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Arthroscopic Reconstruction of the Acetabular Labrum Using an Autograft Hip Capsule

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Investigation performed at Massachusetts General Hospital, Mass General Brigham, Boston, Massachusetts

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Abstract

Background: Whereas uncomplicated labral tears with preserved fibers can be effectively treated with use of labral repair techniques, complex tears and hypoplastic labra require labral reconstruction[1-3]. Standard reconstruction techniques feature grafted tissue that is added to existing, deficient tissue or that is utilized to replace a hypoplastic labrum entirely[4-9]. However, such approaches utilizing allografts or remote autografts are limited because they often necessitate extensive debridement of the existing labrum to prepare a site for graft implantation, an approach that can damage and devascularize the chondrolabral junction[10-14]. The presently described technique, arthroscopic capsular autograft labral reconstruction, is suitable for simple tears as well as hypoplastic, degenerative, and complex tears, and negates the challenges of utilizing allografts or remote autografts by supplementing the labrum. In addition, this technique avoids substantial resection, thus preserving the chondrolabral junction[15-22].

Description: Following induction of anesthesia and appropriate patient positioning, puncture capsulotomy is performed to enter the hip joint[26]. In the presence of a sufficiently intact labrum, 3 to 5 mm of capsule is elevated to augment the labrum and preserve the blood supply. In the presence of a severely deficient or hypoplastic labrum, the capsule is elevated 5 to 10 mm to reconstruct the labrum. Following capsular augmentation and potential acetabuloplasty, 2.3-mm bioabsorbable composite anchors are utilized to secure the elevated capsular tissue and the remaining labral tissue to the acetabular rim. Loop suture or a vertical mattress suture technique is then utilized to complete the repair. A Weston knot and several half-hitches are placed while dynamically tensioning along the capsular aspect of the repair in order to secure the labral reconstruction to the acetabular rim with concurrent release of traction. Anchors are placed roughly 1 cm apart to prevent strangulation of the capsular vessels[29].

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Alternatives: Labral reconstruction options include autografts or allografts7. Potential allografts include the semitendinosus, tibialis anterior, iliotibial band, tensor fasciae latae, and peroneus brevis8-14. Remote autograft sites include the gracilis and quadriceps tendons16,17. These options are limited by increased donor site morbidity and operative time to obtain the grafts. Local autograft sites include the ligamentum teres, indirect head of the rectus femoris, iliotibial band, and hip capsule15,18-23,25.

Rationale: Relative to autografts, the allografts most commonly utilized in labral reconstruction feature a heightened risk of disease transmission, increased cost, and a potentially lengthened time to graft incorporation[15]. Among the local autograft sites, the utility of ligamentum teres graft is limited because its harvesting requires an open approach[21,22]. Rectus femoris autografts lack empirical support for their ability to recreate the suction seal[19,20]. The iliotibial band has known soft-tissue complications at the harvest site, in addition to requiring an additional incision[10,18]. Hip capsule autograft is not limited by these constraints[25]. The presently described technique improves on existing remote and local autograft-harvesting techniques, supporting the labrum and reinforcing its seal through the use of a graft with an intact blood supply. Given the various degrees of capsular augmentation that can be performed, this technique may be utilized in some form for all degrees of acetabular labral repair.

Expected Outcomes: Labral reconstruction with capsular augmentation from the hip capsule showed significant improvement over baseline in functional outcomes at 3, 6, 12, and 24 months postoperatively in patients with complex labral tears that could not be treated with simple repair. Additionally, at 24 months postoperatively, 76.3%, 65.5%, and 60.8% of patient International Hip Outcome Tool-33 (iHOT-33) scores exceeded threshold values for the minimal clinically important difference, patient acceptable symptom state, and substantial clinical benefit, respectively[30].

Important Tips:

- For large cam lesions, 3D computed tomography is performed during preoperative planning.
- The anterolateral portal should be placed under fluoroscopic guidance with use of the intra-articular fluid-distention technique in order to minimize the risk of iatrogenic injury to the labrum and/or articular cartilage of the joint.
- The amount of capsular tissue to be elevated is determined by the extent of labral damage.
- When elevating the capsular tissue, meticulous care is required to preserve the blood supply to the capsule and labrum.
- Final suture tiedown is performed with no traction applied, which assures an in-round repair and restores the labral suction seal.
- Intermittent traction is utilized to minimize the risk of nerve palsies. No traction is applied for prepping and draping, bone marrow aspirate harvesting, suture tie-down, or femoral neck osteoplasty. Minimal traction is applied for capsular elevation, acetabuloplasty, anchor placement, and suture tensioning.
- Our approach utilizes the puncture capsulotomy technique, which was shown in a previous study of 163 patients to have zero risk of common arthroplasty complications, such as microinstability and revision for capsular plication[26,31].
- In revision cases with severe loss of the labrum and chondrolabral junction, reconstruction of the labrum with use of remote autograft or allograft may be required.
- Note that this procedure has a steep learning curve and requires meticulous technique.

Acronyms and Abbreviations:

- FAI = femoroacetabular impingement
- ITB = iliotibial band
- TFL = tensor fasciae latae

- LT = ligamentum teres
- iHOT-33 = International Hip Outcome Tool-33
- MCID = minimal clinically important difference
- PASS = patient acceptable symptom state
- SCB = substantial clinical benefit
- CT = computed tomography
- AP = anteroposterior
- MRI = magnetic resonance imaging
- ASIS = anterior superior iliac spine
- BMAC = bone marrow aspirate concentrate
- DVT = deep vein thrombosis

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