Prehabilitation and Rehabilitation Program for Patients Undergoing Arthroscopic Acetabular Labral Repair

A Comprehensive 5-Phase Patient-Guided Program

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Background: Many of the current rehabilitation programs for patients undergoing hip arthroscopy fail to consider the progression of soft tissue healing and inflammation that can be heightened due to aggressive therapy to the operative hip in the immediate postoperative period.

Hypothesis: It was hypothesized that introducing conservative physical therapy (PT) preoperatively along with a slow progression to return to activity using a structured, patient-guided postoperative program would improve patient outcomes.

Study Design: Case series; Level of evidence, 4.

Methods: The authors conducted a retrospective review of patients who received a hip arthroscopy, were at least 18 years old, and who had completed the following patient-reported outcomes (PROs) at 1-year follow-up: modified Harris Hip Score (mHHS), Hip Outcome Score, Nonarthritic Hip Score, International Hip Outcome Tool-33, and Lower Extremity Functional Scale. Patients who underwent previous surgery on the ipsilateral hip and those with cartilage erosion down to exposed subchondral bone (Outerbridge grade 4) were excluded. Paired-samples *t* tests were used to compare the change in PRO scores at 3-month, 6-month, and 1-year follow-up, and the percentage of patients who achieved minimal clinically important difference (MCID) and substantial clinical benefit (SCB) thresholds on the mHHS were stratified according to their Outerbridge grade (0-3).

Results: Overall, 202 patients (53% female, 47% male) were included in the analysis. Significant improvement was seen from 3 to 6 months on all PRO measures and from 6 months to 1 year on all but the mHHS ($P < .05$ for all except the mHHS). A significantly smaller percentage of patients with Outerbridge grade 3 cartilage damage achieved the MCID and SCB on the mHHS compared with those with grade 0, both at 6 months (grade 3 vs 0: 20% vs 63.2% [MCID]; 18.0% vs 52.6% [SCB]; both $P = .03$) and 1 year (grade 3 vs 0: 22.0% vs 57.9% [MCID]; 14.0% vs 52.6% [SCB]; both $P < .05$).

Conclusion: A structured, patient-guided PT protocol after arthroscopic acetabular labral repair can significantly improve postoperative outcomes.

Keywords: hip arthroscopy; physical therapy; return to play

Femoroacetabular impingement (FAI) is a clinical syndrome caused by bone overgrowth that develops around the femoral head and along the acetabulum. With repetitive loading, these osseous abnormalities can cause abnormal contact between the bony prominences, labrum, and articular cartilage, which can lead to labral damage and cartilage degeneration.[1,49,52] With FAI compromising labral integrity and function, the usual course of treatment has transitioned from debridement of the labral tear to repairing and preserving the labrum.[10,20,23] Depending on the location of the acetabular labral lesion, the labrum heals either by fibrovascular repair tissue that originates from capsular tissues or by reattachment via bone formation.[36] Partial healing of labral repairs takes place by 12 weeks postoperatively, which is important to consider when creating a rehabilitation protocol.[36]

Hip arthroscopy is the current approach of choice for physicians, as it is minimally invasive, safer, and has a

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shorter recovery compared with open surgery techniques.[9,19] With increasing surgical technological advancement, hip arthroscopy can be expanded to various patient groups. Despite improvements in comprehensive patient care and rehabilitation being at the forefront of every patient health plan, optimal rehabilitation treatment programs for patients undergoing hip arthroscopy for their labral tear remain unclear.

A majority of the preexisting postoperative protocols are similar in their initial exercises and early preservation of the patient's range of motion (ROM).[15,16,28] A systematic review performed by Grzybowski et al[18] describes the variability present in the literature surrounding rehabilitation programs of patients undergoing hip arthroscopy. Some studies[25,26,32,44,47] have stated that immediate weightbearing as tolerated is the postoperative course of action, while others have initiated a partial weightbearing protocol or the use of a hip brace. Moreover, most current published protocols encourage motion in the early postoperative period after surgery. For example, Shaw et al[39] allowed immediate weight-bearing for the first 3 postoperative weeks and emphasized hip motion via slow stationary bicycle revolutions with hip flexion limited to $<90.^{\circ}$ Garrison et al also encouraged early motion exercises, such as using aquatic therapy to perform light jogging in the water, manual therapy to perform hip joint mobilizations and contract-relax stretching for internal and external rotation, and ROM exercises emphasizing internal rotation.[17] The commonality that exists among these hip arthroscopy physical therapy (PT) protocols is a phase-by-phase progression with early protection and mobility, controlled stability, and strengthening followed by return to sports.

