Clinical Sports Medicine Update

Outcomes of Hip Arthroscopic Surgery in Adolescents With a Subanalysis on Return to Sport

A Systematic Review

Sarah L. Chen,*† BA, David R. Maldonado,* MD, Cammille C. Go,* BS, Cynthia Kyin,* BA, Ajay C. Lall,* MD, MS, and Benjamin G. Domb,*‡ MD
Investigation performed at the American Hip Institute, Des Plaines, Illinois, USA

Background: There is a plethora of literature on outcomes after hip arthroscopic surgery in the adult population; however, outcomes in the adolescent population have not been as widely reported. Additionally, as adolescents represent a very active population, it is imperative to understand their athletic activity and return to sport after hip arthroscopic surgery.

Purpose: To analyze patient-reported outcomes (PROs) after hip arthroscopic surgery in adolescents (aged 10-19 years) and present a return-to-sport analysis in the athletic adolescent subgroup.

Study Design: Systematic review; Level of evidence, 4.

Methods: The PubMed, Embase, and Cochrane databases were searched according to the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines to identify articles that reported PROs after hip arthroscopic surgery in adolescents. The standardized mean difference was calculated to compare the effect size of hip arthroscopic surgery on various PROs. For the athletic subgroup, a return-to-sport summary was also provided.

Results: Ten studies, with 618 adolescent hips and a collective study period of December 2004 to February 2015, were included in this systematic review. Across all studies, the mean age was 15.8 years (range, 11.0-19.9 years), and female patients composed approximately 56.7% of the entire cohort. The mean follow-up was 34.5 months (range, 12-120 months). The modified Harris Hip Score (mHHS) was reported in 9 studies, and at latest follow-up, scores were excellent in 4 studies (range, 90-95) and good in the remaining 5 studies (range, 82.1-89.6). All adolescents also showed significant improvement on the Non-Arthritic Hip Score (NAHS), the Hip Outcome Score–Activities of Daily Living (HOS-ADL), the HOS–Sport-Specific Subscale (HOS-SSS), the physical component of the 12-Item Short Form Health Survey (SF-12P), a visual analog scale for pain (VAS), and both versions of the International Hip Outcome Tool (iHOT-12 and iHOT-33) at latest follow-up ($P < .05$). Further, mean improvements reported in all studies surpassed reported values of the minimal clinically important difference and patient acceptable symptomatic state for the mHHS, HOS-ADL, HOS-SSS, and iHOT-33. Finally, the collective return-to-sport rate among athletic adolescents was 84.9%.

Conclusion: In the setting of labral tears and femoroacetabular impingement, hip arthroscopic surgery can safely be performed in adolescents and leads to significant functional improvement. Furthermore, athletic adolescents return to sport at high levels after hip arthroscopic surgery.

Keywords: femoroacetabular impingement; labral tear; hip arthroscopic surgery; adolescent; return to sport

As hip arthroscopic surgery continues to be a successful procedure in treating femoroacetabular impingement (FAI) and labral tears, the number performed in the young active population continues to rise.[38,50,55] There is a plethora of literature on outcomes after hip arthroscopic surgery in the adult population; however, outcomes in the adolescent population have not been as widely reported. Whether hip arthroscopic surgery should be performed in skeletally immature patients remains debatable. Adolescents possess smaller joint spaces and a different vascular supply; as such, complications after hip arthroscopic surgery in this patient population include slipped capital femoral epiphysis, proximal femoral physeal separation, growth disturbance, neurapraxia, and infections.[13,43] However, there is a growing body of literature that has shown that hip arthroscopic surgery can effectively treat labral tears and symptomatic FAI in adolescents.[5,32,41,54] Studies investigating the bony morphology of adolescents have found that cam-type

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(deformity at the head-neck junction) or pincer-type (deformity of the acetabular rim) FAI can occur in early adolescence.[30,37] Furthermore, high-impact and cutting sports may contribute to the development of cam-type FAI in adolescents.[2,3,14,20,49] Adolescents, generally defined as patients aged 10 to 19 years,[1] are an active population, and their athletic activity and return to sport after hip arthroscopic surgery warrant further investigation. The purpose of this systematic review was to analyze patient-reported outcomes (PROs) after hip arthroscopic surgery in adolescents and present a return-to-sport analysis in the athletic adolescent subgroup.

