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Transition to Telehealth Physical Therapy After Hip Arthroscopy for Femoroacetabular Impingement

A Pilot Study With Retrospective Matched-Cohort Analysis

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Background: Telehealth use has increased significantly of late. However, outside of total hip and knee arthroplasty, there is minimal evidence regarding its efficacy in orthopaedics and postoperative rehabilitation.

Purpose: To determine the efficacy and cost-effectiveness of a transition to postoperative telehealth physical therapy in patients undergoing hip arthroscopy for femoroacetabular impingement (FAI).

Study Design: Cohort study; Level of evidence, 3.

Methods: Included were 51 patients undergoing postoperative physical therapy after hip arthroscopy for FAI. The intervention group consisted of patients undergoing initial in-person visits followed by a transition to telehealth physical therapy for 3 months postoperatively (group 1; n = 17). Comparison groups included patients undergoing in-person physical therapy with the same physical therapy team as the telehealth group (group 2; n = 17) and patients undergoing in-person therapy with a different therapy team at the same facility (group 3; n = 17). All groups were matched 1-to-1 by patient age and sex. All patients completed the short version of the International Hip Outcome Tool (iHOT-12) both preoperatively and at 3 months postoperatively. At 3 months postoperatively, it was determined whether patients met the minimally clinically important difference (MCID; ≥13 points) or substantial clinical benefit (SCB; ≥28 points) or whether they reached a Patient Acceptable Symptomatic State (PASS; ≥64 points). Billed charges were recorded as a measure of cost.

Results: The overall mean age of the study patients ranged from 33 to 34 years. Among the 3 groups, there was no significant difference in the preoperative, postoperative, or pre- to postoperative change in iHOT-12 scores or in the percentage of patients meeting MCID, SCB, or PASS at 3 months. Group 1 had significantly lower mean costs ($1015.67) compared with group 2 ($1555.62; $P = .011$) or group 3 ($1896.38; $P < .001$).

Conclusion: In this pilot study, telehealth physical therapy after hip arthroscopy was found to lead to similar short-term outcomes and was cost-effective compared with in-person physical therapy.

Keywords: telehealth; hip arthroscopy; femoroacetabular impingement; postoperative physical therapy; value-based health care

The treatment of femoroacetabular impingement (FAI) is evolving. Surgical techniques have progressed significantly since FAI was described in the late 1990s.[2] Hip arthroscopy is now the most common technique used to treat FAI.[2] In addition, understanding of the underlying muscular deficits in young patients with hip pain has increased, and in turn, physical therapy for the treatment of hip pain in young adults has evolved over the same time period.[5,10] Recent protocols focus on core and closed chain hip exercises as the foundation of a program for conservative care as well as postoperative rehabilitation.[4,10]

Telehealth has become more widespread in clinical practice over the past decade as well. However, it has been slow to find its role in our health care system and has been most commonly used in rural areas where availability of care is sparse. The benefits of telehealth include a potential for decreased cost and increased patient convenience compared with the in-clinic setting. In physical therapy specifically, there have been multiple hurdles that have stood in the way of widespread telehealth usage.[8] These include the

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reliability of physical assessments performed over video platforms, payment policy barriers, and licensing roadblocks.[7,8] There are limited studies on the efficacy and cost-effectiveness of physical therapy in orthopaedic rehabilitation. Most of the literature focuses on total hip and knee arthroplasty, whereby a few randomized controlled studies report that telehealth physical therapy is noninferior to in-person physical therapy, with a potential for decreased cost, especially in patients who need to travel for their care.[12,13,19,21]

The COVID-19 pandemic has necessitated a rapid shift in the way that we practice medicine and physical therapy.[18] Payers have rapidly changed policies related to payment for telehealth services.[18] For the safety of patients and practitioners, we have seen a rapid increase in the use of telehealth services. However, this has mostly occurred alongside a vacuum of medical evidence as to the efficacy of the use of telehealth services when it comes to physical therapy. Before this rapid transition, our clinic had shifted some patients' postoperative physical therapy to telehealth services after hip arthroscopy for FAI. Therefore, we wanted to determine whether these patients had similar short-term clinical outcomes after hip arthroscopy for FAI and whether there were cost savings for patients who transitioned to telehealth services for postoperative physical therapy. We hypothesized that the patients who transitioned to telehealth physical therapy would have decreased costs without a change in clinical outcomes in the short term.

