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Research Article

Age is not necessarily a determinant: labral reconstruction of the hip demonstrates improved patient-reported outcomes in adults aged 60 years and older

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ABSTRACT

This case series aims to share our experience with arthroscopic circumferential allograft labral reconstruction (CLR) as a part of the treatment for femoroacetabular impingement (FAI) syndrome in 34 nonarthritic hips of patients aged 60 and older. Twenty-nine patients had a minimum follow-up of 36 months (ranging from 3 to 10 years), with one case converting to total hip arthroplasty. Five patients were lost to follow-up. Significant improvements were observed across all patient-reported outcomes used at the last follow-up. Modified Harris Hip Scores improved by a mean of 40 points ($P < .001$), with 96% of patients meeting the minimal clinically important difference (MCID) of 8.9. Lower Extremity Functional Scale scores improved by a mean of 31 points ($P < .001$), with 92% of patients meeting the MCID of 8.6. Pain, as measured by the Visual Analogue Scale, showed significant improvement at rest, during daily activities, and with sports. At the latest follow-up visit, the mean post-operative satisfaction level was 9.2 out of 10, with 96% of patients rating their satisfaction above 7. The case series suggests that CLR as a part of treatment for FAI is a viable surgical alternative to conservative treatment for pain reduction and joint preservation in non-arthritic hips of select patients aged 60 and older. Moreover, the results indicate that chronological age alone is not an absolute contraindication for joint preservation surgery.

INTRODUCTION

Arthroscopic management of femoroacetabular impingement (FAI) syndrome and associated acetabular labral pathology has become widely accepted, with numerous studies supporting favourable outcomes among younger patient cohorts. However, the clinical outcomes of arthroscopic interventions in older patients, particularly those aged 40 years and above, are less predictable and have shown greater variability in the literature [1–14]. Potential reasons for this variability include patient-related factors such as diminished labral tissue quality, reduced vascularity, impaired healing capacity, variations in how the labrum is treated [15], and differences in surgeon experience. The lead author (BJW) previously published favourable outcomes using arthroscopic circumferential allograft labral reconstruction (CLR) in patients aged 40 years and older, demonstrating that in the older population, labral reconstruction was more successful than labral repair. With a threefold higher failure rate with labral repair versus reconstruction [4].

The arthroscopic treatment approach typically involves addressing osseous deformities, such as cam and pincer morphologies, and the torn labrum. Although conventional labral repair techniques aim to preserve the native labrum, prolonged injury and dense innervation by pain-sensitive nerve fibres frequently result in persistent post-operative discomfort and compromised outcomes. Labral reconstruction utilizing allograft tissue represents a valuable alternative due to its ability to restore the biomechanical integrity and the synovial fluid seal of the hip joint. CLR with allograft tissue offers the advantage of absent nerve regeneration, ensuring that the new labral tissue does not produce pain. Due to these advantages, the lead author has advocated for CLR even in primary surgical cases of labral pathology [4, 16–20]—a procedure traditionally reserved by many surgeons for revision surgeries [21]. This key difference should be considered when interpreting the generalizability of our outcome results.

Conventionally, total hip replacement (THR) is indicated primarily for patients with advanced osteoarthritis (Tönnis grade 3 or grade 4). However, a subgroup of patients aged 60 and older exists who, despite lacking advanced arthritis (Tönnis grade 0 or 1), suffer significant hip pain and dysfunction due to labral tears associated with FAI syndrome. These individuals often receive conservative treatments, which may fail to adequately

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relieve pain or improve function. Recognizing this gap in effective treatment options for active, older patients with a good range of motion, we offer CLR as an alternative surgical option. This case series reports our experience with CLR in patients 60 years and older. We detail our surgical technique, post-operative rehabilitation protocol and three-plus-year post-operative follow-up observations, aiming to provide further insights into managing FAI syndrome in this specific patient population.

MATERIALS AND METHODS

Study design and subject selection

This study is a retrospective case series evaluating outcomes of patients over the age of 60 who underwent labral reconstruction surgery between June 2012 and December 2019. This study was approved by the local Institutional Review Board. Patients were identified from a prospective hip registry of the lead author. Any patient over 60 years at the time of labral reconstruction surgery and who had at least 3 years of post-operative follow-up was included in this case series. All patients included in this case series had FAI syndrome.