METHODS

Study Selection

In April 2019, the PubMed, Embase, and Cochrane databases were searched to identify articles that reported outcomes after hip arthroscopic surgery in adolescents. The search was performed in accordance with the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses)[36] guidelines and utilized the following keywords: hip arthroscopy, femoroacetabular impingement, labral tear, and adolescent.

Two reviewers (S.L.C. and D.R.M.) examined the titles and abstracts before selecting articles for a full-text review. The bibliographies of all reviewed articles were also referenced for additional studies. Articles were included in our analysis if they included PROs after hip arthroscopic surgery in adolescents. Articles were excluded if they did not meet the abovementioned inclusion criteria or were composed of overlapping patient populations. Additionally, abstracts, case reports, review articles, technical notes, and cadaveric studies were excluded. We reviewed the selected studies for patient demographics, mean follow-up, surgical indications, physical examination findings, PRO scores, return-to-sport findings, subsequent surgical procedures, and complications.

Quality Assessment

Two authors (S.L.C. and D.R.M.) separately assessed each selected article using the validated Methodological Index for Non-Randomized Studies (MINORS) criteria.[51] This scoring system was used to generate a numerical score for each article based on the study's purpose, data collection process, endpoints, follow-up rate, and statistical analysis. There were no cases of disagreement between the 2 authors in MINORS scoring.

Statistical Analysis

For studies that reported preoperative PRO scores, postoperative PRO scores and a measure of dispersion of the data, the standardized mean difference (SMD), was calculated to estimate the effect size of hip arthroscopic surgery on select PROs. The SMD was calculated by the method described by Griffin et al,[21] and if the SD of the respective preoperative PRO score was not provided, it was approximated by using the range[24] or the 95% CI.[23] The effect sizes were analyzed using the established threshold values for weak (SMD, 0.20-0.49), moderate (SMD, 0.50-0.79), and large (SMD $\geq$0.80).[9]

Additionally, if available, return to sport after arthroscopic surgery was summarized with the return-to-sport rate, sport type, and reasons for not returning to sport. The collective return-to-sport rate was calculated by weighting each study's return-to-sport rate by the number of hips in each study.

RESULTS

Study Selection

The literature search yielded a total of 1079 articles, with 780 unique articles. After reviewing the full text of 18 studies, 8 studies were excluded for the following reasons: 2 were review articles, 2 reported on the nonoperative management of FAI or labral tears, 1 reported on arthroscopic and open cases, and 3 consisted of overlapping patient populations. Ten studies, with 618 hips and a collective study period of December 2004 to February 2015, were included in our systematic review.[§] Our search strategy is illustrated in Figure 1.

[§]References 6, 8, 11, 12, 19, 35, 39, 41, 46, 54.

[‡]Address correspondence to Benjamin G. Domb, MD, American Hip Institute, 999 East Touhy Avenue, Suite 450, Des Plaines, IL 60016, USA (email: DrDomb@AmericanHipInstitute.org) (Twitter: @Hip_Institute).

*American Hip Institute, Des Plaines, Illinois, USA.

[†]Sidney Kimmel Medical College at Thomas Jefferson University, Philadelphia, Pennsylvania, USA.

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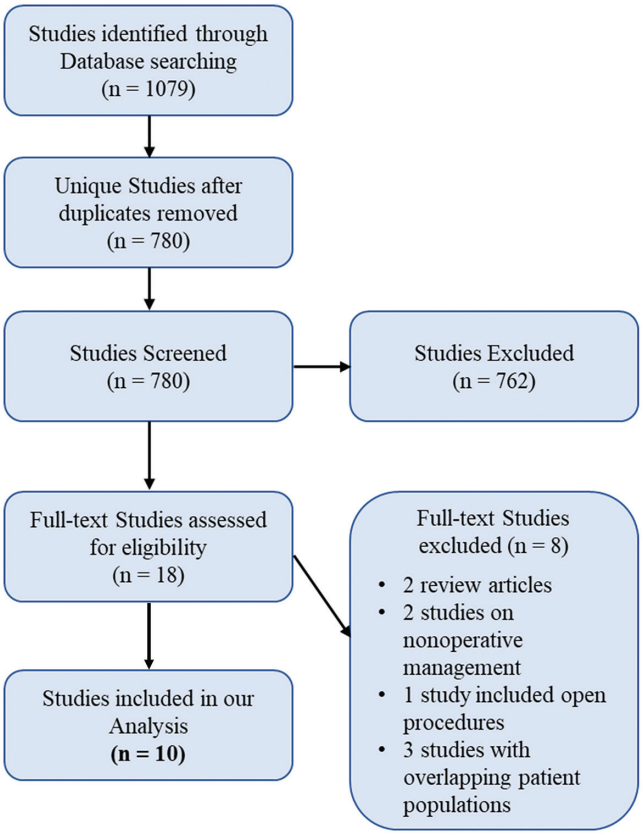

