Systematic Review

Durable Outcomes After Hip Labral Reconstruction at Minimum 5-Year Follow-Up: A Systematic Review

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Purpose: To systematically review and report the mid- to long-term patient-reported outcomes (PROs) after hip labral reconstruction. **Methods:** A literature search of the PubMed, Embase, and Cochrane Library databases was performed using the Preferred Reporting Items for Systematic Reviews and Meta-Analyses guidelines for clinical studies reporting mid- to long-term PROs at minimum 5-year follow-up after arthroscopic hip labral reconstruction. A quality assessment was performed using the Methodological Index of Non-Randomized Studies grading system. Data collection included study characteristics, demographics, indications, radiographic metrics, perioperative findings, surgical technique, baseline and most recent PROs, and subsequent surgeries. **Results:** Four studies met inclusion criteria, with 182 hips (age range, 27.9-38.7 years) undergoing labral reconstruction in primary and revision hip surgery with minimum 5-year follow-up. There were three Level III studies and one Level IV study, with an average Methodological Index of Non-Randomized Studies score of 16.6. All studies cited labral tissue characteristics as a factor for surgical indications, including the quality and/or size of the labrum. Three studies performed segmental labral reconstructions, whereas another study used a circumferential technique. Varying grafts were selected, including hamstring autograft/allograft, ligamentum teres autograft, iliotibial band autograft, and tensor fascia lata autograft. All studies demonstrated improved PROs from baseline to most recent follow-up, with 4 studies reporting modified Harris Hip Score values that increased from baseline (range, 58.9-66.8) to most recent follow-up (range, 80.1-86.3). After labral reconstruction, rates of revision arthroscopy ranged from 4.8% to 13.3% and conversion to total hip arthroplasty ranged from 1.6% to 27%. **Conclusions:** Improved PROs were observed in all studies at minimum 5-year follow-up, suggesting that labral reconstruction can offer durable results beyond short-term follow-up. Although surgical indications for all studies included labral tissue characteristics, differing graft selection and surgical techniques were used across studies, limiting the ability to determine an optimal treatment approach. **Level of Evidence:** Level IV, systematic review of Level III and IV studies.

In patients with nonarthritic hip pain, the management of labral pathology has evolved over the past 2 decades.[1,2] The importance of the labrum to hip function has been appreciated in part after cadaveric studies that demonstrated compromised labral integrity is associated with disadvantageous biomechanical

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properties of the hip joint.[3-6] Consequently, advancements in arthroscopic surgical techniques have provided treatment options with the goal of restoring native labral function, which includes retention of joint fluid, enlargement of joint contact surface area, and maintenance of the hip suction seal.[7]

These advanced techniques initially involved a transition from labral debridement to labral repair. Numerous clinical studies have demonstrated improved patient-reported outcomes (PROs) with labral repair, rather than debridement.[8-11] However, surgeons may encounter clinical scenarios in which the labrum is not amenable to repair, including poor labral tissue quality, a calcified labrum, or revision hip arthroscopies.[12] In these situations, labral reconstruction has been proposed as an alternative treatment option, with the aim of re-establishing labral function.[12-15] Numerous studies with short-term follow-up have demonstrated promising results after labral reconstruction, regardless of segmental or circumferential techniques.[16-21] Although previous systematic reviews have reported outcomes after labral reconstruction,[16,18,19,22,23] the mid- to long-term outcomes remain poorly defined.

The purpose of this study was to systematically review and report the mid- to long-term PROs after hip labral reconstruction. We hypothesized that patients would demonstrate improved PROs from baseline to most recent follow-up after labral reconstruction.

Methods

This study was performed in accordance with the ethical standards in the 1964 Declaration of Helsinki. This study was carried out in accordance with relevant regulations of the U.S. Health Insurance Portability and Accountability Act. Details that might disclose the identity of the subjects under study have been omitted. This study was approved by the institutional review board (institutional review board ID: 5276).

Literature Search

In accordance with Preferred Reporting Items for Systematic Reviews and Meta-Analyses criteria,[24] a systematic reviewed was performed with a literature search of the PubMed, Embase, and Cochrane Library databases conducted in September 2022. Key words included in the search query were "((reconstruction) OR (augmentation) OR (autograft) OR (allograft)) AND (labrum)) AND ((hip) OR (acetabulum))." The search strategy was registered with PROSPERO (PROSPERO ID # blinded for review). For the studies that underwent full-text review, their bibliographies and citation results also were searched for additional relevant articles.