These PT protocols were instituted in patients who underwent hip arthroscopy via a T-capsulotomy approach. This technique transects the iliofemoral ligament, which can cause iatrogenic instability. In addition, since the hip capsule provides both static and dynamic stability to the joint, disruption of this structure has been implicated in postoperative pain, dislocation, heterotopic ossification, and seroma formation.[11,12,14] Furthermore, disruption to the capsule alters the joint biomechanically, which can lead to restrictions in postoperative motion that can subsequently lead to pain and stiffness.[15] With capsular closure, it is recommended that early PT focused on hip joint mobilizations are employed in order to prevent capsular stiffness, muscular guarding, and postoperative pain.[16] However, the minimally invasive puncture capsulotomy technique for hip arthroscopy utilized by the senior author (S.M.) does not require postoperative ROM limitations; thus, it should theoretically allow faster recovery, as it preserves the capsule and limits the burden of excessive inflammation.[11] In addition, with puncture capsulotomy, there is a decreased likelihood of microinstability, persistent pain, and heterotopic ossification.[18]

Despite an increasing number of published protocols for use after hip arthroscopy, few of these studies have supported their protocols with postoperative outcomes. With many of the published rehabilitation programs recommending PT immediately after surgery, the senior author hypothesized anecdotally, when he started performing labral repairs in lieu of labral debridement, that with such protocols, there would be a heightened potential for exacerbating inflammation or causing increased trauma to the inflicted site. This encouraged the senior author to implement preoperative PT and a less aggressive, patient-guided protocol after the procedure.

In the current study, we aimed to summarize the current PT protocols after hip arthroscopy, describe our regimen, and demonstrate its efficacy by reporting prospective outcomes. We hypothesized that introducing conservative PT preoperatively along with a slow progression to return to activity via a structured, patient-guided, postoperative PT program would improve patient outcomes.

METHODS

Data Collection

This study was a retrospective review of prospectively collected patient-reported outcomes (PROs) between December 2013 and January 2019. The study protocol was approved by an institutional review board with each patient providing informed consent. Patients who were included in this study underwent a labral repair for their labral tear; completed the prehabilitation and rehabilitation protocol; at least 18 years old at the time of surgery; and had baseline, 3-month, 6-month, and 1-year follow-up data for the PRO measures that we collected (modified Harris Hip Score [mHHS], Hip Outcome Score [HOS], Nonarthritic Hip Score [NAHS], International Hip Outcome Tool-33 [iHOT-33], Lower Extremity Functional Scale [LEFS]). These patients were seen back in the office after their operation at 2 weeks for suture removal then at 3 months, 6 months, and 1 year postoperatively to check their progression through their recovery process. Patient cartilage damage was assessed intraoperatively via the Outerbridge classification system (grades 0 [normal] to 4).[7] Patients who underwent previous surgery on the ipsilateral hip and those with cartilage erosion down to exposed subchondral bone (Outerbridge grade 4) were excluded.

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Statistical Analysis

Descriptive analysis was employed to identify the patient population with regard to PRO scores. Patient recovery was assessed using paired-samples *t* tests to identify significant changes from baseline to 3 months, 3 to 6 months, and 6 months to 1 year postoperatively. To assess the clinical relevance of the PRO scores, we calculated the percentage of patients who achieved the minimal clinically important difference (MCID) and substantial clinical benefit (SCB) on their iHOT-33 at 6 months and 1 year postoperatively, using data published by Nwachukwu et al.[34] Patients were also stratified according to Outerbridge classification (grades 0-3), and their recovery was compared according to MCID and SCB achievement on the mHHS. Analysis of variance was employed to compare differences among Outerbridge grades, and Tukey post hoc analysis was conducted to identify differences within these groups. Statistics were computed using SPSS Statistical software (Version 26.0.0; IBM Corp), and $P < .05$ was considered significant.

