CRITICALLY APPRAISED TOPIC

FOCUSED CLINICAL QUESTION

For a 24-year-old female long-distance recreational runner with an anterior labral hip tear, is conservative management via physical therapy or aggressive management via surgical labral repair or debridement more likely to lead to a return to running without limitations of pain or further joint damage?

AUTHOR

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CLINICAL SCENARIO

The patient was a 24-year-old female recreational runner with a clinically diagnosed anterior labral hip tear. She had likely experienced the initial injury three years previously, during a particularly strenuous bout of training in preparation for a half marathon. At this point, her training mileage of 60+ trail miles per week significantly predisposed her to injury. During the evaluation, it was determined that this risk was further increased by poor neuromuscular control and excess hip capsular and ligamentous laxity. After the initial injury, she took several months off from running to cross train, and later gradually increased her mileage to a near full return. Unfortunately, the following year during a race she experienced a second – and more severe – exacerbation that left her barely walking for nearly two months. At this time, she began to seek physical therapy services.

Despite the presence of unmodifiable characteristics increasing her injury risk (such as her ligamentous laxity),[1-3] the patient was a life-long runner and wanted to continue running. Thus, she was interested in exploring treatment options that would allow her to continue to run but without pain or further increasing hip damage. Gathering information about efficacy and return to sport outcomes of physical therapy versus surgical management can allow physical therapists to address patient concerns and assist in effective decision making for optimal satisfaction and outcomes in patients with labral hip tears.

SUMMARY OF SEARCH

[Best evidence appraised and key findings]

- A literature search addressing the clinical question utilized 3 electronic databases to deliver 8 pertinent articles meeting the scenario inclusion and exclusion criteria. Most of the evidence was low level, ranging from 2b-5 per the Portney and Watkins levels of evidence classification system. Included in the 8 studies were: 1 Cohort study (level 2b), 1 systematic review of mixed quality studies (level 3a), 1 critically appraised topic (level 3b), 4 case series (level 4), and 1 expert opinion (level 5).
- As of September 2018, no studies exist directly comparing conservative management to surgical management for patients with acetabular labral tears. One article utilizing best evidence and highest level of clinical scenario applicability was chosen for each of the two interventions. A comparison of the interventions was made by individually analysing the evidence for each, and synthesizing it to deliver an evidence based recommendation.
- Limited and low-quality evidence suggests that physical therapy rehabilitation can be beneficial for return to sport after an acetabular labral tear.
- Surgical management shows poor return to sport outcomes for up to one year after surgery.

CLINICAL BOTTOM LINE

Current research suggests that physiotherapy may be more effective than surgical management for return to sport after an acetabular labral tear, although no information exists regarding long term joint damage with either intervention. Evidence for this topic is lacking in quality, specific patient characteristics potentially affecting outcomes, as well as long-term data. If more aggressive surgical management is chosen, the patient should be advised that rehabilitation is likely to be long in duration and activity limitations may still be present one year after surgery.

This critically appraised topic has been individually prepared as part of a course requirement and has been peer-reviewed by one other independent course instructor

The above information should fit onto the first page of your CAT

SEARCH STRATEGY

Terms used to guide the search strategy			
Patient/Client Group	**I**ntervention (or Assessment)	**C**omparison	**O**utcome(s)
Hip labral tear	Physical therapy Physiotherapy Rehabilitation Strengthening	Labral repair Debridement	Running Physical activity Return to sport Pain Joint damage

Final search strategy (history):

Show your final search strategy (full history) from PubMed. Indicate which "line" you chose as the final search strategy.

#1 – (Hip OR acetabulum OR acetabular) AND (labrum OR labral) AND tear
#2 – "Physical therapy" OR physiotherapy OR rehabilitation OR strengthening
#3 – Labr* repair
#4 – Debridement
#5 – Running OR "physical activity" OR pain OR "return to sport"
#6 – Joint damage
#7 – #1 AND (#3 OR #4) AND (#5 OR #6)
#8 – #1 AND #2 AND (#5 OR #6)
#9 - #7 OR #8

Filters: English

In the table below, show how many results you got from your search from each database you searched.

Databases and Sites Searched	**Number of results**	**Limits applied, revised number of results (if applicable)**
PubMed	**185**	**Language: English, Subjects: Human**
CINAHL	**74**	***Revised #: 139*** **Language: English**
PEDro	**1**	***(same #)*** **N/A**

INCLUSION and EXCLUSION CRITERIA

Inclusion Criteria
Participants were athletes with labral tears; prioritization of runners Outcome was return to sport; prioritization of impact sports or those involving running Intervention was: physical therapy or surgical management
Exclusion Criteria
Surgical approaches other than labral repair or debridement Abstracts, conference content, editorials Not human subjects Not published in English

RESULTS OF SEARCH

Summary of articles retrieved that met inclusion and exclusion criteria

For each article being considered for inclusion in the CAT, score for methodological quality on an appropriate scale, categorize the level of evidence, indicate whether the relevance of the study PICO to your PICO is high/mod/low, and note the study design (e.g., RCT, systematic review, case study).