METHODS

Study Design

This study received institutional review board approval and used a matched-cohort design that consisted of 3 groups. Patients were selected from a prospectively collected outcomes cohort (2013 to 2019) that was approved for retrospective analysis at a tertiary referral center for hip preservation. Inclusion criteria for the intervention group (group 1) were patients who underwent hip arthroscopy for FAI by a single surgeon (H.S.W.) and had transitioned to telehealth physical therapy by the same physical therapy team (B.S.H. and J.D.M.). Exclusion criteria included patients who had psoas release or microfracture as well as those who did not have pre- or postoperative (3-month) 12-item International Hip Outcome Tool scores (iHOT-12). A total of 17 patients met the criteria. These patients were then matched at a 1-to-1 ratio with 2 control groups based on patient age (±1 year) and sex (Figure 1).

Group 2 consisted of patients who underwent hip arthroscopy for FAI by the same surgeon (H.S.W.) and received in-person physical therapy by the same physical therapy team at the same facility (B.S.H. and J.D.M.). Group 3 consisted of patients who underwent hip arthroscopy for FAI by the same surgeon and had in-person physical therapy from a different physical therapy team but followed the same postoperative protocol at the same facility.

Physical Therapy

The physical therapy protocol is detailed in the Appendix (available online as supplemental material). It was created based on available evidence and expert opinion in treating FAI patients postoperatively. It concentrated on a foundation of guided exercise while minimizing in-person visits and focusing on a home exercise program with in-person visits to guide exercise progressions. All patients had a minimum of 2 in-person physical therapy visits at 2 weeks and 3 months after surgery, where they were seen by the surgeon and physical therapist, and radiographs were obtained in the clinic. The physical therapy program followed by all groups consisted of 2 weeks of 50% partial flat-foot weightbearing, followed by weightbearing with crutches as tolerated for 2 weeks. The home exercise program started in the first few days after surgery with gluteus maximus and quadriceps isometrics and bridges. Patients were advised to use a stationary bike without resistance as tolerated after surgery.

In-person physical therapy started at 1 week postsurgically and consisted of isometrics and bridging to work on core and hip muscle activation for the first 6 weeks. After 6 weeks postsurgically, the program progressed to more dynamic strengthening movements that concentrated on core stability and closed-chain, hip-strengthening exercise. In addition, resistance was added to the stationary bike, and patients began using the elliptical. At 3 months, if patients had good core stability and strength, a walk/jog with a progression to running was initiated. Patients' earliest return to sport was at 4 months postoperatively, with return to sport determined by symmetric strength and coordination, including the Plyo Press Power Quotient, 1-minute timed single-leg jump rope, 1-minute timed single-leg dips, 1-minute timed single-leg lateral jumps,

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Ethical approval for this study was obtained from Intermountain Healthcare Research (ref No. 018045).