Study Eligibility

Inclusion criteria consisted of clinical studies investigating patients undergoing open or arthroscopic labral reconstruction of the hip in the setting of primary or revision hip surgery. Exclusion criteria included non-English language, minimum follow-up of less than 5 years after surgery, technique articles, case reports, noncomparative case series of fewer than 10 patients, failure to report surgical technique, and absence of postoperative PROs. If multiple studies were present from the same institution, the study with a smaller sample size was excluded to prevent duplication of the included patients. Labral reconstruction was defined as the segmental or circumferential application of autograft or allograft tissue to the acetabular rim with the intent of functioning as a labrum. The included studies were reviewed by 2 fellowship-trained orthopaedic surgeons (A.J.C. and P.P.P.). Any discrepancies in study inclusion were resolved by discussion until consensus was obtained, with the senior author providing the final decision (B.G.D.).

Quality Assessment

A quality assessment of the included articles was performed independently by 2 fellowship-trained orthopaedic surgeons (A.J.C. and P.P.P.) using the Methodological Index of Non-Randomized Studies grading system.[25] Disagreements were resolved by discussion until consensus was obtained. An interobserver agreement percentage between the 2 reviewers was calculated.

Data Collection

The studies included in the review were evaluated for year of publication, journal, institution, study design, dates of study inclusion, and level of evidence. The surgical indications and techniques for performing a labral reconstruction were recorded. Additional data extraction included patient demographics, radiographic findings, intraoperative findings, procedures performed, length of follow-up, baseline and most recent PROs, adverse effects, and subsequent surgeries.

Results

Study Characteristics

The database search yielded 483 studies, and an additional 4 articles were identified through other sources (Fig 1). After duplicates were removed, another 345 studies were excluded as the result of article type or topic. Nine full-text articles were reviewed for eligibility. Four of these studies were excluded as the result of inclusion of patients with less than 5 years' follow-up. An additional study[26] was excluded for duplicate patient cohorts from the same institution, leaving 4 studies[27-30] to be included in this systematic review.

The 4 included articles were published from 2020 to 2022, consisting of three Level III and one Level IV study (Table 1). Three of the studies[27-29] used a

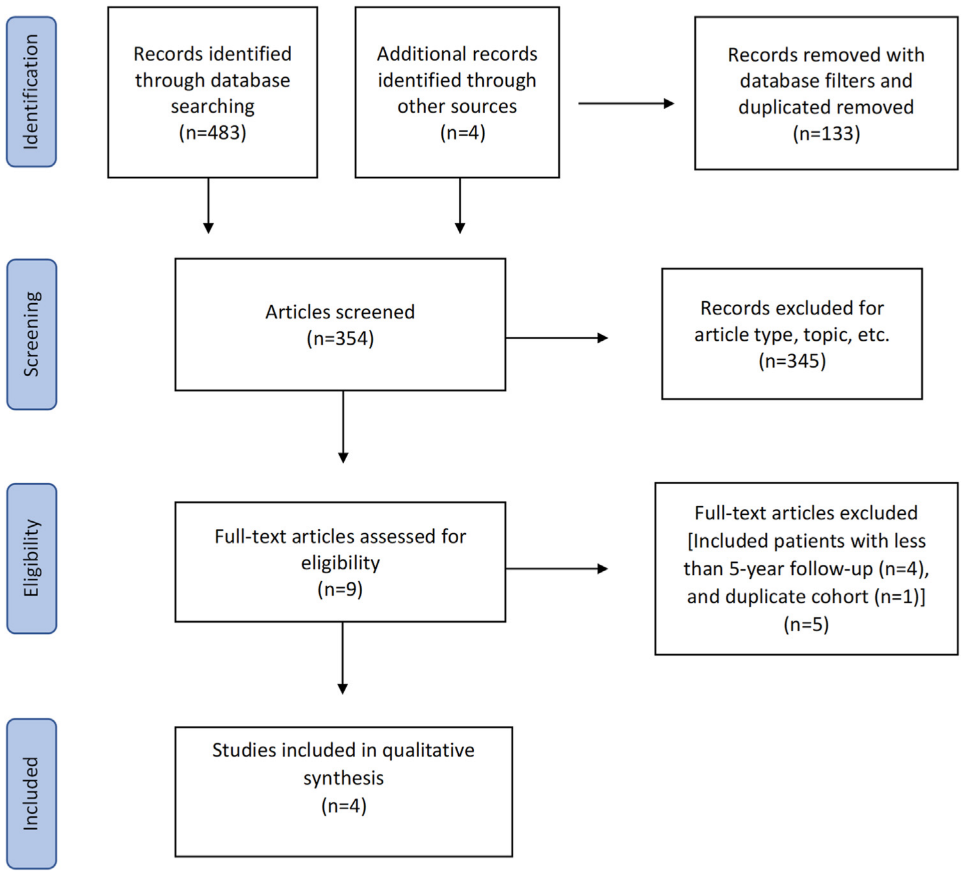

Fig 1. Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) flowchart of included studies.

minimum 5-year follow-up criterion, whereas another study[30] reported minimum 10-year results. The average Methodological Index of Non-Randomized Studies score of the studies was 16.6, with an interobserver agreement of 94.3% between reviewers. Common methodologic domains of weakness included no prospective calculation of study size, greater than 5% loss to follow-up, and possible bias in end-point assessment.