Author (Year)	Risk of bias (quality score)*	Level of Evidence**	Relevance	Study design
Thorborg, 2018[4]	**Modified Downs&Black 13/29**	**2b**	**High**	**Cohort study**
Lee, 2010[5]	**Modified Downs&Black 16/29**	**4**	**Low**	**Case series**
Yazbek, 2011[6]	**Modified Downs&Black 12/29**	**4**	**High**	**Case series**
Ayeni, 2014[7]	**AMSTAR 7/11**	**3a (downgraded due to poor quality of included studies)**	**Intermediate**	**Systematic review (1 Prospective Cohort, 3 Case series, 1 Retrospective chart review)**
Ha, 2014[8]	**Modified Downs&Black 12/29**	**4**	**Intermediate**	**Case series**
Harris, 2016[9]	**High risk of bias due to study design**	**5**	**Intermediate**	**Expert opinion**
Domb, 2017[10]	**Modified Downs&Black 12/29**	**4**	**High**	**Case series**
Theige, 2018[11]	**No tool exists; AMSTAR used due to comparable methodology of systematic reviews 6/10**	**3b**	**High**	**CAT (1 Case series, 3 Case reports)**

*Indicate tool name and score

**Use Portney & Watkins Table 16.1 (2009); if downgraded, indicate reason why

BEST EVIDENCE

The following 2 studies were identified as the 'best' evidence and selected for critical appraisal. Rationale for selecting these studies were:

Because no studies exist directly comparing my two interventions (conservative management vs surgical management), I chose one article for each of the two forms of treatment and will assess the two to come to a conclusion based on the individual evidence of each.

- **Theige, 2018[11] – This was the highest level of evidence for conservative management, as it synthesized evidence from several studies. Of note, the included studies were case studies and a case series and thus of low level of evidence; however, as the other evidence exists primarily in these forms as well, and lacks a unifying synthesis, selection of the CAT was an evident choice. While its rating on the AMSTAR was poor (6/10), it is important to note that this tool was not genuinely developed for assessment of a CAT and no such tool for a CAT exists. Based solely on the score it is evident that this study has a high risk of bias, but this should be interpreted with caution due to usage of the AMSTAR on a type of study that it was not originally intended for.**
- **Thorborg, 2018[4] – This was the highest level of evidence for surgical management. Unfortunately, it only investigated labral repairs (as opposed to other surgical techniques), but it had a full one year follow up – one of the longest durations of follow up for surgical management in this realm. One other study had a five year follow up, but its surgical technique was a less common one and thus I deemed that study less relevant. Additionally, Thorborg's outcome measures included sport-specific information, which is what I was desperately seeking (whereas many of the others utilized general outcome measures). Although it had a high risk of bias based on the Downs and Black checklist, many of the other studies included in my original 8 did as well and thus I did not see this as a detriment to choosing this article for my final article selection.**

SUMMARY OF BEST EVIDENCE

(1) Description and appraisal of (study title) by (authors, Year): "Nonsurgical Management of Acetabular Labral Tears" by Theige M and David S (2018).[11]

Aim/Objective of the Study/Systematic Review:

This study aimed to investigate the available literature for nonsurgical management of acetabular labral tears to determine the effectiveness of physical therapy rehabilitation for improved symptoms or function in athletes.

Study Design

[e.g., systematic review, cohort, randomised controlled trial, qualitative study, grounded theory. Includes information about study characteristics such as blinding and allocation concealment. When were outcomes measured, if relevant]

Note: For systematic review, use headings 'search strategy', 'selection criteria', 'methods' etc. For qualitative studies, identify data collection/analyses methods.

- Critically Appraised Topic (CAT), treated comparably to a systematic review for the purposes of analysis
- **Search strategy:**
  - Sources: PubMed, SPORTDiscus, MEDLINE (EBSCO), MEDLINE (Thompson Reuters), and Cochrane Database of Systematic Reviews
  - Keywords: acetabular labral tear; nonsurgical OR conservative management OR rehabilitation
- **Selection criteria:**
  - Inclusion: subjects with diagnosed labral tear, subjects who participated in any level of sport, outcome measures of pain and function, full text available, English language
  - Exclusion: rehabilitation only as a pre-surgical/post-surgical adjunct, no athletes of any level studied, published 2006 or earlier
- **Methods**: physical therapy treatment
- **Included studies**: 1 case series and 3 case reports
  - Study #1: Case series (Yazbek et al)
  - Study #2: Case report (Khoo-Summers and Bloom)
  - Study #3: Case report (Liem et al)
  - Study #4: Case report (MacIntyre et al)

Setting

[e.g., locations such as hospital, community; rural; metropolitan; country]

The setting affiliations of the two authors completing the CAT are Pingree School (Hamilton, MA) and North Dakota State Univeristy (Fargo, ND). The settings of the included studies were not specified, but presumably took place in physical therapy clinics.

Participants

[N, diagnosis, eligibility criteria, how recruited, type of sample (e.g., purposive, random), key demographics such as mean age, gender, duration of illness/disease, and if groups in an RCT were comparable at baseline on key demographic variables; number of dropouts if relevant, number available for follow-up]

Note: This is not a list of the inclusion and exclusion criteria. This is a description of the actual sample that participated in the

study. You can find this descriptive information in the text and tables in the article.

- Study #1: Case series (Yazbek et al)
  - 4 subjects: 27 year old male, 24 year old male, 24 year old male, 24 year old female
  - The males were athletes (from recreational to professional) and the female was sedentary
- Study #2: Case report (Khoo-Summers and Bloom)
  - 1 subject: 29 year old female
  - Clinical diagnosis
  - Professional ballet dancer; performing 36 hrs/wk as a principal (highest ranking) ballerina
  - Previously attempted treatment included ice and pharmacology
- Study #3: Case report (Liem et al)
  - 1 subject: 12 year old female
  - Imaging (MRI) diagnosis; no bony abnormalities
  - Nationally competitive figure skater
  - History of 1 month of hip pain with increasing pain despite 3 full weeks of rest
- Study #4: Case report (MacIntyre et al)
  - 1 subject: 22 year old male
  - Imaging diagnosis; labral tear coupled with CAM type FAI
  - Recently retired from professional hockey due to exclusion from surgical treatment (in lieu of conservative management), surgical apprehension, and desire to preserve hip function
  - History of 4 years of hip pain

Intervention Investigated

[Provide details of methods, who provided treatment, when and where, how many hours of treatment provided]

Control

No controls were included in any of these studies due their study designs.