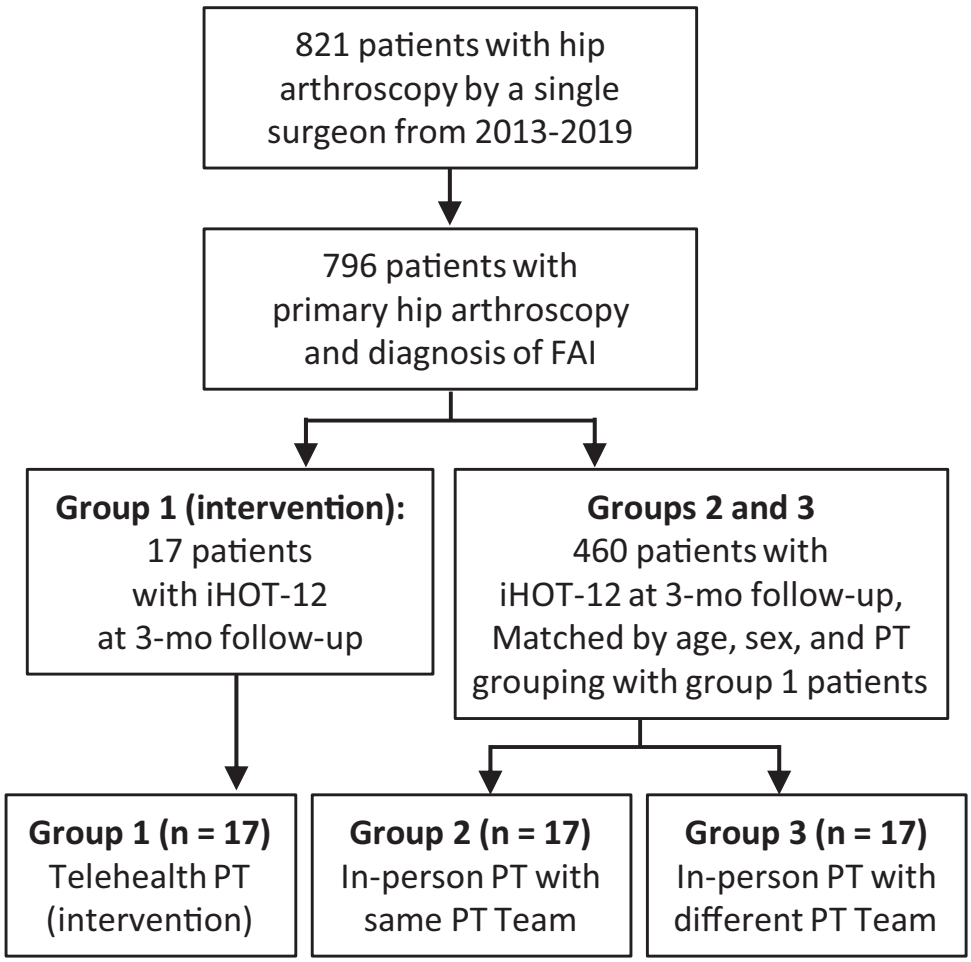

Figure 1. Flowchart of patient selection for the study. FAI, femoroacetabular impingement; iHOT-12, 12-Item International Hip Outcome Tool; PT, physical therapy.

and the single-leg hop test, with a goal of 90% symmetry between sides on all tests. Modalities and billing for these services was at the discretion of the physical therapy team. In patients who transitioned to physical therapy (group 1), the telehealth visits consisted of up to 22 minutes of guided exercise program, with appropriate exercise progressions through the American Well platform, a privacy-protected telehealth portal.

Outcome Measures

The number of in-person physical therapy visits were recorded for each group, with all patients having a minimum of 2 visits at 2 weeks and 3 months. All patients had an iHOT-12 score collected both preoperatively and at the 3-month postoperative time point. The delta between the 2 measurements was calculated to determine improvement after surgery. Prior published iHOT-12 values for 1-year outcome were used to gauge patients who met a minimal clinically important difference (MCID) of $\geq$13 points,[9,16] substantial clinical benefit (SCB) of 28 points,[9] and a Patient Acceptable Symptomatic State (PASS) of $\geq$64 points.[16] Complications and revision surgeries were recorded in the 3-month follow-up period.

Cost Analysis

For in-person physical therapy visits, billed charges were used to determine the cost. For telehealth physical therapy visits, all sessions consisted of up to 22 minutes of guided exercises and progressions without modalities, so they were billed as 1 therapeutic exercise unit. For cost-analysis purposes, a single therapeutic exercise unit was billed at $93.29 (2019 USD), which is the same charge used for the in-person therapy at the facility where all groups had their in-person visits. Total costs for the 3-month episode of care were calculated as the sum of the billed in-person charges and the telehealth appointment charges.