Indications

Similar indications were reported across the 4 studies, which often commented on the labral tissue as a key factor. Two studies[27,28] noted that segmental defects or nonviable labral tissue were indications for labral reconstruction. Philippon et al.[30] performed labral reconstructions in the setting of a diminutive labrum (less than 5 mm width) or inability to re-establish the suction seal intraoperatively. Likewise, Scanaliato et al.[29] noted small labral width as an indication, as well as a prior failed labral repair or labral base instability.

Labral Reconstruction Technique

Various labral reconstruction techniques were observed in the included studies. Laboudie et al.[28] performed a labral reconstruction through an open surgical hip dislocation, whereas the remaining 3 studies[27,29,30] used an arthroscopic technique. Scanaliato et al.[29] reported on circumferential labral reconstruction (CLR), whereas the other 3 studies[27,28,30] performed segmental labral reconstruction.

In regards to graft selection, Maldonado et al.[27] compared hamstring autografts versus allografts. The remaining 3 studies reported on a single graft type for the patients, which included ligamentum teres autograft,[28] iliotibial band autograft,[30] or tensor fascia lata allograft.[29]

Patient Characteristics

The 4 studies included 182 hips that underwent labral reconstruction (Table 2). Mean age and body mass index ranged from 27.9 to 38.7 years and 23.3 to 27, respectively. Scanaliato et al.[29] reported on a cohort that was 62.9% female, whereas the remaining 3 studies.[27,28,30] performed labral reconstructions on patient populations that were greater than 50% male.

Preoperative radiographic measurements were reported in all 4 studies.[27-30] Laboudie et al.[28] noted acetabular overcoverage in their labral reconstruction group with a mean lateral center-edge angle of 46.4 ± 11.7°, whereas the other 3 studies[27,29,30] reported an

Table 1. Summary of Included Studies

Author	Article Title	Year of Publication	Journal	Institution	Study Design	Dates of Study Inclusion	Level of Evidence	Average MINORS Score	Indications	Labral Reconstruction Technique
Maldonado et al.[27]	Minimum 5-Year Outcomes After Primary Segmental Labral Reconstruction for Irreparable Labral Tears in the Hip with Hamstring Grafts	2022	*American Journal of Sports Medicine*	American Hip Institute (Chicago, Illinois, U.S.A.)	Comparative cohort study	2010-2015	III	21.5	Segmental labral defects. Nonviable labral tissue.	Arthroscopic SLR; hamstring autograft or allograft
Laboudie et al.[28]	Does Labral Treatment Technique Influence the Outcome of FAI Surgery? A Matched-Pair Study of Labral Reconstruction Versus Repair and Debridement With a Follow-Up of 10 Years	2022	*Journal of Hip Preservation Surgery*	Division of Orthopedic Surgery, The Ottawa Hospital (Ottawa, Canada)	Comparative cohort study	2005-2015	III	15.5	Segmental labral defects. nonviable labral tissue.	Open SHD with SLR; ligamentum teres autograft
Philippon et al.[30]	Acetabular Labral Reconstruction with Iliotibial Band Autograft	2020	*Journal of Bone and Joint Surgery*	Steadman Philippon Research Institute, (Vail, Colorado, U.S.A.)	Case series	2006-2018	IV	11	Diminutive labral size (<5 mm). Inability to establish suction seal intraoperatively.	Arthroscopic SLR; iliotibial band autograft
Scanaliato et al.[29]	Labral Repair and Complete Labral Reconstruction Both Offer Durable, Promising Results at Minimum 5-Year Follow-up	2022	*American Journal of Sports Medicine*	Washington Orthopedics and Sports Medicine, (Washington, DC, U.S.A.)	Comparative Cohort study	2015	III	18.5	Diminutive labral size. Previous failed labral repair with compromised labral tissue quality. Labral base instability.	Arthroscopic CLR; TFL allograft

CLR, circumferential labral reconstruction; MINORS, Methodological Index for Non-randomized Studies; SHD, surgical hip dislocation; SLR, segmental labral reconstruction; TFL, tensor fascia lata.