Surgical Technique

All operations were performed with the patient in the supine position on a hip distraction table under general anesthesia. Using a puncture capsulotomy approach, we established the anterolateral portal under fluoroscopic guidance, followed by the anterior, midanterior, and Dienst portals under direct arthroscopic visualization.[2,19]

If the labrum was found to be hypoplastic or degenerative or had complex tearing, capsular autograft labral reconstruction was performed to reestablish the labral seal.[11,41] In these patients, capsulotomy was performed at the capsular reflection, approximately 5 to 10 mm above the region of the labrum that would be augmented. For labrums without complex tearing, degeneration, ossification, or calcification, repair was completed via a composite anchor (2.3-mm Osteoraptor; Smith & Nephew) placed at the first drilling site, thus twisting the anchor into the bone to lock it in place. In cases involving bone decompression for impingement, osteoplasty was performed using a 4.0 mm long round abrader. Throughout the overall process, reduced traction was maintained, and great care was taken to preserve the remaining chondrolabral junction.[13,43]

Prehabilitation and Rehabilitation Protocol

The 5-phase preoperative and postoperative PT protocol is summarized in Appendix Table A1.

Phase 1. As standard of care for patients with hip pain due to a labral tear, nonoperative treatment is first employed for 3 months to potentially resolve the issue. The treatment includes a core-strengthening PT program with a trained physical therapist. The initial goal of phase 1 is to restore functional and minimize pain without surgery. During this time, the patient receives an intra-articular anesthetic/corticosteroid injection, which is both diagnostic and therapeutic. The anesthetic (short-acting lidocaine) provides patients with an intra-articular hip pathology temporary relief, while the corticosteroid injection (long-acting depomedrol) provides patients with relief 2 to 4 weeks after the injection to reduce pain and inflammation, thus allowing the patient to comfortably start PT. During PT, the therapist is to focus on core stabilization, focusing on gait and accessory muscle strength and stability (eg, forward core planks, side planks, and lunge with shoulder proprioceptive neuromuscular facilitation pattern). Eventually, the hip muscles and joint can be incorporated in the patient's therapy plan, but it is important to strengthen the muscles around the hip as much as possible because that can decrease the strain on the hip joint itself as well as aid the recovery process if the patient progresses to surgery.

Phase 2. Phase 2 takes place from the day the patient receives hip arthroscopy to 6 weeks postoperatively. Throughout this time period, the patient is weightbearing and using crutches. The patient is to maintain a flat foot, stiff-legged gait on their operative leg. Avoiding limping and lurching of the pelvis is imperative to the rehabilitation process, as this may stress the repair site. Movements such as pivoting and active hip flexion with $>90^\circ$ of flexion should be avoided during this time. However, the patient can start stair climbing immediately with use of a rail/assistive device as indicated by the physician. During this time, if the patient is no longer taking any narcotics and is comfortable with performing the actions required to drive, then we recommend that the patient follows up with the state agency for safe reinstatement of driving. Upper body exercises that involve core stabilization, such as bench press, rows, flies, should be avoided. Light isolated strengthening such as bicep curls can be performed as tolerated. Aspirin use is recommended for the first 21 days to reduce the risk of deep vein thrombosis. For pain, the patient is advised to use nonsteroidal anti-inflammatory drugs. The patient is also provided with education on the PT self-guided course as well as understanding the cause of any symptoms he or she might experience during this time. This initial rehabilitation process after surgery is imperative in order to reduce joint inflammation while also protecting the soft-tissue repair. At 2 weeks postoperatively, the patient's sutures are removed. During this appointment, the physician also ensures that the patient is using crutches correctly.

Phase 3. Phase 3 lasts from week 6 to week 10. The goals of this phase are to slowly increase the patient's ROM while maintaining pelvic control and balance in a pain-free manner. After 6 weeks, the patient can wean use of crutches progressively, from 1 to none. Stationary bicycling on low resistance with the seat high to reduce hip flexion is acceptable (Figure 1A).

The patient can start with 5 minutes a day at first and then slowly add more time as comfortable. The seat height of the stationary bicycle may also be slowly lowered as

Figure 1. Phase 3 exercises. (A) Cycling with high seat and low resistance. (B) Hip extensions.

tolerated. Functional strengthening such as hip extensions and mini squats may be performed during this phase (Figure 1B).

Phase 4. Phase 4 spans from weeks 10 to 16. The focus of this phase is to build up gluteal strength and core trunk strength in order to maintain pelvic control without any pain. Gluteal exercises such as clam shells can be performed during this time. The patient can also start training on the elliptical machine at low resistance for 5 minutes a day and gradually increase the time by a minute each day. The elliptical training duration may increase as tolerated. In addition, the patient may begin to partake in light swimming activities, but he or she should avoid intense flutter kicks and should use a buoyance board as needed.