Statistical Analysis

Continuous variables were tested for normal distribution by the Shapiro-Wilk test and are reported with mean and standard deviation or standard error. Differences among

TABLE 1
Intraoperative Procedures Performed in Each Group

	Group 1 (%)	Group 2 (%)	Group 3 (%)
Femoroplasty	100	94	100
Labral repair	47	47	82
Chondrolabral debridement	35	29	0
Acetabuloplasty or subspine decompression	35	47	47

TABLE 2
Patient Reported Outcomes (iHOT-12) Between Groups[a]

	Group 1	Group 2	Group 3	*P* Value
iHOT-12, mean (SE)				
Preoperative	41.6 (4.6)	42.2 (4.4)	38.3 (3.9)	.592
Postoperative	66.6 (5.6)	69.6 (4.1)	59.1 (4.7)	.328
$\Delta_{\text{pre-post}}$	24.9 (5.5)	27.3 (3.5)	20.7 (5.9)	.619
MCID, %	71	88	53	.105
SCB, %	35	53	35	.500
PASS, %	65	65	47	.526

[a]Data are presented as mean and SD or standard error. iHOT-12, 12-Item International Hip Outcome Tool; MCID, minimally clinically important difference (defined as ≥13 points); SCB: substantial clinical benefit (defined as ≥28 points); PASS, Patient Acceptable Symptomatic State (defined as final iHOT-12 score of ≥64); Δpre-post, difference between the preoperative and postoperative value.

the 3 matched cohorts were determined for continuous variables by a repeated measures analysis of variance. Pairwise comparisons were completed with adjustment for multiple comparisons using the least significant difference test. Categorical variables were tested for statistical difference between matched groups by the Cochran Q test. $P < .05$ was considered significant.

RESULTS

Identified were 17 patients who transitioned to telehealth for physical therapy after hip arthroscopy. There were 51 patients in the study, with 17 matched patients in each of the 3 groups (Figure 1). There were 10 male (59%) and 7 female (41%) patients in each group. The age range was between 15 and 53 years, and there were no statistically significant age differences between the groups (mean age ± SD: 33.94 ± 10.4 years [group 1]; 33.8 ± 10.3 years [group 2]; and 33.5 ± 10.2 years [group 3]; $P > .05$). Procedures performed in each group are shown in Table 1.

There was no difference in preoperative, postoperative, or the change in iHOT 12 (Table 2). All groups had a significant improvement in iHOT-12 from preoperatively to the 3-month postoperative evaluation. There was no difference in the proportion of patients who achieved MCID of ≥13 points, SCB of ≥28 points, or a PASS of ≥64 points (Table 2).

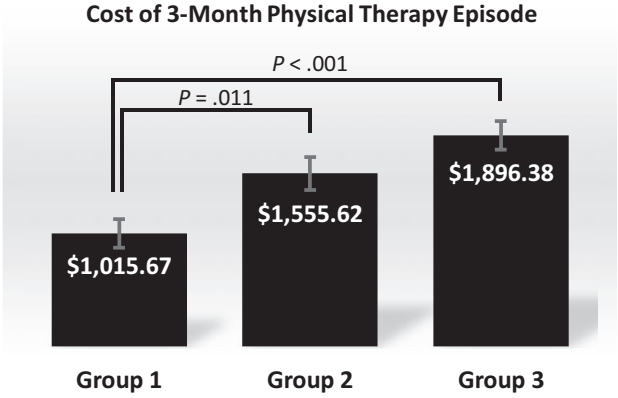

Figure 2. Cost of a 3-month episode of physical therapy care by group (in 2019 USD). Error bars represent standard error.

There were no recorded complications, revisions, or arthroplasties in the 3-month follow-up period.

Looking at utilization and cost, there was a mean (±SD) of 3.7 ± 1.3 in-person visits in group 1 compared with 6.5 ± 1.4 in group 2 and 6.8 ± 1.6 in group 3 in the 3-month period (both $P < .001$). In turn, there was also a decreased cost of physical therapy for the entire 3-month episode of care in group 1 ($1015.67; standard error [SE], $127.66) compared with group 2 ($1555.62; SE, $147.93; $P = .011$) and group 3 ($1896.38; SE, $127.75; $P < .001$). There was no difference in cost between groups 2 and 3 ($P = .089$) (Figure 2).

DISCUSSION

The most important findings from this pilot study were that the patient-reported outcomes were similar and that the total cost of physical therapy was lower in the group that transitioned to telehealth compared with the control groups that underwent only in-person therapy. This is the first study, to our knowledge, on the transition to telehealth physical therapy for postoperative physical therapy after hip arthroscopy for FAI.