Figure 1. Search strategy, based on the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines.

Patient Demographics and Indications for Surgery

Across all studies, the mean age was 15.8 years (range, 11.0-19.9 years), and female patients composed approximately 56.7% of the entire cohort. All patients underwent hip arthroscopic surgery for the treatment of labral tears or FAI, and the majority of studies cited the adolescents' hips being refractive to nonoperative management (activity modification, physical therapy, injections) as the main indication for surgery.[6,8,11,19,35,39,54] The mean follow-up was 34.5 months (range, 12-120 months), with all studies reporting a minimum 1-year follow-up. Radiographic findings were reported in all studies,[‖] and the mean preoperative alpha angle in the studies was 62.8°. Cam-type impingement was more commonly found than pincer-type impingement. Further, in 3 studies, all patients who underwent surgery had cam-type impingement, with 40.5% having concomitant cam-type and pincer-type impingement.[11,12,54] Across all studies that reported concomitant cam-type and pincer-type impingement, 64% of adolescents had combined cam and pincer impingement.[6,11,19,35,39,46,54] With regard to physical examination findings, 1 study (90 adolescents) found that female patients were more likely to have a Beighton score >4[8]; another study (60 adolescents) reported a positive impingement sign in 100% of patients and a positive flexion, abduction, and external rotation test result in 52% of patients[46]; and a separate study (41 adolescents) reported that all patients had pain with flexion, adduction, and internal rotation before surgery.[54] Further descriptive data are included in Table 1.

Patient-Reported Outcomes

In their patient populations, the selected studies used a total of 8 PROs, which included the modified Harris Hip Score (mHHS), Non-Arthritic Hip Score (NAHS), Hip Outcome Score–Activities of Daily Living (HOS-ADL), HOS–Sport-Specific Subscale (HOS-SSS), physical component of the 12-Item Short Form Health Survey (SF-12P), visual analog scale for pain (VAS), and both versions of the International Hip Outcome Tool (iHOT-12 and iHOT-33) (Table 2).

The mHHS was reported in 9 of 10 studies, and in all 9 studies, patients demonstrated statistically significant improvement ($P < .05$).[¶] Postoperative mHHS scores were excellent in 4 studies (range, 90-95)[6,41,46,54] and good in the remaining 5 studies (range, 82.1-89.6).[8,11,12,19,39] Tran et al[54] was the only study to report a mean improvement on the mHHS of <20 (delta, 16.8), but the effect size was still large (Figure 2). In this study, all patients had cam-type impingement, and a greater proportion of patients underwent labral debridement than repair (31.7% vs 17.1%, respectively).[54] Additionally, in all reviewed studies, patients exhibited improvement that surpassed values reported in the literature of the minimal clinically important difference (MCID) and patient acceptable symptomatic state (PASS) for the mHHS.[29]

Six studies utilized both subscales of the HOS (HOS-ADL and HOS-SSS), and in all 6 studies, patients experienced significant improvement at a minimum 1 year postoperatively ($P < .05$).[8,11,12,19,39,41] Furthermore, in these 6 studies, all patients achieved the MCID and PASS for the HOS-ADL (postoperative range, 87.4-95.7) and HOS-SSS (postoperative range, 79.9-91.0).[29] When compared with the HOS-ADL, patients tended to show greater improvement on the HOS-SSS.

In addition, patients in the selected studies demonstrated substantial improvement on the NAHS, iHOT-12, and iHOT-33 ($P < .05$).[8,12,35,41,54] In the 2 studies that reported preoperative and postoperative iHOT-33 scores,[12,41] all patients achieved the MCID and PASS for the iHOT-33.[34,42] Finally, Chandrasekaran et al[8] reported VAS scores, and mean pain decreased significantly ($P < .001$) from 6.07 of 10 to 2.16 of 10 postoperatively.

