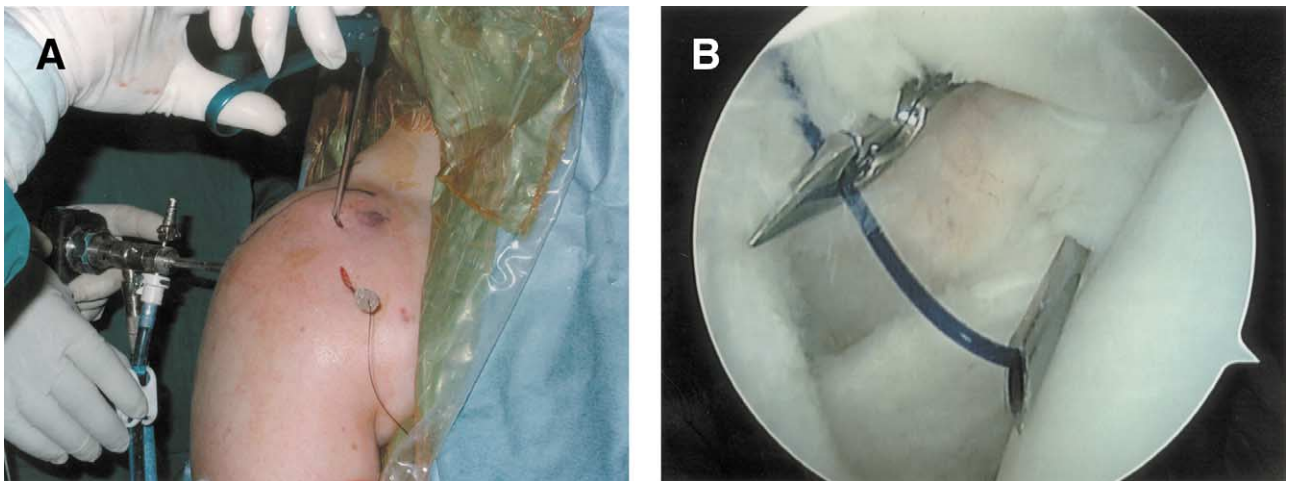


FIGURE 2. (A) Arthroscopic penetrator placed through the anterosuperior portal. (B) Intra-articular view of the penetrator piercing the superior glenohumeral ligament and grasping the suture passed through the spinal needle.