Phase 5. Phase 5 spans from months 4 to 6. The patient may begin light hip twisting activities such as golf. Training on the elliptical machine more backward than forward as well as walking on the treadmill backward are modifications that are encouraged during this time to enhance gluteal strength and normal ROM. After evaluation at the 6-month follow-up appointment, the patient may gradually resume full impact loading activities such as jogging and plyometrics as they seem fit. Moreover, at the 6-month follow-up, the physician will gauge the patient's recovery performance and decide whether or not to extend PT training or if he or she can return to his or her sport.

RESULTS

Patient Characteristics

A review of the medical records revealed 202 patients who fit the inclusion criteria; 95 were male (47%), and 107 were female (53%). Mean patient age was 38 ± 11.0 years, and mean body mass index was 25.1 ± 3.7. Roughly 55.6% of patients received surgery on their right labrum, and 44.4% received it on their left. All patient and injury characteristics are shown in Table 1.

PRO Scores

At baseline, the mean ± SD mHHS was 63.4 ± 13.2, HOS-Sport was 40.0 ± 23.8, NAHS was 63.0 ± 17.9, iHOT-33 was 40.6 ± 18.0, and LEFS was 46.1 ± 14.9. After undergoing surgery and continuing their self-guided PT for 3 months, all patients were identified to have improved significantly on all PRO measures except HOS-Sport ($P = .644$) (Table 2). Comparing 3 months with 6 months, the patients improved significantly in all metrics (mHHS, HOS-Sport, NAHS, iHOT-33, LEFS; $P < .05$). A similar result was identified when comparing 6 months with 1 year postoperatively, as patients improved significantly on all PROs except the mHHS.

Clinical Relevance of PROs

At 6 months postoperatively, 53.5% of our patients achieved the MCID, and 47.5% achieved SCB on the iHOT-33. By 1 year postoperatively, 63.4% had achieved the MCID according to their iHOT-33. Likewise, according to their SCB, 58.4% achieved the threshold iHOT-33 score. Two patients were identified to have received a total hip arthroplasty postoperatively.

Subanalysis by Outerbridge Grade

When assessing patients by Outerbridge classification, 16.1% had grade 0, 13.6% had grade 1, 28% had grade 2, and 42.4% of patients had grade 3. Patients with

Outerbridge grade 2 had significantly worse iHOT-33 scores at baseline compared with the other classifications (grade 3, 43.3; grade 2, 33.2; grade 1, 44.0; grade 0, 42.5; $P < .05$). However, this difference was not seen at any of the postoperative timepoints (3 months, 6 months, or 1 year). Figure 2 shows the iHOT-33 and mHHS scores according to Outerbridge grade at the different postoperative timepoints.

When stratified by Outerbridge classification, a significantly smaller percentage of patients with grade 3 cartilage damage achieved the MCID and SCB on the mHHS compared with those with grade 0, both at 6 months (grade 3 vs 0: 20.0% vs 63.2% [MCID]; 18.0% vs 52.6% [SCB]; both $P = .03$) and 1 year (grade 3 vs 0: 22.0% vs 57.9% [MCID]; 14.0% vs 52.6% [SCB]; both $P < .05$).

TABLE 1
Characteristics of Study Patients (N = 202)[a]

Variable	Value
Age, y	38.0 ± 11.0
Sex	
Male	47.0
Female	53.0
Body mass index	25.1 ± 3.7
Laterality	
Right	55.6
Left	44.4
Outerbridge grade	
0	16.1
1	15.6
2	28.0
3	44.3
Tönnis grade	
0	20.0
1	65.5
2	13.6
3	0.9
Tönnis angle, deg	7.8 ± 4.8
Alpha angle, deg	56.7 ± 14.0
Center-edge angle, deg	35.3 ± 7.0

[a]Data are presented as mean ± SD or percentage of patients.

DISCUSSION

The current study identified that patients undergoing the proposed PT protocol after receiving a labral repair can significantly improve their postoperative outcomes. From baseline to 3 months, patients significantly improved in their mHHS (63.4-76.5), iHOT-33 (40.6-59.2), NAHS (63.0-75.5), and LEFS (46.1 to 53.3) scores ($P < .05$ for all). By 1 year, 63.4% of patients reached their MCID, and 58.4% had reached their SCB for iHOT-33. When stratified by Outerbridge grade, there was no significant difference among the groups at any postoperative time point ($P > .05$ for all).