Patient selection for primary CLR surgery

Active patients aged 60 years and older who had not improved with conservative treatment for hip joint pain and met all the following criteria were offered CLR surgery. The criteria included having a non-arthritic hip (Tönnis grade 0 or 1 confirmed radiographically and also by evaluation of the sagittal sequences on MRI to confirm symmetric joint space), a non-dysplastic hip joint (center-edge [CE] angle greater than 25°), pain reproducible with the anterior impingement manoeuvre, an MRI-confirmed labral tear and maintaining a hip rotation arc greater than 40° or a range of motion similar to the unaffected contralateral hip. Patients who did not meet these criteria continued conservative treatment options or were offered THRs by the lead author.

Surgical procedure

Patients were brought to the operating room and positioned supine on a fracture table. A perineal post was used for distraction, with cumulative traction limited to a total of 90 min and applied intermittently, never exceeding 30 continuous minutes. The surgical procedure began with posterior labral resection and acetabular rim preparation, including reshaping in cases of associated pincer-type morphologies. Attention was then shifted to the peripheral compartment for femoral osteoplasty, typically removing between 3 and 8 mm of bone over a 3.5 cm width to create a smooth concavity and achieve an alpha angle (AA) in the mid-40s range. Femoral osteoplasty was performed cautiously, considering patient age and potential osteopenia, to maintain femoral neck integrity and minimize post-operative fracture risk. Our approach is to preserve as much bone as possible in this population.

Upon completion of femoral osteoplasty, lateral intraoperative X-rays were utilized to confirm appropriate sphericity had been created in the proximal femur. Subsequently, the anterior labrum was excised, and the anterior acetabular rim was prepared. In some cases, the acetabular rim was simply excoriated when the cup volume was low or normal and in other cases when there was significant pincer FAI, the acetabular rim was reshaped appropriately.

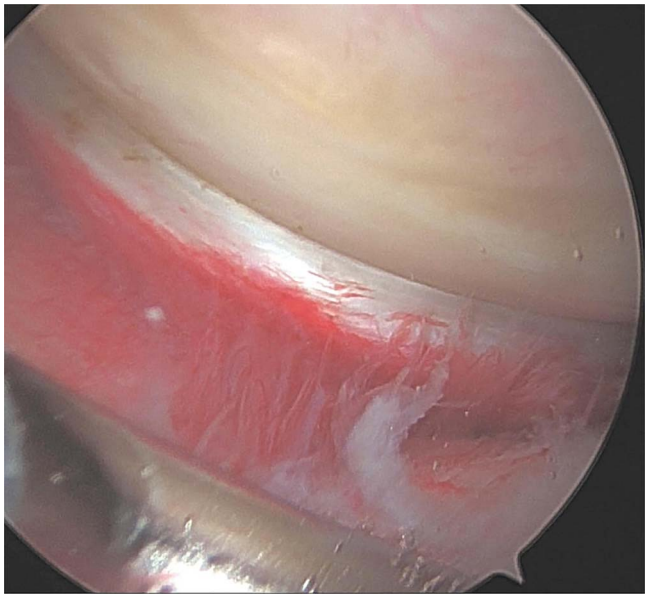

Figure 1. An upside-down view from the peripheral compartment of the anteromedial compartment shows a severely bruised, torn labrum.

A fresh-frozen tensor fascia lata allograft (AlloSource, Centennial, CO) was tubularized and secured with circumferential 2.0 absorbable vicryl sutures, creating a structure approximately 5–5.5 mm in diameter and measuring between 10 and 13 cm in length. Following graft preparation, traction was reapplied, and cartilage stabilization was performed. Shaving chondroplasty was utilized for grade 2 and 3 chondromalacia, whereas unstable/full-thickness cartilage delamination was treated with a microfracture procedure.

Suture anchors (Q-fix, Smith & Nephew, Inc.) were subsequently placed approximately 1 cm apart to anatomically secure the prepared graft, ensuring a proper seal with the femoral head and restoration of normal hip anatomy. After labral reconstruction, the integrity and global seal of the reconstruction were carefully assessed, with dynamic testing conducted to ensure the absence of impingement. Finally, the anterior capsule was closed, using a single or double suture depending on the presence of capsular laxity. If patients reported experiencing significant pain while lying in the lateral decubitus position, a greater trochanteric bursectomy, windowing of the iliotibial band, and platelet-rich plasma injection were also performed. Figures 1–5 provide a visual example of pre- and post-operative changes seen in a 64-year-old male with labral pathology and preserved chondral surfaces who underwent successful CLR.