Table 2. Radiographic and Intraoperative Information of Included Studies

Author	Group	Number of Hips	Demographics	Radiographic Findings	Intraoperative Findings, n (%)	Procedures Performed, n (%)
Maldonado et. al.[27]	Autograft	15	Female: 5 (33.3%) Age: 35.9 ± 11.2 y BMI: 26 ± 4.5 Left hips: 6 (40%)	LCEA: 33.7 ± 8.6 Tönnis angle: 2.9 ± 5.6 ACEA: 36.9 ± 7 Alpha angle: 59.9 ± 11.3	Labral tear (Seldes grade) 0: 0 (0%) I: 0 (0%) II: 5 (33.3%) I and II: 10 (66.7%) ALAD 0: 1 (6.7%) 1: 1 (6.7%) 2: 3 (20%) 3: 9 (60%) 4: 1 (6.7%) Outerbridge: acetabulum 0: 2 (13.3%) 1: 1 (6.7%) 2: 2 (13.3%) 3: 8 (53.3%) 4: 2 (13.3%) Outerbridge: femoral head 0: 13 (86.7%) 1: 1 (6.7%) 2: 1 (6.7%) 3: 0 (0%) 4: 0 (0%) LT percentile class: Domb 0: 10 (66.7%) 1: 1 (6.7%) 2: 2 (13.3%) 3: 2 (13.3%) LT Villar class 0: 10 (66.7%) 1: 2 (13.3%) 2: 2 (13.3%) 3: 1 (6.7%)	Capsular treatment: interportal Capsulotomy without repair: 10 (66.7%) Repair: 5 (33.3%) Femoroplasty: 15 (100%) Acetabuloplasty: 15 (100%) Acetabular microfracture: 2 (13.3%) Femoral head microfracture: 0 (0%) LT debridement: 1 (6.7%)
	Allograft	15	Female: 6 (40%) Age: 34.8 ± 10.4 y BMI: 26.7 ± 5.1 Left hips: 7 (46.7%)	LCEA: 34.5 ± 7.6 Tönnis angle: 3.5 ± 6.6 ACEA: 37.4 ± 6.8 Alpha angle: 65.9 ± 11.6	Labral tear (Seldes Grade) 0: 0 (0%) I: 2 (13.3%) II: 5 (33.3%) I and II: 8 (53.3%) ALAD 0: 3 (20%) 1: 2 (13.3%) 2: 1 (6.7%) 3: 7 (46.7%) 4: 2 (13.3%) Outerbridge: acetabulum	Capsular treatment: interportal Capsulotomy without repair: 9 (60%) Repair: 6 (40%) Femoroplasty: 13 (86.7%) Acetabuloplasty: 14 (93.3%) Acetabular microfracture: 3 (20%) Femoral head microfracture: 0 (0%) LT debridement: 4 (26.7%)

(continued)

Table 2. Continued

Author	Group	Number of Hips	Demographics	Radiographic Findings	Intraoperative Findings, n (%)	Procedures Performed, n (%)
					0: 3 (20%) 1: 2 (13.3%) 2: 2 (13.3%) 3: 5 (33.3%) 4: 3 (20%) Outerbridge: femoral head 0: 15 (100%) 1: 0 (0%) 2: 0 (0%) 3: 0 (0%) 4: 0 (0%) LT percentile class: Domb 0: 8 (53.3%) 1: 3 (20%) 2: 2 (13.3%) 3: 2 (13.3%) LT Villar class 0: 8 (53.3%) 1: 2 (13.3%) 2: 3 (20%) 3: 2 (13.3%)	
Laboudie et al.[28]	Labral reconstruction	8	Male: 8 (100%) Age: 27.9 ± 9.1 y BMI: 27 ± 6.7	LCEA: 46.4 ± 11.7 Alpha angle: 57.2 ± 7.6 End joint space: 3.2 ± 1.4 Tönnis OA grade: 0: 3 (37.5%) 1: 2 (25%) 2: 3 (37.5%)	Acetabular Cartilage Damage (Beck) 1. Normal: 4 (50%) 2. Malacia: 0 (0%) 3. Debonding: 0 (0%) 4. Cleavage: 2 (25%) 5. Defect: 2 (25%)	Femoroplasty: 7 (88%) Acetabuloplasty: 6 (75%) Microfracture: 0 (0%)
	Labral repair	24	Male: 24 (100%) Age: 28 ± 7.9 y BMI: 25.2 ± 4.6	LCEA: 40.3 ± 6.4 Alpha angle: 65.1 ± 15 End joint space: 5.2 ± 4.6 Tönnis OA grade: 0: 10 (42%) 1: 10 (42%) 2: 4 (16%)	Acetabular cartilage damage (Beck) 1. Normal: 10 (42%) 2. Malacia: 0 (0%) 3. Debonding: 1 (4%) 4. Cleavage: 11 (46%) 5. Defect: 1 (4%)	Femoroplasty: 24 (100%) Acetabuloplasty: 21 (88%) Microfracture: 4 (17%)
	Labral debridement	24	Male: 24 (100%) Age: 32.2 ± 7.3 y BMI: 27.2 ± 4.1	LCEA: 42 ± 1.4 Alpha angle: 70 ± 10.6 End joint space: 4.1 ± 1.3 Tönnis OA grade: 0: 4 (16%)	Acetabular Cartilage Damage (Beck) 1. Normal: 3 (12%) 2. Malacia: 1 (4%) 3. Debonding: 2 (8%) 4. Cleavage: 7 (29%) 5. Defect: 8 (33%)	Femoroplasty: 24 (100%) Acetabuloplasty: 0 (0%) Microfracture: 10 (42%)