Experimental

- Study #1: Case series (Yazbek et al)
  - Protocol treatment provided in 3 phases – 1) pain control, core stabilization, movement pattern correction, 2) ROM and muscle strength imbalance correction, 3) proprioception and sport specific movement
  - 9-16 weeks of treatment depending on speed of progress; number of treatments or length (time) not reported
  - Not reported who provided treatment
- Study #2: Case report (Khoo-Summers and Bloom)
  - Sahrmann analysis to identify movement patterns contributing to injury
  - Treatment focused on corrective programming for flawed biomechanics as well as posture education
  - Home exercise program focused on muscular control during sitting, standing, walking, and dancing; frequency unspecified
  - 8 weeks of treatment; 6 visits during this time; length (time) not reported
  - Not reported who provided treatment
- Study #3: Case report (Liem et al)
  - Treatment focused on addressing issues found during evaluation – including poor core activation, weakness of gluteus medius/external rotators/paraspinals
  - Included progression to functional and sport-specific exercises
  - Home exercise program daily; inclusion of exercises not specified
  - 16 weeks of treatment; 28 visits during this time (twice per week for the first 12 weeks, then once per week for the last 4 weeks); length (time) not reported
  - Not reported who provided treatment
- Study #4: Case report (MacIntyre et al)
  - Individualized protocol
  - Treatment focused on active release techniques, instrument-assisted soft tissue mobilization, spinal manipulation therapy, Mulligan mobilizations with movement, electro-acupuncture, and rehabilitation exercises progressing from strength and stability to functional activities and sport-specific exercises
  - 6 weeks of treatment; 8 visits during this time; length (time) not reported
  - Not reported who provided treatment

Outcome Measures

[Give details of each measure, maximum possible score and range for each measure, administered by whom, where]

- Study #1: Case series (Yazbek et al)

- Pain using VAS (score 0-10, with 10 indicating worst possible pain)
- Hip strength (incremental scale from 0 to 5, with 5 indicating maximal strength)
- Hip ROM (goniometric assessment with standardized norms present for different motions)
- Function
- Special tests: Impingement, FABER, Scour, Internal rotation, Squish, Lasegue, Piriformis, Grava
- Luquesne Hip Score (score 0-24, with 24 indicating maximal pain or disability)[12]
- Measurements taken pre-intervention, at 4 months post-treatment, and at 6 months post-treatment

- Study #2: Case report (Khoo-Summers and Bloom)
  - Pain using VAS (score 0-10, with 10 indicating worst possible pain)
  - Nonarthritic Hip Score (score 1-100, with 100 indicating best function)[13]
  - Measurements taken pre-intervention and directly at post-intervention (2 months later)
- Study #3: Case report (Liem et al)
  - Pain using VAS (score 0-10, with 10 indicating worst possible pain)
  - Level of participation in figure skating
  - Measurements taken pre-intervention, at 1 month, at 1.5 months, 3 months, at 4 months, and at 1 year post-intervention
- Study #4: Case report (MacIntyre et al)
  - Pain using VAS (score 0-10, with 10 indicating worst possible pain)
  - Performance of ADLs
  - Level of participation in hockey
  - Special tests: Scour, FADIR, FABER
  - Measurements taken pre-intervention and directly at post-intervention (1.5 months later)

Main Findings

[Provide summary of mean scores/mean differences/treatment effect, 95% confidence intervals and p-values etc., where provided; you may calculate your own values if necessary/applicable. You may summarize results in a table but you must explain the results with some narrative.]

Case series (Yazbek et al)	• Less pain with provoking special tests • VAS scores decreased by 4-7 points; three out of four patients reported no pain • Lequesne Hip Scores decreased by 4-9 points • Hip adductor, abductor, flexor, and extensor strength improved: 0-98% in involved limb and 0-139% in uninvolved limb • One out of the four subjects returned to professional sport participation
Case report (Khoo-Summers and Bloom)	• VAS decreased from 7/10 to 0/10 during sitting/standing/walking • Nonarthritic Hip Score increased from 36.25% to 97.5% • Mild groin pain still present during advanced dance steps but subject was able to return to her ballet career • Remained pain-free and dancing professionally 5 months after treatment end
Case report (Liem et al)	• VAS decreased from 8/10 to 0/10 after the 6th week of treatment • Absent from sport participation in the first 6 weeks, return limited to step routines at weeks 6-12, performance of jumps at 75% of normal height 12-16 weeks, and full return to sport at 16 weeks after treatment end • Remained pain-free and competing nationally 12 months after injury
Case report (MacIntyre et al)	• VAS decreased by 7 points to no pain after treatment end • Special tests Scour, FADIR, and FABER did not produce pain after treatment end • Remained pain-free and able to compete in hockey recreationally 2 weeks after treatment end; was playing professionally at the time of article publication

Original Authors' Conclusions

[Paraphrase as required. If providing a direct quote, add page number]

Authors concluded that evidence supports nonsurgical rehabilitation for treating acetabular labral tears in athletes for return to sport. This is supported by the possibility of avoiding a more invasive surgical procedure, as well as low risk of implementation, but should be interpreted with caution due to the generally poor quality of evidence evaluated.

