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Arthroscopic acetabular labral reconstruction with rectus femoris tendon autograft: Our experiences and early results

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ABSTRACT

Background: The native labrum has been shown to play a critical role in the maintenance of overall health of the cartilage of the hip. Disruption of the labral seal could be detrimental to the overall nutrition of the cartilage, leading to its premature degeneration.
Purpose: This study sought to investigate patients undergoing labral reconstruction with indirect head of rectus femoris autograft, to determine the subjective improvement in pain they experienced, the complications and reoperation rates including conversion to Total hip replacement(THR).
Method: We retrospectively reviewed all 7 patients who underwent labral reconstruction using indirect head of the rectus femoris tendon autograft between January 2013 to October 2015. We assessed improvement in pain and function, complications, and subsequent surgery. The minimum follow-up was 12 months (average, 15 months; range, 12–18 months).
Results: All patients reported subjective improvement in preoperative pain and function. The mean modified Harris Hip Score (mHHS) improved significantly from 56 (54–60) preoperatively to 93 (90–97)) at mean latest follow-up. The mean change of mHHS was 36 (30–43) and mean postoperative patient satisfaction score was 9.1. We observed no radiological progression of arthritis as well as no patient had revision procedure including total hip replacement.
Conclusion: Acetabular labrum reconstruction for irreparable labral tears in young patients with no significant arthritis, using indirect head of the rectus femoris tendon autograft is a new technique that shows improvement in pain and function post-operatively. Long-term follow-up results with higher quality studies will be necessary to further define the role of labral reconstruction in hip preservation surgery.

1. Introduction

The native labrum has been shown to play a critical role in the maintenance of overall health of the cartilage of the hip. The intact acetabular labrum play a direct role on the stability of the hip via its structural extension of the bony acetabulum, but it plays a crucial role in stability through its effect on the fluid dynamics of the central and peripheral compartments.[1,2]

The labrum provides a seal against fluid flow in and out of the intra-articular space. This sealing function of the labrum improves the stability of the joint through a vacuum effect and enhances lubrication mechanisms in the hip joint.[3,4]

The ability of the labrum to contain a pressurised fluid layer within the hip joint under loading conditions prevents direct contact of the joint surfaces and distributed the applied load more evenly across the cartilage surfaces.[1,2]

With a relatively low permeability, the labrum limit the rate of fluid expression from the cartilage layers during loading. By slowing fluid expression from the cartilage layers, loads applied to the joint are carried by fluid pressure within the cartilage, limiting the magnitude of stresses within the collagenous solid matrix of the cartilage.[5–7]

Failure of this mechanism could lead to increased friction and higher loading in the solid matrix of the cartilage surfaces, and eventually to the degenerative changes associated with Osteoarthritis (OA).[8–10]

The available literature emphasizes the importance of restoring normal hip anatomy when possible, with an intact labrum independently leading to better outcomes with intra-articular hip pathology.[11]

Labral debridement can lead to an immediate pain relief on a short-term period, but will likely compromise the physiologic function of the labrum, thus resulting in an increased joint degeneration. Preservation

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of labral tissue by repairing it when damaged is increasingly being reported with successful outcomes.[12,13]

However, clinical situations do exist where primary labral repair may not be possible. Labral reconstruction, therefore, has recently emerged as a technique to address the issue of an irreparable labrum, with reconstruction serving to alleviate pain and improve hip biomechanics.

This study sought to investigate patients undergoing labral reconstruction with indirect head of rectus femoris autograft, to determine the subjective improvement in pain they experienced, the complications and reoperation rates including conversion to THR.

2. Method

A Retrospective review of the 19 patients with irreparable labral tear who underwent arthroscopic acetabular labral reconstruction from January 2013 to October 2015 is carried out.

Inclusion criteria were adult patients having undergone arthroscopic labral reconstruction with indirect head of rectus femoris tendon autograft during the study period for symptomatic labral tear without advanced radiographic osteoarthritis with minimum follow-up of one year. Informed consent has been obtained from all the study subjects to participate in the study.

For this study, we excluded 11 patients who underwent labral reconstruction with tensor fascia lata allograft and are part of another report. One patient in labral reconstruction with indirect head of rectus femoris tendon autograft group has less than one-year follow-up, is also excluded from the study.