(continued)

Table 2. Continued

Author	Group	Number of Hips	Demographics	Radiographic Findings	Intraoperative Findings, n (%)	Procedures Performed, n (%)
				1: 4 (16%) 2: 10 (42%)		
Philippon et al.[30]	N/A	82	Age: 38.7 ± 11.4 y Male: 51 (62.2%)	Hips converted to THA (n = 22): LCEA: 35.7 ± 6 Alpha angle: 72.4 ± 13 Joint space ≤2: 15 (68%) Hips not converted to THA (n = 60): LCEA: 36.6 ± 8 Alpha angle: 68.4 ± 13 Joint space ≤2: 5 (8%)	None reported	Cam + pincer decompression: 65 (71.4%) Only cam decompression: 11 (12.1%) Only pincer decompression: 5 (5.5%) Microfracture: acetabulum + femoral head: 4 (4.4%) Femoral head only: 2 (2.2%) Acetabulum only: 10 (11.0%) LT debridement: 60 (65.9%)
Scanaliato et al.[29]	Labral repair	68	Female: 60.29 % Age: 29.9 ± 11.5 y BMI: 28.4 ± 4.2	Alpha angle: 66.2 ± 10.9 LCEA: 33.4 ± 6.7	Labral tear severity Mild: 58.8% Moderate: 35.3% Severe: 5.9%Beck classification 0: 85.3% I: 8.8% II: 4.4%; III: 1.5% IV: 0% V: 0%	Cam osteoplasty: 56 (82.5%) Pincer osteoplasty: 16 (23.5%) Acetabular osteoplasty: 39 (57.4%)
	Labral reconstruction	62	Female: 62.9% Age: 38.3 ± 11.2 y BMI: 23.2 ± 3.3	Alpha angle: 64.1 ± 12.9 LCEA: 34.0 ± 8.2	Labral tear severity Mild: 1.6% Moderate: 35.5% Severe: 62.9% Beck classification 0: 65.4% I: 19.4% II: 3.2% III: 4.8% IV: 8.1% V: 0%	Cam osteoplasty: 60 (96.8%) Pincer Osteoplasty: 46 (74.2%) Acetabular osteoplasty: 56 (88.9%)

NOTE. Data are presented as means ± SD or n (%).

ALAD, acetabular labrum articular disruption; BMI, body mass index; LCEA, lateral center-edge angle; LT, ligamentum teres; OA, osteoarthritis; THA, total hip arthroplasty.

average lateral center-edge angle less than 37°. Furthermore, Laboudie et al.[28] observed the lowest alpha angle of 57.2 ± 7.6°, whereas Philippon et al.[30] noted the greatest alpha angle of 72.4 ± 13° in their 22 patients undergoing labral reconstruction who eventually were converted to total hip arthroplasty (THA).

Perioperative Information

Three studies[27-29] reported intraoperative findings. Maldonado et al.[27] noted that lower-grade Seldes[31] type I tears were more common in the repair group rather than the reconstruction hips (64.7% vs 35.3%, respectively). Likewise, Scanaliato et al.[29] reported milder labral tear severity and less chondral damage in their labral repair cohort compared with labral reconstruction patients. Laboudie et al.[28] observed a dichotomous presence of chondral lesions in their labral reconstruction group, with 50% of hips having Beck[32] grade 0 changes and the other 50% with Beck grade 4 to 5 damage.

All 4 studies provided information on specific procedures that were performed during surgery. Femoral and/or acetabular osteoplasties frequently were reported in all 4 studies. Microfracture procedures were reported in 3 studies,[27,28,30] which ranged from 0% to 17.6% in hips undergoing concomitant labral reconstruction. Ligamentum teres management varied across the articles that included debridement (range, 16.7%-65.9%) in 2 studies,[27,30] whereas Laboudie et al.[28] used the ligamentum teres as autograft for the labral reconstruction in 100% of patients.

Patient-Reported Outcomes

Labral reconstruction patients demonstrated improvements in PROs from baseline to most recent follow-up in all studies (Table 3). Three studies[27,29,30] reported modified Harris Hip Score (mHHS) outcomes in patients undergoing labral reconstruction, with preoperative values ranging from 58.9 to 66.8 and most recent postoperative values ranging from 80.1 to 86.3.

Two studies[28,29] provided a comparative cohort that did not undergo labral reconstruction. When compared with a labral repair cohort, Laboudie et al.[28] noted similar improvements in all PROs ($P > .05$) for the labral reconstruction group. Likewise, Scanaliato et al.[29] reported similar minimal clinically important difference (MCID), patient acceptable symptomatic state (PASS), and substantial clinical benefit for mHHS and International Hip Outcome Tool-12 between groups at latest follow-up ($P > .05$) when comparing reconstruction and repair hips, although patients undergoing reconstruction demonstrated a significantly greater increase in mHHS from baseline to most recent follow-up (27.43 vs 17.13; $P = .04$).