Critical Appraisal

Validity

[Summarize the internal and external validity of the study. Highlight key strengths and weaknesses. Comment

on the overall evidence quality provided by this study.]

- Due to the nature of the (Critically Appraised Topic or CAT) study design, there are no evaluation tools to formally assess the risk of bias in the study. However, as the study design is comparable to that of a systematic review, the bias in this study was assessed using an AMSTAR measurement tool; it received a score 6/10 based on -
    - "A priori" study design: Yes; Duplicate study selection and data extraction: Yes; Comprehensive literature search: Yes; Grey literature used as an inclusion criterion: No; List of included and excluded studies provided: No; Characteristics of included studies provided: Yes; Scientific quality of the included studies assessed and documented: Yes; Scientific quality of the included studies used appropriately in formulating conclusions: Yes; Methods used to combine findings of the studies appropriate: Not applicable; Likelihood of publication bias assessed: No; Conflict of interest included: No.
- The AMSTAR score indicates a high risk of bias for this study. As noted above, this should be interpreted with caution as the AMSTAR was not developed for analysis of CAT's methodological quality.
- **Strengths of the study**: comprehensive literature search, recent (2018) publication assessing most current evidence, including only acetabular labral tears whereas most other studies in this literature categories include acetabular labral "and/or" femoroacetabular impingement (FAI), relatively higher quality evidence than all of the other literature available.
- **Limitations noted by the authors**:[11] Low quality evidence (potentially including outliers due to risk of bias in researcher selection of which cases to publish in the case reports; lack of controls and skewing effects in case series) and study results potentially affected by clinician experience with the sport of the patient/subject.
- **Additional limitations**: Heterogeneity of rehabilitation approaches, heterogeneity of study subjects limiting application, limited objective outcome measures.
- **Overall evidence quality**: Overall, this is a good quality study; despite its inclusion of low quality evidence subject to bias as noted above, this is the best evidence available and the rigor of the search process and inclusion/exclusion criteria act as a positive factor for its analysis.

Interpretation of Results

[This is YOUR interpretation of the results taking into consideration the strengths and limitations as you discussed above. Please comment on clinical significance of effect size / study findings. Describe in your own words what the results mean.]

Evidence weakly supports nonsurgical rehabilitation for acetabular labral tears in athletes. Notably, the weak support is due to the low quality of best available evidence; however, as conservative management is low risk and non-invasive, it is a worthwhile consideration. The only outcome measure consistently used in all of the studies was pain; nonetheless, after a course of conservative treatment, pain showed improvement for every patient included in this research article. This shows promise for function. Other individually improved factors include strength, patient specific participation outcome measures (Luquesne Hip Score and Nonarthritic Hip Score), and improvement in discomfort elicited during special tests (which may potentially be representative of daily athletic movements but may also arguably have limited functional impact).

It is important to consider these results within the context of what is valuable to these patients – their sport participation. Out of the six athletes included in the study, four were able to return to their previous level of sport. While this is a large positive, these studies were limited in their follow-up. The follow-up durations in this study ranged from 1.5 months after intervention to 1 year after intervention. While this may seem significant in the short term, in the context of one's life it is but a small amount of time. This is important to consider when advising a patient about his/her options. Furthermore, all of the subjects were in the adolescent to young adult age range (12-29 years old); thus, these results warrant further consideration in their applicability to patients of older age.

Applicability of Study Results

[Describe the relevance and applicability of the study to your clinical question and scenario. Consider the practicality and feasibility of the intervention in your discussion of the evidence applicability.]

This research article is of moderate to high relevance and high applicability to the proposed clinical scenario. The patient is a 24 year old, within the age range of subjects included in the studies in the population with this condition. The patient is also a runner, an athlete like these study subjects. Unfortunately, as of the literature search to date, no studies exist featuring runners; thus, study results from other athletic endeavours (such as jiu jitsu, ballet, figure skating, and hockey featured in this study) must be applied. Ideally, more studies assessing high impact repetitive sports would be assessed. However, consideration of the fact that this is the best quality evidence available supports clinical application of these results.

The interventions utilized in this case series and these case reports were standard musculoskeletal physical therapy approaches with extremely feasible utility in the clinical setting. Unfortunately, I do not believe that the evidence warrants any recommendations regarding the *type* of approaches to be used in physiotherapy rehabilitation of labral tears. When considering whether conservative management works, it is valuable not only to know that it works but also how to structure a treatment plan to ensure efficacy. The heterogeneity in

treatment approaches and treatment timeframes was large, and thus it would be misleading to suggest that any single approach over another was beneficial. Specificity was varied but some commonalities within the treatments were present: individualization of treatment approach, focus on core stabilization, and inclusion of sport-specific movements. While limited in scope, these may provide a loose guideline for a treatment approach in applying these study results to a patient. In the context of this clinical scenario, sport specific rehabilitation movements prior to return to running may include single leg squats, "running man" exercise, and multidirectional bounding.

(2) Description and appraisal of (study title) by (authors, Year): "Patient-Reported Outcomes Within the First Year After Hip Arthroscopy and Rehabilitation for Femoroacetabular Impingement and/or Labral Injury: The Difference Between Getting Better and Getting Back to Normal" by Thorborg K, Kraemer O, Madsen AD, Holmich P (2018).[4]

Aim/Objective of the Study/Systematic Review:

This study aimed to evaluate and compare clinical outcomes at 3, 6, and 12 months after hip arthroscopy for acetabular labral tears and/or femoroacetabular impingement (FAI) using the modified Hip Harris Score (mHHS) and the Copenhagen Hip and Groin Outcome Score (HAGOS). Additionally, it aimed to examine how many patients improved a value of minimal clinical importance (MCI) and to establish scores of normal for healthy controls.