Our postoperative patient-guided PT program is structured to limit postoperative pain and inflammation while safely regaining ROM, muscle strength, muscle length restriction, aerobic conditioning, functional mobility, and proprioceptive balancing training. In order to properly carry out this protocol, we believe it is imperative that, in the weeks after surgery, an emphasis is placed on protecting the healing tissue from any damage caused by aggravating movements. After the tissue has healed adequately, the protocol focuses on progressive exercises to allow the patient to improve ROM as well as improve strength in the hip loading joints and the surrounding muscles, such as the gluteus maximus and medius. The role of strengthening the gluteus maximus has been shown to play an important role in hip abduction and pelvis stabilization.[37] Beck et al[5] also identified that isometric hip strength (hip extension) significantly correlates with improved short-term outcomes. These studies support the growing evidence that additional surrounding muscle groups to the labrum should be addressed in a patient's PT plan. In our patient-guided PT protocol, we utilize strengthening the areas around the hip muscles preoperatively to maximize our patients' baseline strength before going into surgery. Postoperatively, the patient is allowed to continue strengthening these muscles during the first 4 months by carrying out daily activities.

The preoperative period of PT included in our protocol is just as imperative to the patient's recovery profile. In the clinic, patients often present with a chronic, antalgic gait, which has caused their pelvic and hemipelvic musculature imbalance. Theoretically, if these patients undergo surgery before correction of their gait, recovery could be hampered by their maladaptive patterns. By allowing this preoperative

TABLE 2
Patient-Reported Outcome Scores[a]

					P value		
Measure	Baseline	3 mo	6 mo	1 y	BL vs 3 mo	3 mo vs 6 mo	6 mo vs 1 y
mHHS	63.4 ± 13.2	76.5 ± 17.6	79.9 ± 17.4	82.5 ± 18.2	**<.001**	**.002**	.120
HOS-Sport	40.0 ± 23.8	40.0 ± 29.5	60.0 ± 29.0	69.2 ± 7.6	.644	**<.001**	**<.001**
NAHS	63.0 ± 17.9	75.5 ± 12.2	82.1 ± 13.4	84.8 ± 14.9	**<.001**	**<.001**	**.003**
iHOT-33	40.6 ± 18.0	59.2 ± 18.5	66.7 ± 20.4	72.1 ± 22.6	**<.001**	**<.001**	**<.001**
LEFS	46.1 ± 14.9	53.3 ± 13.8	60.9 ± 15.5	63.1 ± 17.4	**<.001**	**<.001**	**.020**

[a]Data are presented as mean ± SD. Bolded *P* values indicate statistically significant difference between time points compared ($P < .05$). BL, baseline; HOS, Hip Outcome Score; iHOT-33, International Hip Outcome Tool-33; LEFS, Lower Extremity Functional Scale; mHHS, modified Harris Hip Score; NAHS, Non-Arthritic Hip Score.