Maldonado et al.[27] compared hamstring autograft versus hamstring allograft patients, observing similar PROs, patient satisfaction, and rates of achieving MCID and PASS between the groups ($P > .05$). Although a comparative cohort was not available, Philippon et al.[30] provided a summary of PROs for hips that did not undergo revision arthroscopy or conversion to THA, which included 50 of 82 patients (61%). These authors noted that the rate of achieving MCID and PASS for Hip Outcome Score−Activities of Daily Living was 80% and 87%, respectively.

Adverse Effects and Subsequent Surgeries

No studies reported adverse effects that were directly related to the surgery (e.g., infection or heterotopic ossification). All 4 studies reported on subsequent surgeries after labral reconstruction, with the rates of revision arthroscopy ranging from 4.8% to 13.3% and conversion to THA ranging from 1.6% to 27%. Laboudie et al.[28] also noted observed a secondary surgery for screw removal in 37.5% of patients undergoing surgical hip dislocation for labral reconstruction.

Discussion

The most important finding of this study was that improved PROs for patients undergoing labral reconstruction were observed in all studies at mid- to long-term follow-up. While Philippon et al.[30] reported the greatest rate of conversion to THA, the authors noted that using current indications for labral reconstruction (joint space >2 mm) resulted in an improvement of survivorship from 61% to 90%. These findings suggest that labral reconstruction, with appropriate patient selection including the absence of joint space narrowing, can offer durable results beyond short-term follow-up. Likewise, a systematic review by Kyin et al.[33] noted improved mid- to long-term outcomes in patients undergoing labral repair, with osteoarthritis and increased age predictive of worse outcomes. Although Kyin et al.[33] included different patient populations with varying intra-articular pathology compared with the present review, both studies suggest that surgical techniques aimed to restore native labral function may portend improved PROs at extended follow-up.

All 4 studies[27-30] noted their surgical indications for performing a labral reconstruction included an assessment of labral tissue quality and/or size. In a survey study of 12 high-volume hip surgeons, Maldonado et al.[12] found that 21.1% of surgeons would use a labral reconstruction during a primary hip arthroscopy for poor labral tissue, whereas 7.9% of surgeons cited a hypoplastic labrum as an indication. Furthermore, these authors reported that surgeons more commonly performed labral reconstructions in the revision setting,

Table 3. Patient-Reported Outcomes of Included Studies

Author	Group	Number of Hips	Length of Follow-Up, mo	Baseline Patient-Reported Outcomes	Most Recent Patient-Reported Outcomes	Comparison of Patient-Reported Outcomes With Control Group	Subsequent Surgeries
Maldonado et. al.[27]	Autograft	15	80.8 ± 25.5	mHHS: 66.2 ± 18.8 HOS-SSS: 40.4 ± 19 VAS: 5.9 ± 2.1 NAHS: 58.7 ± 13.8	mHHS: 75.6 ± 20 HOS-SSS: 65.2 ± 30.7 VAS: 3.5 ± 2.4 NAHS: 75.3 ± 19.3 iHOT-12: 63.9 ± 23 Satisfaction: 6.5 ± 3.3	Similar PROs, patient satisfaction, and rates of achieving MCID and PASS were found between the groups ($P > .05$)	Revision hip arthroscopy: 1 (6.7%) Conversion to THA:1 (6.7%)
	Allograft	15	66.1 ± 8.3	mHHS: 67.3 ± 16.9 HOS-SSS: 45.8 ± 28.3 VAS: 4.3 ± 2.1 NAHS: 67.9 ± 20	mHHS: 85.9 ± 15.3 HOS-SSS: 70 ± 32.2 VAS: 2.6 ± 2.4 NAHS: 67.9 ± 20 iHOT-12: 76.6 ± 20.6 Satisfaction: 8.1 ± 2		Revision hip arthroscopy: 3 (20%) Conversion to THA: 3 (20%)
Laboudie et al.[28]	Labral reconstruction	8	99.6 ± 31.2	WOMAC Pain: 9 ± 3.9 WOMAC Stiffness: 4.9 ± 1.6 WOMAC Function: 30 ± 11 WOMAC Total: 43.7 ± 13.6 SF-12 Mental: 42.8 ± 12 SF-12 Physical: 36.1 ± 8 HOOS-Symptoms: 37.1 ± 11 HOOS-Pain: 49.3 ± 15 HOOS-QoL: 9.8 ± 6 HOOS-ADL: 56.1 ± 16 HOOS-SRA: 30.4 ± 10 UCLA: 6.2 ± 2	WOMAC Pain: 4.4 ± 4.2 WOMAC Stiffness: 3 ± 2.1 WOMAC Function: 13.2 ± 10.3 WOMAC Total: 21.8 ± 16.5 SF-12 Mental: 41.5 ± 13.4 SF-12 Physical: 42.7 ± 7.4 HOOS-Symptoms: 64.2 ± 24.8 HOOS-Pain: 71 ± 21.4 HOOS-QoL: 45.9 ± 23.3 HOOS-ADL: 80.9 ± 15.8 HOOS-SRA: 64.6 ± 23.2 UCLA: 8.8 ± 1.6	Similar postoperative PROs and change in PROs from baseline ($P > .05$) were observed across all 3 groups.	Screw removal: 3 (37.5%) Conversion to THA: 2 (25%)
	Labral repair	24	142.8 ± 25.2	WOMAC Pain: 1.8 ± 3.3 WOMAC Stiffness: 3.3 ± 1.4 WOMAC Function: 15 ± 11 WOMAC Total: 24.6 ± 14.8 SF-12 Mental: 53.2 ± 5 SF-12 Physical: 43 ± 7 HOOS-Symptoms: 60 ± 15.9 HOOS-Pain: 67.7 ± 16.7 HOOS-QoL: 30 ± 20 HOOS-ADL: 77.8 ± 17 HOOS-SRA: 51.3 ± 22 UCLA: 8.4 ± 2	WOMAC Pain: 2.2 ± 3.1 WOMAC Stiffness: 2.2 ± 1.5 WOMAC Function: 8.6 ± 8.9 WOMAC Total: 12.8 ± 12.8 SF-12 Mental: 56 ± 5.3 SF-12 Physical: 49 ± 6.9 HOOS-Symptoms: 76.9 ± 17.5 HOOS-Pain: 83.7 ± 17.8 HOOS-QoL: 63.7 ± 27 HOOS-ADL: 87.3 ± 13.2 HOOS-SRA: 76.9 ± 22.6 UCLA: 8.3 ± 1.9		Screw removal: 13 (54%) Conversion to THA: 5 (21%)