All patients who underwent this procedure, regardless of age, stayed overnight at the hospital postoperatively. Weight-bearing protocols involved either 30% weight-bearing for 4 weeks or 20% weight-bearing for 6 weeks if the patient underwent a microfracture procedure. Patients in the latter group also utilized a continuous passive motion or bending machine for 6 to 8 hours daily for a duration of 6 weeks. All patients underwent early-stage pool therapy and progressive strengthening exercises targeting the

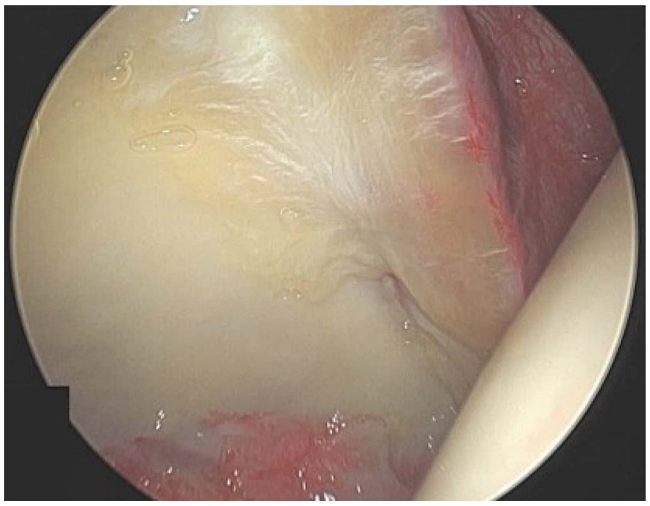

Figure 2. View from the anterolateral portal showing an extensively torn/degenerative labrum with well-preserved chondral surfaces.

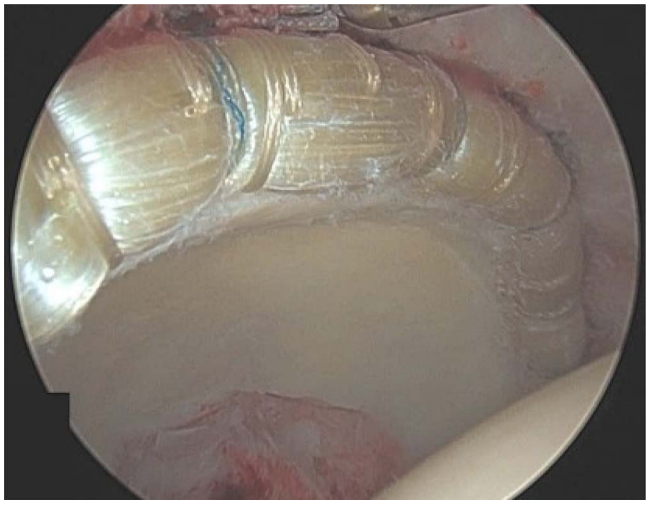

Figure 3. View from the anterolateral portal of a 13 cm CLR, secured with 13 suture anchors.

gluteus medius to achieve optimal pelvic muscular balance. The structured rehabilitation protocol aimed for patients to return to full activity and sport within approximately 6 months.

Data collection

The following data were recorded prospectively when available: age at surgery, gender, AA, CE angle, and concomitant arthroscopic procedures. Preoperative data were collected for the modified Harris Hip Score (mHHS), Lower Extremity Function Scale (LEFS), and average visual analogue scale (VAS) scores to assess pain at rest, during daily activities, and during athletic activities. For patients who had at least 3 years post-surgery, we conducted follow-up phone calls to complete these assessments again and note any patient-reported complications or conversion to THR. Also, patients were asked to rate their level of satisfaction with their surgery on a scale from 0 to 10, where 10 indicates extreme satisfaction. Minimal clinically important

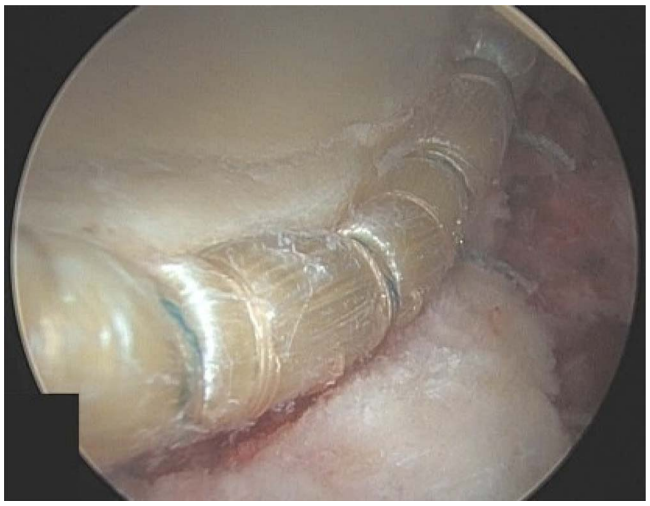

Figure 4. An upside-down view from the anteromedial portal shows the labral graft extending posteriorly.