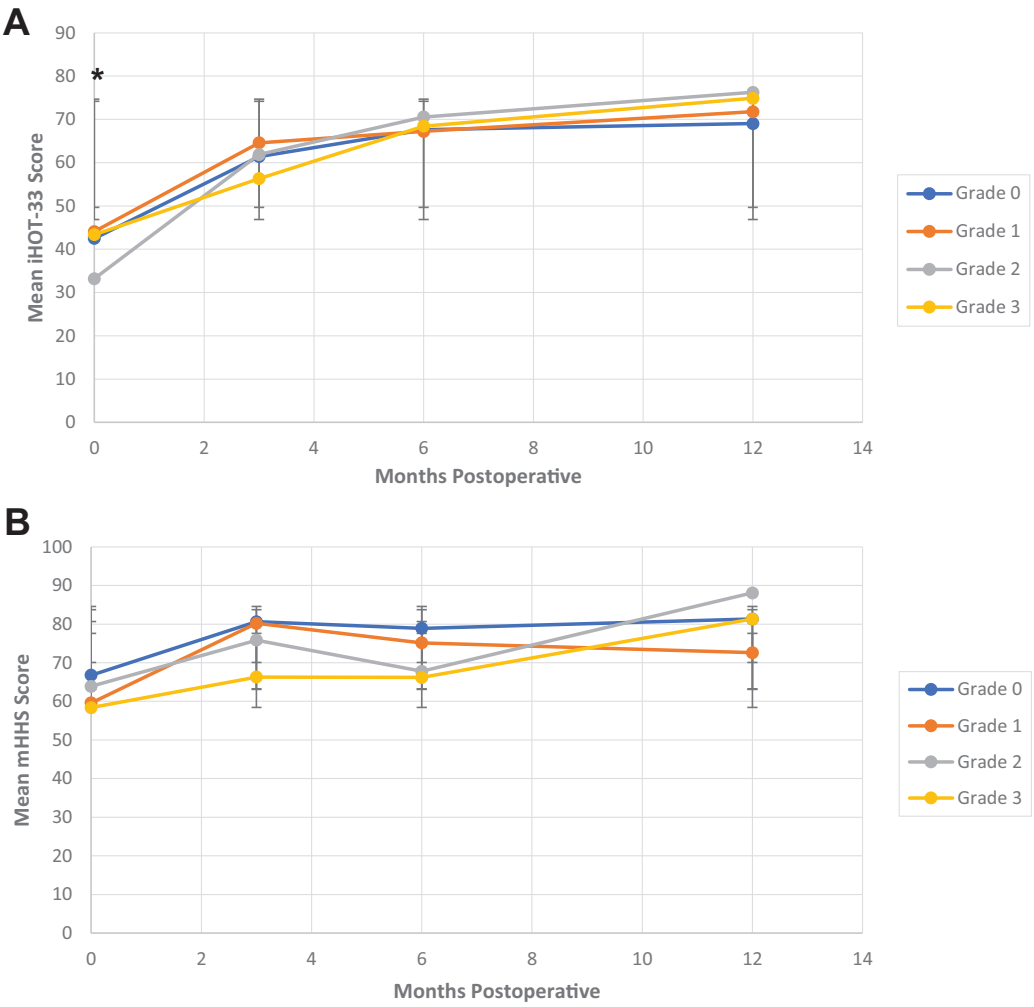

Figure 2. Mean (A) iHOT-33 and (B) mHHS scores by Outerbridge grade. Error bars signify SDs. *Statistically significant difference between grade 2 and grades 0, 1, and 3 ($P < .05$). iHOT-33, International Hip Outcome Tool-33; mHHS, modified Harris Hip Score.

period of PT to take place, we enable the patients to build their structures around the hip such as their lower back, iliotibial band, knee muscles, and their pelvic floor. This will allow force to be dispersed to other structures in the body and allow for greater absorption of stress.

In our patient cohort, we identified sequential improvement in all PROs through the first year of recovery. While there are a few PT protocols present for patients undergoing hip arthroscopy, our postoperative 1-year PROs were comparable with those reported. Our mean 1-year mHHS score (82.5) was identified to be similar to that in previous studies by Larson and Giveans[23] (85.4, n = 96), Bardakos et al[4] (77.0, n = 47), and Domb et al[14] (72.0, n = 738). Patients who underwent our proposed PT plan were also identified to do functionally well during short-term follow-up, as 63.4% of patients achieved MCID and 58.4% achieved SCB in iHOT-33 by 1 year postoperatively. These clinical data further support our hypothesis that aggressive postoperative PT is not a prerequisite to experience positive results after surgery.

The subanalysis of patients according to the extent of their cartilage damage identified that, irrespective of Outerbridge grade, patients did not have significantly different outcomes according to their mHHS and iHOT-33 scores by 1-year follow-up. Since cartilage procedures such as microfractures are secondary to FAI procedures, it is imperative to focus research on how cartilage defects and FAI morphology affect clinical outcomes. Previous studies have suggested that osteoarthritis may serve as a better predictor of worse PRO scores and higher rates of conversion to total hip arthroplasty compared with age.[24,25] More specifically, Haviv and O'Donnell[21] reported the rate of conversion to total hip replacements to be 50% within 1.5 years when having increased age (>55 years) and advanced osteoarthritis (Tönnis grade 3). Despite studies that have stated the negative prognostic value of chondral defects on PROs,[31,42] our results suggested that a conservative postoperative PT protocol may mitigate this negative factor.