(continued)

Table 3. Continued

Author	Group	Number of Hips	Length of Follow-Up, mo	Baseline Patient-Reported Outcomes	Most Recent Patient-Reported Outcomes	Comparison of Patient-Reported Outcomes With Control Group	Subsequent Surgeries
	Labral debridement	24	142.8 ± 20.4	WOMAC Pain: 8.9 ± 4.3 WOMAC Stiffness: 4.3 ± 1.3 WOMAC Function: 28.9 ± 15 WOMAC Total: 46 ± 17.4 SF-12 Mental: 49.9 ± 17 SF-12 Physical: 39.2 ± 7.3 HOOS-Symptoms: 50 ± 11.9 HOOS-Pain: 49.2 ± 20.1 HOOS-QoL: 22.9 ± 20 HOOS-ADL: 57.8 ± 22 HOOS-SRA: 31.9 ± 22 UCLA: 7.7 ± 3	WOMAC Pain: 5.1 ± 3.7 WOMAC Stiffness: 3.6 ± 2.6 WOMAC Function: 16.2 ± 14.7 WOMAC Total: 25 ± 20.2 SF-12 Mental: 45.3 ± 15.7 SF-12 Physical: 45.4 ± 10.6 HOOS-Symptoms: 60 ± 25 HOOS-Pain: 72.5 ± 17 HOOS-QoL: 46.7 ± 25.7 HOOS-ADL: 76.4 ± 21.8 HOOS-SRA: 62.5 ± 26 UCLA: 7.5 ± 2.3		Screw removal: 5 (21%) Conversion to THA: 3 (12.5%)
Philippon et al.[30]	Patients who did not undergo revision arthroscopy or THA	50 of 82 hips (61%)	132 (range, 120-156)	HOS-ADL: 69 ± 17 HOS-sports: 43 ± 26 mHHS: 60 ± 16 WOMAC: 33 ± 18 SF-12 MCS: 54 ± 9 SF-12 PCS: 44 ± 10	HOS-ADL: 90 ± 17, MCID: 80%, PASS: 87% HOS-sports: 76 ± 28, MCID 86%, PASS: 92% mHHS: 82 ± 16, MCID 72%, PASS 87% WOMAC: 12 ± 15 SF-12 MCS: 54 ± 7 SF-12 PCS: 51 ± 10	N/A	Revision hip arthroscopy: 7 (9%) Conversion to THA: 22 (27%)
Scanaliato et al.[29]	Labral repair	68	60.1 ± 2.2	mHHS: 66.1 ± 16.9 iHOT-12: 39.8 ± 15.8 Pain VAS: 42.3 ± 18.8	mHHS: 83.2 ± 16.3 iHOT-12: 80.6 ± 13.5 Pain VAS: 24.1 ± 17.4 Satisfaction VAS: 87.4 ± 16.2	Significantly greater increase in mHHS from baseline to latest follow-up in reconstruction than repair groups (27.43 vs 17.13; *P* = .04). Similar MCID, PASS, MOI, and SCB for mHHS and iHOT-12 between groups at latest follow-up (*P* > .05).	Revision hip arthroscopy: 2 (2.9%) Conversion to THA: 1 (1.5%)
	Labral reconstruction	62	60.4 ± 1.51	mHHS: 58.9 ± 17.4 iHOT-12: 32.8 ± 13.5 Pain VAS: 47.7 ± 17.1	mHHS: 86.3 ± 16.2 iHOT-12: 79.5 ± 18.3 Pain VAS: 26.1 ± 16.8 Satisfaction VAS: 85.1 ± 17.4		Revision hip arthroscopy: 3 (4.8%) Conversion to THA: 1 (1.6%)