Return to Sport

Six studies, with a total of 317 hips, reported athletic details for their patient populations.[6,11,19,35,46,54] Among this athletic cohort, the most common sports were football, soccer, dance/gymnastics, and ice hockey (Figure 3). Three studies with 194 hips (31.4% of the entire adolescent population) reported

[‖]References 6, 8, 11, 12, 19, 35, 39, 41, 46, 54.

[¶]References 6, 8, 11, 12, 19, 39, 41, 46, 54.

TABLE 1
Characteristics of Included Studies[a]

Study	Level of Evidence	MINORS Score	No. of Hips (Sex)	Age,[b] y	Follow-up,[b] mo	Radiographic Findings[c]	Indications
Byrd et al[6] (2016)	4	15	116 (12 bilateral; 57 F/47 M)	16 (12-17)	38 (24-120)	Cam-type FAI: 33 (28.4%); pincer-type FAI: 16 (13.8%); combined-type FAI: 67 (57.8%)	Persistent symptomatic FAI unresponsive to nonoperative treatment
Chandrasekaran et al[8] (2017)	4	15	90 (77 F/13 M)	16.3 (13.2-18.0)	30.6 (24.1-60.0)	Alpha angle: 59.5; femoral version (F/M): 15.7/11.3	Minimum 6 wk of nonoperative management including physical therapy or activity modification
Cvetanovich et al[11] (2018)	4	14	37[d] (26 F/11 M)	17.0 ± 1.4	28.3 ± 6.2	Alpha angle (bilateral vs unilateral): 63.4 ± 8.9 vs 57.8 ± 6.6, respectively (P = .01)	Failure of nonoperative management
Degen et al[12] (2017)	3	17	38 (4 bilateral; 16 F/18 M)	16 (13-17)	34.1 ± 11.0 (24.0-77.4)	Alpha angle: 65.2 ± 7.1; femoral version: 15.6 ± 7.9	NR
Fabricant et al[19] (2012)	4	9	27 (6 bilateral; 9 F/12 M)	17.6 (14.5-19.9)	18 (12-30)	Alpha angle (preoperative vs postoperative): 64 ± 16 vs 40 ± 5, respectively	6 mo of nonoperative treatment
McConkey et al[35] (2017)	2	20	36 (12 bilateral; 14 F/10 M)	Bilateral: 15.7 ± 1.4; unilateral: 16.5 ± 1.9	Minimum: 12	Cam-type FAI (bilateral vs unilateral): 20.8% vs 33.3%, respectively; pincer-type FAI: 12.5% vs 16.6%, respectively; combined-type FAI: 66.7% vs 50.0%, respectively	Refractory to nonoperative management
Newman et al[39] (2016)	3	18	42 revision; 84 primary	16 (14-18)	Primary: 45 ± 18; revision: 43 ± 17	Alpha angle (primary vs revision): 68 ± 14 vs 64 ± 20, respectively; lateral CEA: 33 ± 9 vs 32 ± 7, respectively	Refractory to nonoperative management
Nwachukwu et al[41] (2017)	4	12	47 (32 F/15 M)	16.5 ± 1.1	12	Alpha angle: 57.0 ± 12.4; sagittal CEA: 58.2 ± 9.7; coronal CEA: 31.2 ± 6.5	NR
Philippon et al[46] (2012)	4	14	60 (43 F/17 M)	15 (11-16)	36 (24-60)	Lateral CEA: 36 (95% CI, 34-38); alpha angle: 64 (95% CI, 60-69)	NR
Tran et al[54] (2013)	4	12	41 (7 bilateral; 5 F/29 M)	15.7	14 (12-24)	Cam-type FAI: 100%; pincer-type FAI: 22%	Cam-type FAI and refractory to nonoperative treatment for at least 6 mo

[a]CEA, center edge angle; F, female; FAI, femoroacetabular impingement; M, male; MINORS, Methodological Index for Non-Randomized Studies; NR, not reported.
[b]Data are reported as mean, mean ± SD, or mean (range) unless otherwise indicated.
[c]Data are reported as mean ± SD unless otherwise indicated. Alpha angle, lateral CEA, sagittal CEA, and coronal CEA are all in degrees.
[d]Ten bilateral cases.