Theoretically, a less aggressive postoperative PT protocol prevents added inflammation from occurring in an

environment that has already been traumatized by the insult of surgery. Postoperative inflammation has also been identified to have a major effect on a patient's ability to participate in PT.[8,50] Given the labrum's constrained location, inflammation from a surgical procedure produces the same inflammatory response as a polytrauma injury.[38] Consequently, we advise our patients to minimize movements that would exacerbate inflammation for the first few weeks postoperatively. The concept of decreasing physical activity differs from other musculoskeletal operations, such as total knee arthroplasty, in which patients are typically prescribed a PT plan that involves early and aggressive rehabilitation with high-intensity and high-velocity exercises being performed as early as 4 weeks.[12]

Notably, the PT regime for patients undergoing labral debridement also differs from that of patients undergoing a labral repair. Since anchors and sutures are not present for patients undergoing labral debridement, these patients can experience a quicker return to normal activities of daily life and sports.[22] However, labral repairs are more involved procedures since the acetabular rim is prepared using a bur in order to expose a bleeding bone bed to assist with anchoring the repaired labrum to bone. Moreover, an ample number of anchors are also utilized by the surgeon to stabilize the labral base and restore the hip suction seal.[33] Because of the invasiveness of the procedure, a slower, progressive PT regimen is plausible to allow for proper healing immediately postoperatively. If the PT protocol outlined in this study is followed, patients can return to play by 6 months after hip arthroscopy, which is earlier than in most published protocols.[27,28,30-32] However, depending on the type of procedure performed, the return to play timeline can be affected. For example, concurrent microfracture typically has a recovery timeline of 4 to 6 months postoperatively.[51] In addition, psoas tendon release for painful snapping hip can delay return to play up to 9 months.[3] With the last phase requiring a more individualized approach based on surgical treatment and progression throughout the other phases, our timeline for phase 5 being 4 to 6 months is similar to that of Spencer-Gardner et al[40] and is in line with the data presented by Byrd and Jones.[6]

Our 5-phase PT protocol is similar in its structure to other previously published protocols, yet it also differs in its ideologies. Protocols published by Tijssen et al,[45] Mansell et al,[29] and Spencer-Gardner et al[40] all noted significant PRO improvement by utilizing preoperative PT before surgical intervention. Similarly, most of these phase-based programs aimed to normalize patient gait pattern by roughly 6 weeks. However, Shaw et al[39] advocated working toward full flexion during the first 3 weeks after surgery, and Mansell et al[29] encouraged passive ROM exercises for weeks 1 to 3. Unlike our slow progression home-program, Mansell et al[29] also utilized a shorter PT plan, with the first phase occurring in the first postoperative week, the second phase occurring over the next 2 to 3 weeks, the third phase extending from 4 to 6 weeks, and the last phase occurring in week 7. Having this condensed timeline opposes our hypothesis of allotting sufficient time for the body to heal after undergoing surgery.

Moreover, with medicine moving toward a more patient-centered, holistic, value-based care system, by providing patients with our proposed self-guided protocol, we hope to not only improve their functional outcomes but also to diminish the costs incurred. Previous studies have described the cost of outpatient PT to be, on average, $648 million per year for certain orthopaedic procedures.[35,48] A study done by the US Department of Labor[46] showed that 70% of employment-based, private insurance plans stated that PT was covered. Of these plans, nearly all placed limits on PT benefits, such as limiting the number of visits per year. Since patients are subjected to arbitrary visit limits per year that do not consider the initial diagnosis, patients are responsible for the fees placed by the providers if they continue to receive services beyond their insurance benefits.

The US Department of Labor study[46] also found that 55% of plan beneficiaries were required to make a copayment at each visit, with the median being $20. In the case of hip arthroscopy, PT is to be completed 1 to 2 times per week for 6 to 8 months, with patients accruing an average total cost of about $1000 by the end of their recovery. It is imperative to provide comparable care at a lower cost to patients, especially during pandemics and epidemics of infectious diseases (eg, influenza, coronavirus disease 2019), when it is critical for patients to utilize home health care whenever possible. Consequently, many physical therapists have developed telehealth appointments, which still may cost $150 to $200 per session with a copayment of around $38.[31] By utilizing our home, patient-guided PT program, patients had a safe progression to return to daily activities along with an equitable approach to postoperative treatment, thus lowering their total costs.