Study Design

[e.g., systematic review, cohort, randomised controlled trial, qualitative study, grounded theory. Includes information about study characteristics such as blinding and allocation concealment. When were outcomes measured, if relevant]

Note: For systematic review, use headings 'search strategy', 'selection criteria', 'methods' etc. For qualitative studies, identify data collection/analyses methods.

- Cohort study; experimental group with matched controls
- **Experimental group**
  - Diagnosis: labral injury and/or FAI; determined via medical history, clinical examination (localization of pain, range of motion, anterior hip impingement test), and imaging (radiographs of pelvis and hip joint with positives in alpha angle ≥55º and/or a positive crossover sign and/or an excessively deep acetabular socket. MRI available when aforementioned methods were unclear)
  - Selection criteria:
    - Inclusion: first time undergoing hip arthroscopy, complaints and clinical symptoms of intra-articular hip joint abnormality or bony dysmorphism
    - Exclusion: osteoarthritis as indicated by a joint space width of ≤2 mm
- **Controls:** healthy (no history of hip or groin pain) subjects matched in age and sex to intervention group
- **Sample size considerations:** statistical analysis indicated that 85 subjects would be necessary to evidence a moderate (0.5) effect size at p=0.05 and power of 0.90; authors aimed to recruit 100 patients to account for potential drop-outs
- **Statistical methods:**
  - t test with 2-sided approach; effect sizes calculated using Cohen's d (after 3 months)
  - $p \leq 0.05$
  - Minimal important change (MIC) determined using distribution based method via 0.5 standard deviations (SD) of baseline values
  - All patients that were originally included in the study were included in the analysis
- No blinding or group allocation concealment
- Outcomes measured pre-operatively, 3 months after surgery, 6 months after surgery, and 12 months after surgery

Setting

[e.g., locations such as hospital, community; rural; metropolitan; country]

Surgery performed at Amager-Hvidovre University Hospital in Copenhagen, Denmark (metropolitan hospital). Rehabilitation completed in local outpatient physiotherapy clinics.

Participants

[N, diagnosis, eligibility criteria, how recruited, type of sample (e.g., purposive, random), key demographics such as mean age, gender, duration of illness/disease, and if groups in an RCT were comparable at baseline on key demographic variables; number of dropouts if relevant, number available for follow-up]

Note: This is not a list of the inclusion and exclusion criteria. This is a description of the actual sample that participated in the

study. You can find this descriptive information in the text and tables in the article.

- Total N = 255
- Control: N = 158
  - Consecutive patients presenting to the hospital for hip arthroscopy performed by the same surgeon (one of the study authors) between September 2011 to March 2014
  - Subject demographics
    - 99 females: mean age 39 y/o, range age 16-66 y/o
    - 59 males: mean age 39 y/o, range age 17-57 y/o
- Intervention: N = 97
  - Convenience sample recruited from staff and patients from surgical setting of hospital department
  - Subject demographics
    - 56 females: mean age 38 y/o, range age 17-60 y/o
    - 41 males: mean age 37 y/o, range age 19-59 y/o
  - Hip injury characteristics
    - Femoral head cartilage lesions: 8% grades 1 or 2, 8% grades 3 or 4 ("International Cartilage Repair Society" grading)
    - Acetabular cartilage lesions: 32% grades 1 or 2, 41% grades 3 or 4 ("Beck" grading)
  - Hip arthroscopy procedures (some patients had more than one of these)
    - 98% osteoplasty, rim trimming, and labral repair
    - 8% microfracture of acetabulum
    - 1% microfracture of femoral head
  - Patient flow
    - Pre-surgery: N = 97
      - Dropped out after surgery N=2
    - 5 month follow up: N = 95
      - Total hip replacement N=1; new operation on opposite side N=3; dropped out after 5 month follow up N=2
    - 6 month follow up: N = 89
      - Total hip replacement N=2; new operation on opposite side N=2; reoperation N=2; dropped out after 6 month follow up N=6
    - 12 month follow up: N=77 (total loss of subjects N=20)
  -

Intervention Investigated

[Provide details of methods, who provided treatment, when and where, how many hours of treatment provided]

Control

Received no treatment. One time completion of mHHS and HAGOS patient reported outcome questionnaires for establishment of healthy norm values. Control subjects completed the questionnaires but it is unspecified who administered the questionnaires.

Experimental

- Hip arthroscopy procedure conducted by lead surgeon (Otto Kraemer)
- Standardized 26 page post-surgical rehabilitation; included specific timeframes for mobilization and levels of progression. Completed with local community physical therapists (multiple clinics) for 8 to 12 weeks after surgery
  - 4 phase protocol: mobility, stability, strength, return to sport/competition
  - No further information regarding duration, frequency, or intensity of rehabilitation provided; limited control of rehabilitation due to involvement of multiple local clinics and therapists

Outcome Measures

[Give details of each measure, maximum possible score and range for each measure, administered by whom, where]

- **Copenhagen Hip and Groin Outcome Score (HAGOS)** – primary outcome measure
  - Patient reported outcome score; 0-100 points[4]
  - Validated in the hip arthroscopy candidate population[14]
  - 6 subscales: pain, symptoms, activities of daily living, sport and recreation, participation in physical activities, hip and/or groin related quality of life[4,15]
  - The only patient reported outcome measure to query sports and physical activity related hip and groin function[14,16]
- **Modified Hip Harris Score (mHHS)** – secondary outcome measure
  - Patient reported outcome score; 0-100 points[4]
  - Not properly validated in the hip arthroscopy candidate population[14,16]

- 2 subscales: pain and daily function[4]
- Included as second outcome measure for comparison

Main Findings

[Provide summary of mean scores/mean differences/treatment effect, 95% confidence intervals and p-values etc., where provided; you may calculate your own values if necessary/applicable. Use a table to summarize results if possible.]