return to sport, and the collective return-to-sport rate was 84.9%, with all 3 studies individually having >75% return to sport at latest follow-up.[6,11,54] Cvetanovich et al[11] reported that 23 of 26 (90%) adolescents returned to sport within 6 months of their surgery. Further, McConkey et al[35] found a similar return rate and time to return in patients who underwent bilateral hip arthroscopic surgery compared with those who underwent unilateral hip arthroscopic surgery. Adolescent athletes who did not return to sport after surgery cited hip symptoms, loss of interest, and completion of high school career as reasons for not returning to play.[6]

Reoperations and Complications

The number of revision surgical procedures and complication rates are shown in Table 3. There were 3 cases of pudendal neurapraxia[6,11] and 2 cases of lateral femoral

TABLE 2
Patient-Reported Outcomes in Included Studies[a]

	mHHS			HOS				NAHS				iHOT				VAS		
Study	Preop	Postop	*P* Value		Preop	Postop	*P* Value	Preop	Postop	*P* Value		Preop	Postop	*P* Value	Preop	Postop	*P* Value
Byrd et al[6] (2016)	69	95	<.001														
Chandrasekaran et al[8] (2017)	64.5	89.6	<.001	ADL	66.1	92.1	<.001	65.3	89.9	<.001					6.07	2.16	<.001
				SSS	46.6	80.4	<.001										
Cvetanovich et al[11] (2018)	58.1	82.1	<.001	ADL	66.3	92.2	<.001										
				SSS	45.9	86.9	<.001										
Degen et al[12] (2017)	63.8	86.0	<.001	ADL	74.5	93.1	<.001				33	43.1	73.6	<.001			
				SSS	52.2	85.7	<.001										
Fabricant et al[19] (2012)	67	88	<.001	ADL	77	92	<.001										
				SSS	49	82	.001										
McConkey et al[35] (2017)											12	All had significant improvement ($P < .05$)					
Newman et al[39] (2016)[b]	57.5	84.2	<.05	ADL	65.8	87.4	<.05										
				SSS	46.3	79.9	<.05										
Nwachukwu et al[41] (2017)	61.6	90.0	<.001	ADL	72.3	95.7	<.001				33	40.6	84.6	<.001			
				SSS	55.2	91.0	<.001										
Philippon et al[46] (2012)	57	91	<.001														
Tran et al[54] (2013)	77.4	94.2	<.0005					76.3	93.2	<.0005							

[a]HOS-ADL, Hip Outcome Score–Activities of Daily Living; HOS-SSS, Hip Outcome Score–Sport-Specific Subscale; iHOT-12, short version of International Hip Outcome Tool; iHOT-33, International Hip Outcome Tool–33; mHHS, modified Harris Hip Score; NAHS, Non-Arthritic Hip Score; postop, postoperative; preop, preoperative; VAS, visual analog scale for pain.
[b]Primary cases only.