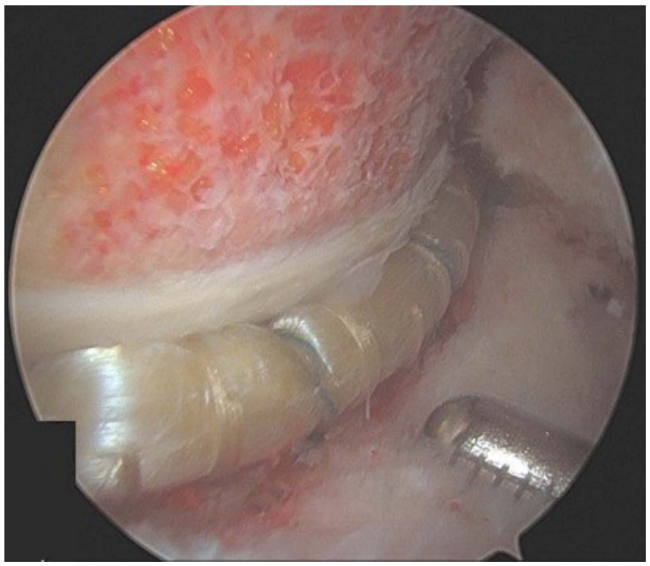

Figure 5. An upside-down view from the anteromedial portal shows a perfect fluid seal between a CLR and the femoral head.

differences (MCID) for mHHS and LEFS were calculated using a distribution-based method.

RESULTS

A total of 34 patients (mean age 62 years; age range 60–68 years; 20 females, 14 males, 24 right and 10 left) underwent comprehensive treatment involving management of FAI syndrome with CLR between June 2012 and Dec 2019. Cam morphology is defined as an AA greater than 60°. Pincer morphology is defined as a Lateral Center Edge Angle over 40° and a positive crossover sign and/or a positive posterior wall sign on an AP pelvis X-ray. All 34 patients exhibited cam-type deformities, with pincer deformities present in 24 of 34 cases. Two patients had previous labral repair from a different surgeon. Of the 34 patients, 29 had more than 3 years of follow-up (average 5.3 years, range 3–10 years) and 5 patients were lost to follow-up.

The mean preoperative lateral CE angle was 36° (range 29°–47°), which was corrected postoperatively to a mean of 34° (range 29°–38°). Post-operative CE measurements indicate that our acetabular rim management did not result in iatrogenic dysplasia. Mean preoperative AA was 65° (range 49°–73°), which was corrected postoperatively to a mean of 44° (range 35°–58°).

Intraoperatively, all patients exhibited full-thickness degenerative tears with labral detachment. The mean post-operative allograft length was 11.5 cm (range: 10–13.5 cm), with an average of 9.3 suture anchors used (range: 6–12). The majority of cases ($N = 19$, 63%) required a minimum of 2 mm acetabular resection. No cases required Ganz periacetabular osteotomy, femoral, or tibial osteotomy.

LEFS scores improved by an overall mean of 31 points ($P < .001$) with 92% of cases meeting MCID (+8.6 points). mHHS scores improved by an overall mean of 40 points ($P < .001$) with 96% of cases meeting MCID (+8.9 points). VAS at rest improved to a post-operative mean of 1.5/10 ($P < .001$). VAS with ADLs improved to a post-operative mean of 1.8/10 ($P < .001$). VAS with sports improved to a post-operative mean of 2.4/10 ($P < .001$). The mean post-operative satisfaction level was 9.2 out of 10, with 96% of patients rating their satisfaction above 7. Out of the 29 patients we were able to follow up with, one patient underwent THR within 1 year of arthroscopy.

DISCUSSION

Ligament and tissue reconstruction are a standard treatment approach in joints such as the knee and shoulder. As surgical techniques and rehabilitation protocols improve, such procedures are increasingly being offered to older patients, provided they have adequate bone quality and overall health [22–25]. Given the success of these procedures in other joints, the authors suggest that acetabular labral reconstruction should be offered to any patient regardless of advanced age when feasible. The acetabulum may be particularly favourable for allograft incorporation regardless of the age of the patient due to its rich vascular supply and its role as a major bone marrow donor site, thereby providing a source of mesenchymal stem cells that could enhance healing, graft integration, and overall joint function. A critical difference in a surgical approach in the elderly patient population involves attention to age-related osteopenia, affecting bone quality. Consequently, femoral osteoplasty should be performed with greater caution, adopting a more conservative approach to bone resection to avoid post-operative femoral neck fractures. Even though the standard practice is to use radially expanding suture anchors (Q-fix, Smith & Nephew, Inc.) in all our patients, these suture anchors may be particularly beneficial for patients with osteopenic bone and could contribute to the long-term stability of the allograft labral constructs.