Mean Outcome Measure Scores: Before Surgery and at 3, 6, and 12 Months After Surgery

	Before sx	3 mos after sx	6 mos after sx	12 mos after sx
HAGOS **Pain** subscale	55.9	77.1*****	77.2	79.4
HAGOS **Symptoms** subscale	48.4	68.1*****	69.7	71.9
HAGOS **ADL** subscale	58.5	79.8*****	82.0	84.3
HAGOS **Sport and Recreation** subscale	38.8	58.7*****	65.6	69.9
HAGOS **Participation in Physical Activities** subscale	18.9	36.0*****	46.9*****	54.1
HAGOS **Hip Related Quality of Life** subscale	26.8	53.0*****	53.7	59.4
mHHS	62.7	79.8*****	82.4	84.7

No standard deviations for the values were provided.
HAGOS: Copenhagen Hip and Groin Outcome Score
mHHS: modified Hip Harris Score
*****indicates significant change from the previous nearest time point at $p<0.01$.

- Significant (positive) change is present in the mHHS, as well as every category of the HAGOS, from before surgery to 3 months after surgery.
- Significant (positive) change is present from 3 to 6 months after surgery for participation in physical activities after hip arthroscopy for labral and/or FAI repair.
- Improvement plateaus 3 months after surgery; while additional improvements may be seen, their significance may be minimal or otherwise not statistically significant.
- Participation in sport and recreation as well as physical activities is still reduced one year after surgery.

Percentage of Patients At or Above MIC at 3, 6, and 12 Months After Surgery

	MIC	3 mos after sx	6 mos after sx	12 mos after sx
HAGOS **Pain**	9.1	61%	59%	58%
HAGOS **Symptoms**	8.4	61%	56%	54%
HAGOS **ADL**	11.2	59%	52%	51%
HAGOS **Sport and Recreation**	9.9	57%	60%	59%
HAGOS **Participation in Physical Activities**	12.1	44%	59%	52%

HAGOS **Hip Related Quality of Life**	8.0	68%	60%	59%
mHHS	6.5	64%	62%	58%

No standard deviations for the values were provided.
MIC: Minimal Importance Change

- Minimal important change (calculated using 0.5 SD from baseline) varies by HAGOS subscale, ranging from 8.4-12.1.
- Minimal important change is smaller for the mHHS than for all subscales of the HAGOS despite both scores being a value out of 100.
- After surgery, not all patients achieve minimally important changes in their scores and function; progress is the worst for participation in physical activities followed by sport and recreation.
- Trends exist for fewer subjects being above a minimally important change value with longer post-surgical timeframes.

Percentage of Patients Within 95% Reference Intervals of Healthy Matched Controls

	Before sx	3 mos after sx	6 mos after sx	12 mos after sx
HAGOS **Pain**	5.2%	28.9%	21.6%	30.9%
HAGOS **Symptoms**	8.2%	33.0%	36.1%	35.1%
HAGOS **ADL**	8.2%	20.6%	34.0%	38.1%
HAGOS **Sport and Recreation**	0%	15.5%	20.6%	24.7%
HAGOS **Participation in Physical Activities**	6.1%	22.7%	28.9%	38.1%
HAGOS **Hip Related Quality of Life**	1%	15.5%	12.4%	19.6%
mHHS	0%	22.7%	27.8%	36.1%

- The mHHS, as well as the HAGOS, showed drastic increases in the percentage of patients with function comparable to that of healthy matched controls after surgery.
- While the mHHS as well as all of the other categories of HAGOS showed a linear increase in the amounts of people improving in function, pain fluctuated between 3 and 6 months whereas symptoms and hip related quality of life fluctuated between 6 and 12 months.
- A large amount of patients don't reach "threshold of normality" (pg.2613) when compared with their healthy matched (age and sex) controls.

Effect Sizes from Pre-surgery to 3 Months After Surgery

	Cohen's d
HAGOS **Pain**	0.92
HAGOS **Symptoms**	0.85
HAGOS **ADL**	0.85
HAGOS **Sport and Recreation**	0.64

HAGOS **Participation in Physical Activities**	0.51
HAGOS **Hip Related Quality of Life**	0.98
mHHS	0.87

- Participation in physical activities, as well as sport and recreation subscales of the HAGOS showed medium effect sizes.
- Pain, symptoms, ADL's, and hip related quality of life subscales of the HAGOS showed large effect sizes.
- mHHS showed large effect size.

Original Authors' Conclusions

[Paraphrase as required. If providing a direct quote, add page number]

Statistical and clinical improvements in the HAGOS and mHHS as early as three months after surgery indicate improvements in function after hip arthroscopy for labral injury and/or FAI. However, the "sport and recreation" and "participation in physical activities" subscales of the HAGOS indicate that many of these patients are still limited in their higher level physical activity. Additionally, many individuals never reach the same level of function as individuals with healthy hips.

Critical Appraisal

Validity

[Summarize the internal and external validity of the study. Highlight key strengths and weaknesses. Comment on the overall evidence quality provided by this study.]