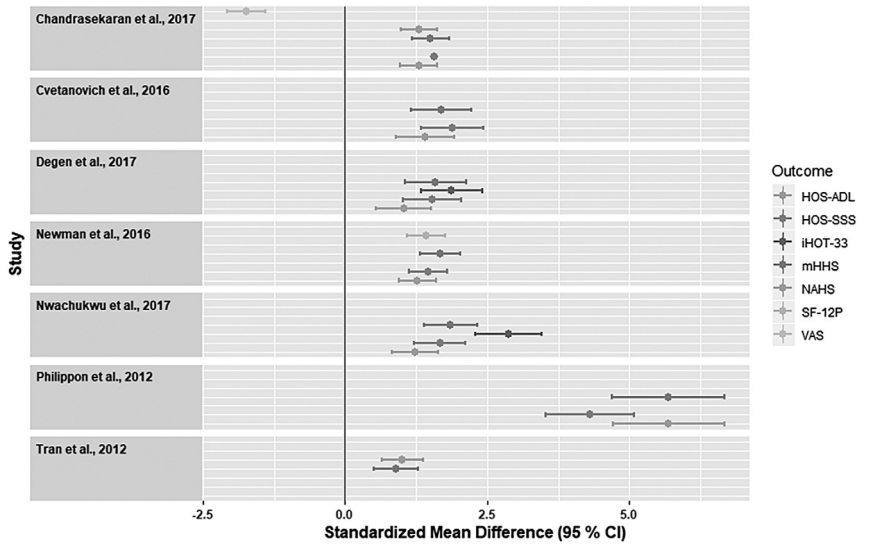

Figure 2. Standardized mean difference with 95% CI. HOS-ADL, Hip Outcome Score–Activities of Daily Living; HOS-SSS, Hip Outcome Score–Sport-Specific Subscale; iHOT-33, International Hip Outcome Tool–33; mHHS, modified Harris Hip Score; NAHS, Non-Arthritic Hip Score; SF-12P, physical portion of 12-Item Short Form Health Survey; VAS, visual analog scale for pain.

cutaneous nerve palsy,[35] and 1 patient required oral antibiotics for portal site wound dehiscence.[11] In total, 19 (3.1%) patients underwent subsequent revision arthroscopic surgery.

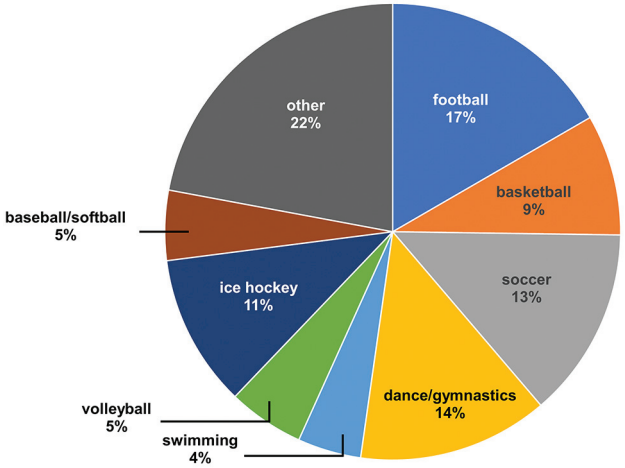

Figure 3. Sport breakdown in athletic adolescent population.

TABLE 3
Revisions and Complications in Select Studies

Study	Revisions/Complications
Byrd et al[6] (2016)	2 (1.7%) cases of transient pudendal neurapraxia; 4 (3.4%) patients required revision arthroscopic surgery (average age, 16 y)
Chandrasekaran et al[8] (2017)	5 (5.6%) patients required revision arthroscopic surgery (average age, 16.9 y)
Cvetanovich et al[11] (2018)	1 (2.7%) case of pudendal neurapraxia; 1 (2.7%) patient required oral antibiotics for portal site wound dehiscence
Degen et al[12] (2017)	2 (5.3%) patients required revision arthroscopic surgery
McConkey et al[35] (2017)	2 (5.6%) cases of lateral femoral cutaneous nerve palsy
Philippon et al[46] (2012)	8 (13%) patients required revision arthroscopic surgery

DISCUSSION

Adolescents demonstrated statistically ($P < .05$) and clinically significant improvement on all 8 PROs used in the reviewed studies: mHHS, NAHS, HOS-ADL, HOS-SSS, SF-12P, iHOT-12, iHOT-33, and VAS. Furthermore, the mean improvement in all adolescents surpassed the values of the MCID and PASS reported in the literature for the mHHS, HOS-ADL, HOS-SSS, and iHOT-33.[29,34,42] Finally, the adolescent athletic subgroup (194 hips) returned to sport at high levels after hip arthroscopic surgery, with a collective return-to-sport rate of 84.9%.

Although hip arthroscopic surgery allows for a quicker recovery time compared with open procedures, its application to skeletally immature adolescents remains controversial.[6,26,32,54] Studies have suggested the possible recurrence of cam deformity in adolescents after femoroplasty or femoral neck fractures.[25,28] However, Perets et al[44] demonstrated that bony regrowth does not occur in skeletally immature patients at 2-year follow-up. Two of our reviewed studies included patients with open growth plates at the time of surgery.[46,54] For patients with open growth plates, Philippon et al[46] performed focal osteoplasty on the femoral head-neck junction, while Tran et al[54] performed all adolescent arthroscopic procedures in the same manner as adult surgery. Patients in both studies still demonstrated significant improvement on all PROs at latest follow-up. Tran et al[54] was the only study in which patients showed an improvement on the mHHS of <20 points; however, patients in this cohort had the highest preoperative mHHS scores, so the smaller delta can be attributed to the ceiling effect of the mHHS.[56] The mean age across all studies was 15.8 years; thus, we postulate that most adolescents who underwent arthroscopic surgery were close to skeletal maturity.