Clinical and radiographic examinations were done preoperatively, at 6 weeks and 1 year postoperatively.

2.1. Clinical assessments

At initial evaluation, the patient underwent physical examination that included bony and soft tissue palpation, range of motion testing, and special diagnostic tests. The special tests included the impingement test and FABER (flex- ion, abduction, and external rotation) test.

All the patients completed detailed subjective questionnaire-modified Harris Hip Score (mHHS) at each clinical visits and Patient satisfaction outcome score postoperatively once only.

2.2. Radiological assessments

Patients also underwent radiographic evaluation that included anteroposterior (AP) pelvis view for the examination of joint space and center edge angle, cross-table lateral view to measure alpha angle, and false profile view to determine over coverage.

Acetabular over coverage was also determined by a crossover sign or posterior wall sign on AP view. Radiological progression of osteoarthritis was recorded according to Tönnis scale.[14] A magnetic resonance imaging (MRI) was completed in all patients for chondral and labral assessment.

In addition, the subjective improvement in pain, complications, revision surgeries, or conversion arthroplasties after labral reconstruction were also recorded.

2.3. Surgical technique

Surgical technique for Arthroscopic labral reconstruction with indirect head of rectus femoris tendon is described in literature.[15]

A dual portal arthroscopic technique with the patient in the supine position is undertaken. Systematic diagnostic arthroscopy is performed to confirm the suspected labral pathology and identify concomitant injuries. Following confirmation of the presence of irreparable labral tissue, debridement of the labral tear is performed and an estimate of the amount of labral deficiency is made. The acetabular rim is prepared to expose a bleeding cancellous bed and poor quality labral tissue is debrided back to stable margins.

The capsule between the reflected head of the rectus femoris and the labrum was carefully debrided to expose the tendon. The reflected head of the rectus femoris tendon is split to achieve the graft of desired width and length.

A suture is place around the graft at the most anterolateral portion of the acetabulum that underlies the tear and fixed using knotless suture anchor (PEEK, Parcus Medical™). Knotless anchors are then sequentially placed along the length of the graft, separated by 1–1.5 cm, to fix the graft to the acetabular rim in the same manner utilized for routine labral repairs. The muscular attachment of the reflected head of the rectus femoris tendon is completely released in order to perform a side-toside anastomosis with the remaining labrum.

Traction was released, and a bird's-eye view was taken of the reconstructed labrum, demonstrating a visually appropriate initial fluid seal effect

2.4. Post-op rehabilitation

Postoperatively, patients are allowed 20 pounds of foot-flat weight bearing for 21 days, followed by 1 week of weaning off crutches. A continuous passive motion machine is used for 4 weeks for 6–8 hours per day. Physical therapy is used to first restore passive motion, followed by active motion and, lastly, strength.

3. Results

There were 7 patients (five men, two women) with a mean age of 35 years (25–41 years) and with mean follow-up of 15 months (12–18 months). All the procedures were undertaken by senior author (JM). Demographics details are shown in Table 1.

All the procedures were primary hip arthroscopies. Femoroplasty as well as resection of the acetabular rim was carried out in all hips with reconstruction of the labrum. A detailed overview of the intraoperative findings is given in Table 2. All seven patients had some degree of acetabular cartilage changes while femoral head cartilage was normal. Five patients had grade II (Outerbridge classification) changes, four of them required micro fractures while one patient has debridement of the lesion. One patient has grade III changes repaired with collagen gel.

All 7 patients reported improvement of their symptoms. Post-operative details are shown in Table 3. The mean mHHS was significantly better from 56 (54–60), preoperatively to 93 (90-97) at mean latest follow-up. The mean change of mHHS was 36 (30–43). All the patients are very satisfied with the outcome of the surgery with mean post-operative patient satisfaction score is 9.1.

No intraoperative or postoperative complications were observed in any of the hips.

None of the patients had undergone or scheduled for revision surgery or arthroplasty. We have not observed progression of osteoarthritis on plain radiographs on latest follow-up.

Table 1
Patient Demographics.

Patient number	Gender	Age in years	Duration of Follow-up in months
1	M	25	15
2	M	37	14
3	M	34	18
4	M	40	16
5	M	33	14
6	F	35	12
7	F	41	14