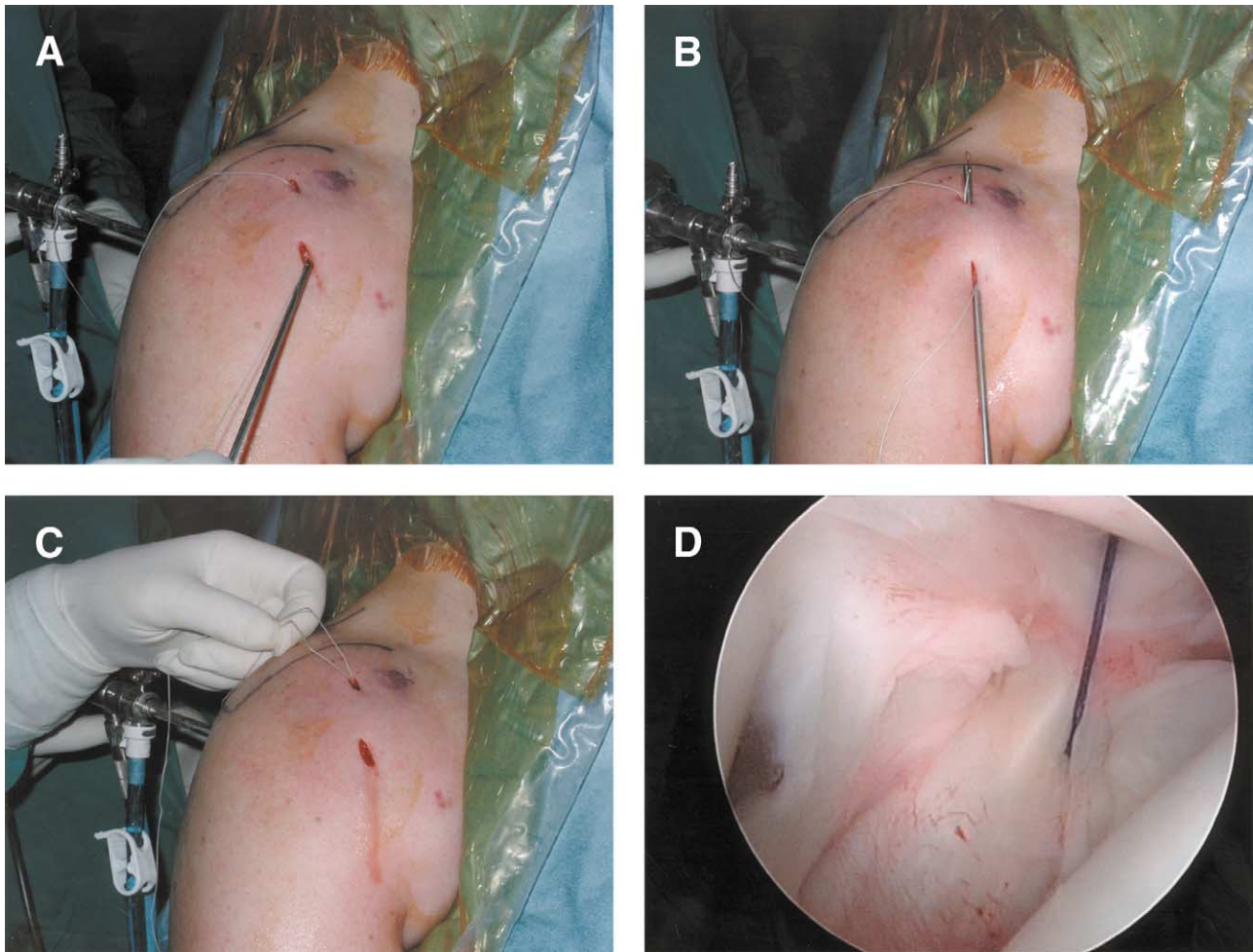


FIGURE 3. (A) Knot-pusher threaded over the suture limb, entering anteroinferior portal. (B) Knot-pusher passed indirectly deep to the deltoid through the anterosuperior portal. (C) Suture limbs protruding through anterosuperior portal. (D) Medial braided suture tied and lateral monofilament suture before shuttling are seen.

tion and external rotation. Persistent inferior translation of the adducted, externally rotated humerus is suggestive of a rotator interval lesion that may contribute to glenohumeral instability. A standard posterior arthroscopic portal is established, and a diagnostic arthroscopy is performed, examining all pertinent structures in a sequential and systematic manner. As stated by Gartsman et al.,⁴ findings that are consistent with rotator interval pathology include capsular redundancy between the subscapularis and supraspinatus tendons and tearing or fraying of the superior glenohumeral ligament, biceps tendon, or superior border of the subscapularis tendon. All pathology, such as labral detachment, capsular redundancy, and rotator cuff tears, are repaired arthroscopically using additional arthroscopic portals as needed.

Our proposed technique of rotator interval closure is independent of pre-existing arthroscopic portals placed for associated glenohumeral procedures. The capsule within the rotator interval is gently abraided with an arthroscopic rasp to incite a healing response. An 18-gauge spinal needle is placed anteriorly (Fig 1A), penetrating the skin or through an anteroinferior portal. It is passed through the capsuloligamentous structures overlying the intra-articular aspect of the subscapularis tendon. A No. 1 monofilament suture is threaded through the spinal needle into the glenohumeral joint (Fig 1B). A tissue penetrator (OBL; Smith & Nephew, Andover, MA) is placed through the anterosuperior portal and pierces the superior glenohumeral ligament and associated capsular tissue anterior to the supraspinatus tendon (Fig 2A).

The tissue penetrator grasps the monofilament suture, which is advanced under direct visualization and withdrawn through the anterosuperior portal (Fig 2B). The spinal needle is removed before withdrawal of the tissue penetrator to prevent amputation of the monofilament suture. The monofilament suture is then tied to a braided nonabsorbable or prolonged absorbable suture and shuttled through the capsular tissue. Tension may now be applied to the suture, showing the quality of the rotator interval closure under direct arthroscopic visualization.

The knot pusher is threaded over the inferior limb of the suture and passed through the anteroinferior portal (Fig 3A), deep to the deltoid and out through the anterosuperior portal (Fig 3B). The knot pusher can alternatively be placed through a small skin incision if a formal anteroinferior portal was not indicated for any other procedure. The surgeon must ensure that the knot pusher is passed in the appropriate tissue plane below the deltoid and anterior to the capsule. This is accomplished by external inspection and palpation of the muscular layers in combination with intra-articular visualization of the knot pusher tenting the anterior capsule.

Before tensioning and tying of the suture, the shoulder is placed in 30° to 40° of external rotation and adduction to prevent permanent loss of external rotation on definitive rotator interval closure. Tension placed on the suture will draw the superior glenohumeral ligament and the inferior rotator interval tissue together. Both limbs of the suture repair are now protruding through the anterosuperior portal and may be tied by an appropriate sliding knot (Fig 3C). We prefer to use an arthroscopic sliding knot while ensuring appropriate suture tension and rotator interval closure under direct intra-articular arthroscopic visualization (Fig 3D). Care must be taken to ensure that the knot is placed deep to the deltoid and does not capture any muscle tissue in the process. Because the knot is extracapsular, an arthroscopic knot cutter (Arthrex, Naples, FL) is advanced over both suture limbs through the anterosuperior portal. The suture is cut

just above the knot. The shoulder is examined for range of motion to ensure that closure of the rotator interval did not inadvertently result in limitation of external rotation. On completion of the procedure, the portals are closed with simple sutures, a sterile dressing is applied, and the arm is placed in a sling in slight abduction.

DISCUSSION

Repair of the rotator interval has been shown to play a role in the treatment of glenohumeral instability, either as an isolated repair or in combination with other stabilization procedures. At least 2 arthroscopic techniques^{6,7} are reported in the literature and provide an effective repair of the rotator interval. The technique presented here has the advantage of avoiding penetration into the subacromial space, while minimizing suture shuttling. Additionally, the technique can be performed in an indirect fashion regardless of the portal placement, minimizing the number of arthroscopic cannulae and instruments used intra-articularly. This technique is technically reproducible and efficient.

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