Despite the usability of our outlined PT plan that demonstrated improved PROs, this study is not without limitations. Since this study was a retrospective review of prospectively collected data, loss to follow-up could affect the sensitivity of our results. Over this period, the physician operated on 604 patients, with 33.4% meeting the inclusion criteria for this study. Another limitation is the lack of biomechanical and histological evidence to further support our theory that conservative PT leads to better healing. This proposed program has not been used in patients who underwent a T-capsulotomy, and, therefore, we cannot comment on the generalizability of this conservative program in that patient population. Finally, the senior author uses unique repair techniques that could limit the proposed program's external validity. Further research in utilizing this program for different populations and different surgical techniques should be conducted to further validate the benefits of conservative PT treatment.

CONCLUSION

Patients undergoing arthroscopic acetabular labral repair can experience significant improvements in functional outcomes by utilizing a preoperative formal PT and postoperative patient-guided PT protocol.

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APPENDIX

TABLE A1
The 5-Phase Preoperative and Postoperative PT Protocol[a]

Phase 1 (3 mo Before Surgery)
Goals • Get the patient back to 100% function without needing surgery • Undergo PT to focus on core stabilization focused on the accessory muscles around the hip to decrease the strain on the hip joint
Precautions • No relief to some pain • Increased inflammation due to functional PT
Phase 2 (Surgery to 6 wk)
Goals • Gain understanding of intraoperative findings of the joint and provide insight into underlying causative factors • Provide patient with understanding of cause of symptoms • Weightbearing with crutches and foot flat gait pattern • Restore functional ROM within surgeon postoperative guidelines • Minimize pain at rest • Minimize pain with ambulation • Pain score 0 out of 10 during daily activities • Ascend/descend 8-in step with good control • Core control during low demand exercises • Adequate pelvic stability to meet demands of ADL • ROM within functional limits • Patient education and independence with home therapeutic exercise program

(continued)

TABLE A1 (continued)

Precautions
- Avoid surgical irritation
- Avoid ambulation to fatigue
- No pivoting during ambulation
- Avoid excessive hip flexion (limit straight-leg raises)
- No extreme combined ROM (eg, flexion/IR, flexion/ER)
- Limit ROM beyond 90° of flexion
- Weightbearing per surgeon's guidelines (avoiding lurching of pelvis)
- Functional ROM per surgeon's guidelines
- Premature discharge of assistive device. Continue to use assistive device until nonantalgic gait
- Faulty movement patterns, posture
- Capsular and soft tissue irritation

Phase 2 (Surgery to 6 wk)

Criteria for Advancement
- Control of pain
- ROM within functional limits
- Ascend/descend 8-in step with good pelvic control
- Good pelvic control during single-limb stance
- Normalized gait without an assistive device
- No active hip flexion until pain subsides

Phase 3 (6 to 10 wk)

Goals
- Normalize gait without an assistive device
- Independent home-exercise program
- Optimize ROM
- LE strength $\geq$4 out of 5, trunk strength $\geq$3 out of 5
- Good, dynamic balance
- Pain-free ADL
- Pain-free hip flexion

Precautions
- Symptom provocation
- Ignoring functional progression
- Overexertion/inflammation

Criteria for Advancement
- Pain-free ROM within normal limits
- Alternate ascend/descend 8-in step with good pelvic control and no UE support
- Good pelvic control during single-limb stance and dynamic balance
- Normalized gait pain free without an assistive device
- No pain at rest, ADL/IADL, or walking

Phase 4 (10 wk to 4 mo)

Goals
- Independent home-exercise program
- Optimize ROM
- LE strength $\geq$4 out of 5, trunk strength $\geq$3 out of 5
- Good, dynamic balance
- Pain-free ADL
- Pain-free hip flexion

Precautions
- Symptom provocation
- Ignoring functional progression
- Sacrificing quality for quantity

(continued)

TABLE A1 (continued)

Criteria for Advancement
- Gluteal strength and core trunk strength to maintain pelvic control
- Pain score 0 out of 10 with advanced activities
- Normal ROM

Phase 5 (4 to 6 mo)

Goals
- Independent home-exercise program
- Optimize ROM
- LE strength 5 out of 5, trunk strength $\geq$4 out of 5
- Normal muscle length
- Good, dynamic balance with unilateral and bilateral LE
- Pain-free with all activities

Phase 5 (4 to 6 mo)

Precautions
- Symptom provocation
- Sacrificing quality for quantity

[a]ADL, activities of daily living; ER, external rotation; IADL, instrumental activities of daily living; IR, internal rotation; LE, lower extremity; ROM, range of motion; PT, physical therapy; UE, upper extremity.