NOTE. Data are presented as means ± standard deviation or n (%).

HOOS, Hip Disability Osteoarthritis Outcome Score; HOOS-ADL, Hip Disability Osteoarthritis Outcome Score-Activities of Daily Living; HOOS-QoL, Hip Disability Osteoarthritis Outcome Score-Quality of Life; HOOS-SRA, Hip Disability Osteoarthritis Outcome Score-Sport Related Activity; HOS-ADL, Hip Outcome Score-Activities of Daily Living; HOS-Sports, Hip Outcome Score Sports; HOS-SSS, Hip Outcome Score-Sports Specific Subscale; iHOT-12, International Hip Outcome Tool; MCID, minimal clinically important difference, MCS, mental component summary; mHHS, modified Harris Hip Score; MOI, maximum outcome improvement; PCS, physical component summary; NAHS, Non-Arthritic Hip Score; PASS, patient acceptable symptomatic state; PRO, patient-reported outcome; SCB, substantial clinical benefit; SF-12, Short Form-12; THA, total hip arthroplasty; UCLA, University of California at Los Angeles Activity Scale; VAS for pain, visual analog scale for pain. WOMAC, Western Ontario and McMaster Universities Arthritis Index.

rather than primary hip arthroscopy. A subsequent study suggested relative indications for labral reconstruction include insufficient labral tissue, a labral defect, severe intrasubstance labral damage, and calcification of the labrum.[14] However, a clear consensus for indications to perform a labral reconstruction has yet to be defined.

Interestingly, improved postoperative PROs were observed in all studies despite differing surgical techniques, including arthroscopic versus open approaches, varying graft selection, and segmental versus circumferential reconstructions. The optimal surgical approach for the treatment of hip pathology is debated, as conflicting results have been reported when comparing arthroscopic versus open techniques.[34,35] Although it is unclear whether the surgical approach, rather than the labral procedure performed, has a greater impact on patient outcomes, Laboudie et al.[28] demonstrated improved PROs at mid- to long-term follow-up when performing a labral reconstruction with a surgical hip dislocation. When comparing hamstring autograft versus allograft, Maldonado et al.[27] found no significant difference in postoperative outcomes or rates of achieving MCID or PASS. These findings were consistent with a recent systematic review of 8 studies that demonstrated similar outcomes regardless of graft choice.[23] In the one study from this review that evaluated CLR, Scanaliato et al.[29] demonstrated a significantly greater increase in mHHS for labral reconstruction hips compared with patients who underwent labral repair, despite the reconstruction group including older patients with worse labral tears and greater chondral damage. When evaluating segmental labral reconstruction and CLR in a systematic review of 9 studies, Orner et al.[16] found a significant improvement in mHHS for both techniques, although a direct comparison could not be performed due to study heterogeneity. Therefore, the results of this study are in line with the current literature, which has yet to demonstrate superiority of a single surgical technique.

Limitations

Limitations of this review include a small number of studies, consisting of Level III and IV evidence. Methodologic domains of weakness identified in the studies included no prospective calculation of study size, greater than 5% loss to follow-up, and possible bias in end-point assessment. Furthermore, the varying surgical techniques and patient populations precluded a pooled analysis of outcomes. Given that factors associated with improved outcomes were not commonly reported in the included studies, this systematic review was unable to report specific predictors associated with successful results after labral reconstruction. Moreover, the concomitant procedures performed in the included studies limited the ability to determine how much of the improved outcomes could be directly attributed to the labral reconstruction itself, rather than the other procedures performed such as femoroplasty, acetabuloplasty, or microfracture.

Conclusions

Improved PROs were observed in all studies at minimum 5-year follow-up, suggesting that labral reconstruction can offer durable results beyond short-term follow-up. Although surgical indications for all studies included labral tissue characteristics, differing graft selection and surgical techniques were used across studies, limiting the ability to determine an optimal treatment approach.

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