- The bias in this study was assessed using a modified Downs and Black checklist tool for non-randomized studies; it received a score 13/29 based on –
    - **Reporting** - Hypothesis of study described: Yes; Main outcomes described: Yes; Characteristics of patients described: Yes; Interventions of interest described: Yes; Distributions of confounders described: No; Main findings clearly described: Yes; Estimates of random variability for main outcomes: No; Important adverse events that may be a consequence of intervention reported: No; Characteristics of patients lost to follow-up been described: No; Actual probability values reported: No
    - **External validity** - Subjects that were asked to participate representative of the entire population from which they were recruited: Unable to determine; Subjects who were prepared to participate representative of entire population: Unable to determine; Staff/places/facilities representative of the treatment the majority of patients receive: Unable to determine
    - **Internal validity (bias)** - Attempt made to blind study subjects: No; Attempt made to blind those measuring main outcomes: No; If results were based on data dredging, was this made clear: Unable to determine; In trials and cohort studies, did analysis adjust for different lengths of follow up: Yes; Appropriate statistical tests: Yes; Reliance of compliance with intervention: No; Main outcome measures used accurate: Yes
    - **Internal validity (confounding/selection bias)** - Patients in different intervention groups or cases and controls recruited from the same population: Yes; Patients in different intervention groups or cases and controls recruited over the same period of time: Yes; Study subjects randomized to intervention groups: No; Randomized intervention assignment concealed from both patients and healthcare staff until recruitment was complete: No; Adequate adjustment for confounding in the analyses from which the main findings were drawn: Unable to determine; Losses of patients to follow-up taken into account: Yes
    - **Power** - A priori power analysis reported based on clinically meaningful effect size for primary outcome: Yes
- The modified Downs and Black checklist tool indicates an overall high potential for risk of bias in this study. In the individual categories, the study scored poorly on reporting (5/11 points), very poorly on external validity (0/3 points), poorly on internal validity/bias (3/7 points), poorly on internal validity/confounding or selection bias (3/6 points), but very well on power (2/2 points). This study's low external validity score limits the generalizability of the study results to other conditions. Its moderate internal validity (overall score 6/11) suggests potential confounding, or the effect of multiple variables on outcomes/results, and warrants caution with interpretation of study results. The high power score indicates that this study has a high probability of detecting the presence of a true effect, or rather a low chance of concluding that there is no effect when one exists.

- **Strengths of the study**: large number of subjects, wealth of detailed data, matched controls.
- **Limitations noted by the authors**:[4] distribution based method of minimal important change determination, inability to provide greater accuracy in proportions of patients improving or reaching a certain patient reported outcome level.
- **Additional limitations**: lack of differentiation between subjects that have labral tears or FAI or both, lack of specification as to the location of the labral tears, heterogeneity and no details in post-operative rehabilitation.
- **Overall evidence quality**: Overall, this is also a good quality study. As a cohort study at quality level 2, it is one of the highest levels of evidence available for literature on the topic. Additionally, featuring outcomes at one year after surgery it is also has one of the longest durations of follow up. Its primary limitations are in its non-existent external validity and its only moderate internal validity.

Interpretation of Results

[This is YOUR interpretation of the results taking into consideration the strengths and limitations as you discussed above. Please comment on clinical significance of effect size / study findings. Describe in your own words what the results mean.]

While the overall evidence for functional improvements after hip arthroscopy for a labral tear may be positive, this is not the case specifically for more strenuous activities. Of the six subscales of the Copenhagen Hip and Groin Outcome Score (HAGOS), subscales of "sport and recreation" and "participation in physical activities" showed the worst outcomes and relatively the smallest effect sizes. Ranges for Cohen's d were primarily in the "large" range (0.85 to 0.98) for HAGOS "pain", HAGOS "symptoms", HAGOS "ADL", HAGOS "hip related quality of life", and the mHHS. This indicates that surgery had a large effect on the improvements evidenced in these categories. Contrastingly, the effect sizes for HAGOS "sport and recreation" and "participation in physical activities" were 0.64 and 0.51 respectively; this indicates that the surgical treatment effects were only moderate in these categories.

While improvements from baseline (before surgery) were present in all categories including sport and physical activities, they were smaller in these two categories than for all of the others. Furthermore, significant deficiencies in comparison to healthy matched controls were still present at one year follow-up. Although the study did not specifically investigate return to sport, this information indicates that despite improvement from pre-surgical status, a majority of the individuals who underwent hip arthroscopy were still limited in participation in higher level physical activities one year after surgery.

A large portion of the statistical data from this study featured a comparison of scores from before surgery to the scores after surgery at various time points in relation to whether their values were above a minimally important change (MIC). As noted by study authors, while the methodology of utilizing 0.5 SD's to establish the MIC has been used in the literature previously, it could be arguably flawed; thus, it is reasonable to consider whether all of that data has reliable value. Additionally, despite the reports of some individuals reaching scores above the minimal importance change, detailed information regarding extent of improvement is not provided. Lastly, reaching MIC does not necessarily equate to clinical significance in improvement.

While post-operative rehabilitation after the surgery was standardized with a protocol, it was completed in multiple clinics with multiple physical therapists which inherently incorporates variability. Additionally, no information regarding adherence to the rehabilitation course after surgery was available. Thus, it is reasonable to propose that potential differences between patients' outcomes may also be due to poor/varied post-operative rehabilitation adherence.

Unfortunately, the information presented in the article does not indicate how many of these individuals were athletes prior to the injury; thus, it is unclear whether the majority of these subjects were frequent exercisers/sport participants that were limited in their abilities to participate after surgery, or if the subjects were mainly sedentary and then limited in their novel attempts to participate in sport after surgery. Undeniably, previous level of sport participation would have a significant impact on ability to participate in sport after an invasive surgery. Additionally, individual motivation for return to sport, or demands at the professional level, may affect these outcomes.