This study demonstrated favourable outcomes at a minimum follow-up of 36 months. Among the 29 patients we successfully followed up with, only one progressed to THA (3%). However, it is important to consider that the five patients who were lost to follow-up might have also converted to THA. Lower Extremity Functional Scale (LEFS) and the modified Harris Hip Score (mHHS) showed statistically and clinically significant improvements, exceeding the MCID. Pain assessments via VAS at rest, during activities of daily living (ADLs), and during sports activities significantly improved, with 100% of patients reaching the MCID for both ADLs and sports-related activities. Patient satisfaction postoperatively was high, averaging 9.2 out of 10 at the latest follow-up. Due to the nature of practice, where only labral reconstructions are performed by the lead author, this study lacks a matched control cohort for direct comparison. However, existing literature using similar age groups provides context. Redmond *et al.* (2015) reported a 30% conversion rate to THA in a cohort of 30 patients who underwent labral repair, with an average improvement in mHHS of approximately 16 points in non-converted patients [3]. Hartigan *et al.* (2020) similarly reported a 35% conversion rate in a cohort of 26 patients undergoing labral repair or debridement, with a mean mHHS improvement of approximately 26 points among those not progressing to THA [5]. The findings from this case series indicate that the THA conversion rate, including patients lost to follow-up who may have converted to THA (17.6%), and mean mHHS improvement (40 points) were more favourable for CLR than those reported in the two referenced studies. In selected patients aged 60 years or older, CLR of the hip can serve effectively as a joint-preserving intervention, significantly improving both pain and functional outcomes.

Arthroscopic CLR is a technically demanding procedure designed to restore normal hip joint anatomy and biomechanics, irrespective of the condition or size of native labral tissue. Given its complexity, this procedure is ideally suited for surgical teams with high-volume experience in performing it. CLR in the elderly population is not intended as a replacement for THA. Rather, CLR serves as an option to address the unmet needs of FAI syndrome patients who fall into a demographic often overlooked in orthopaedic practice—active adults above 60 years of age who have hip pain but are not eligible for total hip arthroplasty. Given the growing population of these active seniors, conservative treatment alone is insufficient for many of these patients in this age bracket, who continue to maintain high expectations for activity and functional independence. In general, there is significant clinical value in restoring labral function, as the labrum plays a crucial role in acetabular volume enhancement, micro-stability, fluid seal integrity, and preservation of joint fluid—critical for cartilage nutrition through diffusion. Loss or deterioration of the labrum compromises these functions, potentially accelerating joint degeneration and negatively impacting patient quality of life. CLR may be a gentler surgical option that prevents unnecessary degeneration in these non-arthritic subpopulations and helps avoid THR altogether.

Future studies

Several clinical questions need further investigation. Future studies should prospectively compare long-term outcomes among patients who continue conservative treatment, those undergoing labral repair, and patients receiving segmental or CLR, matching similar demographic and clinical characteristics to our case series. Although post-operative survey outcomes from our cohort indicate satisfactory integration of the allograft with host tissues, objective radiographic assessment is required to conclusively determine graft integration. We will consider

other comprehensive scoring systems (e.g. iHOT-12) in future studies for a better assessment of patient outcomes.

CONCLUSION

The study demonstrated that, in the context of well-preserved joint space and the absence of high-grade or diffuse chondral loss, CLR is a viable option for improving pain and functionality in patients aged 60 years or older. The results of the case series suggest that the THA conversion rate and mean mHHS scores were more favourable than those reported in the literature for labral repair. Therefore, if labral repair is considered a viable treatment option for patients over 60, our results showing a lower conversion to THA and a higher level of improvement in mHHS suggest that labral reconstruction should also be considered. However, the retrospective nature of the study and the absence of a more robust research design necessitate cautious interpretation of these findings. Future prospective studies that address the limitations of this case series are needed to confirm these trends and provide more conclusive evidence to guide treatment decisions.

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CONFLICT OF INTEREST

The lead author serves as a development consultant for Smith & Nephew, Allosource, and Biomet, and receives royalties from both Zimmer and Biomet.

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None declared.

DATA AVAILABILITY

The data underlying this article will be shared on reasonable request by the authors.

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