Until recently, telehealth implementation has been slow in the United States.[8] Traditionally, it is more commonly used in rural areas, where, without it, there is a significant barrier to care.[14,20] The reasons for this slow adoption are mostly due to payment policy and licensing barriers to implementation.[8,14] However, with the COVID-19 pandemic, there has been a rapid shift to telehealth services across medicine and therapy despite minimal evidence of efficacy.[18] The current study was performed at a tertiary hip preservation center and therefore represents a patient population that travels significant distances for hip arthroscopy. A telehealth physical therapy program was implemented as part of physical therapy protocols, commonly serving patients who live long distances from their health providers. We present a retrospective matched cohort analysis showing similar iHOT-12 scores at 3

months in our patients undergoing a transition to telehealth physical therapy in the early postoperative period. This is similar to prior randomized studies in total hip and knee arthroplasty where functional scores between 6 weeks and 4 months after surgery were noninferior between patients with telehealth or in-person physical therapy.[12,13,19] This should give clinicians some comfort that the rapid transition to telehealth physical therapy during our current health crisis may not affect short-term patient outcomes from FAI surgery.

This study has further implications as we transition to a more value-based model of medical and orthopaedic care.[15,17] It shows a significant decrease in the cost of physical therapy services in the first 3 months after surgery compared with the groups that participated in the in-person physical therapy with equivalent short-term outcomes. It should be noted that all groups were using a protocol that minimized in-person physical therapy visits, with groups 2 and 3 utilizing only in-person visits a mean of once every 2 weeks. Therefore, protocols using more in-person visits could potentially see a larger decrease in costs. These cost findings are similar to the prior studies of total knee arthroplasty showing noninterior short-term outcomes of telehealth compared with in-person physical therapy and a decreased cost for telehealth.[12,13,19,21] A decrease in cost with similar outcomes increases the value of the care provided in this model. With the transition to bundled payments and accountable care organizations, there is a constant pressure to decrease the cost of our postoperative care.[11,15] Interestingly, 2 of the earlier adopters of telehealth services have been Kaiser-Permanente and the Veterans Affairs Medical Centers, 2 health systems that function as accountable care organizations as either their own payer or as a part of the federal budget.[3,6] This suggests that they identified telehealth early on as a way to help control costs and provide convenience in patient care. Further studies looking at telehealth as an avenue for providing postoperative physical therapy after orthopaedic surgery are needed and could provide significant cost savings as we transition to more value-based care and risk-based compensation contracts.

There are significant limitations in this study. The sample size was small; thus, larger studies are needed to determine whether the preliminary conclusions from this study can be proven in large cohorts. It is possible that our study was underpowered to detect differences in some outcome measures. There was a selection bias, given the retrospective study design. Patients were not randomized to the assigned groups. We partially addressed this bias by matching the groups to within 1 year in age, by sex, and by having patients with the primary diagnosis of FAI. Patients were offered a transition to telehealth services as part of their postoperative therapy, so there was a bias in which patients elected to transition to telehealth. These patients may have traveled long distances to receive care. However, distance traveled for surgery may not affect outcomes after hip arthroscopy.[1] We were unable to match for socioeconomic status, and therefore, this may confound our results. The study also represents a short-term follow-up. This follow-up time point is similar to prior published orthopaedic studies of telehealth physical therapy interventions that have focused on clinical outcomes between groups at the 6-week to 4-month postoperative timepoints.[12,13,19,21] In hip arthroscopy, many patients are starting to transition to more of a home- or gym-based strengthening program at the 3-month time point, so we believe that this is an appropriate time point for the evaluation of clinical outcome from postoperative therapy and represents a partial recovery from surgery. We cannot comment on later outcomes from surgery. Therefore, longer-term studies are needed to determine the effect of telehealth physical therapy on outcomes of these patients at mid- and long-term time points after surgery.

CONCLUSION

In this pilot study, telehealth physical therapy after hip arthroscopy was found to lead to similar short-term outcomes and was cost-effective compared with in-person physical therapy. Further prospective studies, longer follow-ups, and studies consisting of no in-person visits will be needed to further understand the efficacy and cost-effectiveness of telehealth physical therapy in patients after undergoing hip arthroscopy for FAI.

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