Combining FAI and labral tears within the inclusion criteria may further confound the study results. It is possible that the initial condition may have been connected to the post-surgical outcome; perhaps subjects with FAI fared better than those with labral tears, or potentially the reverse. However, lack of stratification by condition limits conclusions based on this information.

Applicability of Study Results

[Describe the relevance and applicability of the study to your clinical question and scenario. Consider the practicality and feasibility of the intervention in your discussion of the evidence applicability.]

This research article is of high relevance to the proposed clinical scenario. The average age of the females in the intervention group was 38 with a range of 17-60; while this average is higher than in the proposed clinical question, 24 years old still falls within this range. Additionally, the surgical approaches in this article addressed the ones in the scenario.

Applicability of this study is limited. One of its most valuable characteristics is the detailed exploration of abilities to participate in higher level activities and sport after a surgical approach for treatment of an acetabular labral tear and/or FAI. While surgery indicates obvious improvement from baseline in this population, not all subjects showed improvement and unfortunately no detailed information about subjects' prior sport participation status, as well as adherence to post-operative rehabilitation, was provided. This, in conjunction with the poor external validity of this study, limits the conclusive information regarding efficacy of the surgical approach for return to sport.

Ultimately, while these results are pertinent to the clinical question, they are only able to provide limited information about return to sport capabilities after arthroscopic hip surgery for a labral repair. However, these results do suggest that return to sport outcomes may be poor, and that while patients should expect improvement from pre-surgical status, return to sport abilities may be limited.

SYNTHESIS AND CLINICAL IMPLICATIONS

[Synthesize the results, quality/validity, and applicability of the two studies reviewed for the CAT. Future implications for research should be addressed briefly. Limit: 1 page.]

Synthesis of evidence

The evidence presented in this literature search suggests that physical therapy may be more beneficial than surgical management for an acetabular labral tear for patients with intentions of returning to sport. Although this recommendation is based on low quality evidence, it is the best available in the topic area. Acetabular labral tears are a relatively new condition with a large amount of research coming out primarily in the last decade; more time is necessary to develop the topic. Although no research exists specifically in runners, this recommendation is extrapolated from the evidence for other athletic populations.

Physiotherapy management evidence is weak, with the recommendation made on the basis of lower quality evidence than what is available for surgical management. Based directly on the research, this recommendation may be most applicable to young adults, much like in the proposed clinical scenario, as none of the conservative management approach strategies were investigated in individuals older than 29 years old. However, the surgical management evidence analysed here shows poor outcomes for return to sport as well as participation in other higher level physical activities. Additionally, physical therapy is a very feasible, lower risk, lower cost, and non-invasive option compared to surgery. Evidence for conservative management, as well as the aforementioned positive factors, warrants a trial of physical therapy.

Implications for clinical practice

Patients seeking advice about conservative versus surgical management for acetabular labral tears should be advised of the paucity of research in the area. However, they should also be advised that research does weakly suggest that physical therapy may be a worthwhile form of treatment with potential for return to sport. Patients should also be advised of the absence of long term outcomes for treatment after this injury.

Unfortunately, the limited evidence available for this topic area prohibits recommendations regarding specific physical therapy approaches for rehabilitation after this injury. Guidelines have been proposed. A case series by Yazbek et al (analysed as part of the CAT that formed the basis for the conservative management suggestions in this CAT) is one of the highest quality articles available for conservative management and proposes a 4 stage protocol for treatment.[6]

- Phase 1: pain control, education in trunk stabilization, correction of abnormal movements (by instruction to correct excessive dynamic valgus or hip adduction and internal rotation); moving on to next phase with decreasing pain and improved trunk control and dynamic valgus
- Phase 2: muscle strengthening, recovery of ROM, and initiation of sensory motor training; moving on to the next phase with affected limb matching or exceeding strength of the injured limb
- Phase 3: advanced sensory motor training with sport-specific functional progression

Patients should be individually assessed for their abnormal movement patterns and a plan should be tailored to the observed deficiencies. However, the above protocol may be used as a general guideline in formulating the intervention.

Implications for future research

While current research provides the groundwork for which more developments can be made, there is a significant amount of research still to be done. Future studies should look at individuals of different ages, as the majority of the current research focuses on youth and young adults. Different sports should also be explored. Many of the current studies look concurrently at FAI and labral tears. It may be better that they are separated for research purposes; while FAI is a large predisposing risk factor for labral tears, others include capsular laxity/hypermobility, trauma, dysplasia, and degeneration – and therefore it is possible that labral tears may occur without adjoining FAI.[17] It is plausible that lack of separation between the two separate conditions

confounds study results.

Additionally, labral tears should be separated by location (anterior versus posterior); while anterior labral tears are most common in the US, constituting 86 to 94% of all non-traumatic labral tears,[3] it is possible that lack of differentiation between the two areas – and the subsequent attempt to treat them the same way – further limits study results.

Generally speaking, more higher quality studies should be done – with randomized controlled trials or more cohort studies. More subjects of different characteristics (age, sport, different labral tear location as noted above) need to be enrolled. Patient characteristics affecting outcomes should be investigated. Long term outcomes need to be explored. Additionally, a direct comparison of surgical versus conservative management should be made, controlling for extraneous factors.

In conservative management, research warrants greater detail about the different approaches used in therapy, as well as more information about timeframes for the course of rehabilitation. In surgical management, more information about the characteristics of different approaches, as well as outcomes specific to these approaches, can be of benefit. All of these suggestions can be used to guide patients as to whether they are better candidates for conservative or surgical management, as well as provide more knowledge of expectations for course of treatment and return to activity.

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