Multiple studies have directly compared outcomes between different age demographics.[10,15,21] Cooper et al[10] found that patients aged ≥25 years had comparable mHHS, NAHS, and Hip disability and Osteoarthritis Outcome Score scores compared with patients aged <25 years. In 1 of our selected studies, the authors found that adolescents demonstrated superior postoperative mHHS, HOS-ADL, and HOS-SSS scores compared with a nonadolescent control group with a mean age of 31 years.[12] Furthermore, the literature shows that favorable outcomes after hip arthroscopic surgery in adolescents are maintained at 5-year follow-up.[32] Hip arthroscopic surgery has also been shown to successfully treat acute or chronic adolescent injuries, as well as acetabular retroversion or borderline dysplasia in adolescents.[5,18,31]

Revision and bilateral surgical procedures were also examined in our selected studies.[35,39] With regard to revision surgery, Newman et al[39] found that 42 patients undergoing revision showed inferior postoperative PRO scores compared with 84 patients undergoing primary surgery. However, patients undergoing revision still achieved significant improvement at latest follow-up ($P < .05$).[39] This finding is consistent with the existing literature, which shows that revision surgery in adults leads to favorable outcomes, but revision surgery can be predictive of inferior postoperative outcomes.[16,40,53] In addition, the revision rate found in the present study (3.1%) is comparable with previously published revision rates.[22,55]

In our systematic review, McConkey et al[35] compared 12 patients with bilateral hip surgery to 12 with unilateral surgery and found no difference in outcomes or time to return to activity between the 2 groups. A recent study on 43 bilateral and 86 unilateral adult cases found that patients with bilateral hip surgery experienced significantly improved functional outcomes at 2 years postoperatively.[27] Patients in the bilateral group who underwent surgery more than 10 months after their initial surgery had inferior outcomes compared with those in the bilateral group who underwent subsequent surgery within 10 months of their initial surgery.[27] The time between adolescent bilateral surgical procedures in McConkey et al[35] was not reported.

There is a clear consensus in the literature that professional and recreational athletes return to sport at high rates after hip arthroscopic surgery. Multiple studies reported a return-to-sport rate of >80% in recreational and

professional athletes.[7,33,45,57] Similarly, our systematic review found a collective return-to-sport rate of 84.9% in adolescents. We suggest that in addition to favorable hip function, an adolescent's passion for the sport and the vast social benefits of returning to sport motivate an adolescent athlete to return to play.[4,47] Team sports provide an incredible platform for adolescents to achieve goals, build self-esteem, and bond with their peers. A systematic review on the psychosocial benefits of sports participation found that adolescents who engaged in sports exhibited increased confidence, emotional regulation, self-knowledge, and cooperation with peers.[17,52] The literature suggests that these health benefits are even greater in athletes who participate in team sports compared with individual sports.[4] In the present study, a majority (60%) of the adolescent athletes engaged in team sports before surgery. Thus, we postulate that the orthopaedic community's ability to successfully perform hip arthroscopic surgery in adolescents in conjunction with the inherent social aspects of sports guides many adolescent athletes back to the field.

Strengths

To our knowledge, this is the first systematic review on outcomes after hip arthroscopic surgery in adolescents with an embedded return-to-sport analysis. The sports represented in this systematic review spanned all 6 sport categories: cutting, flexibility, contact, impingement, asymmetric/overhead, and endurance.[48] In addition, we analyzed the proportion of patients who achieved the MCID and PASS for multiple validated PROs to provide clinical context. Finally, if dispersion data were available, we calculated the SMD to approximate the effect size of hip arthroscopic surgery on PROs, which addresses the varying sensitivity of multiple PROs.

Limitations

We acknowledge the heterogeneity in our studies: 6 studies reported return-to-sport details,[6,11,19,35,46,54] 1 study compared revision and primary arthroscopic surgery,[39] and 1 study compared bilateral and unilateral arthroscopic procedures.[35] There were varying definitions of "adolescent" in the reviewed studies: 7 studies included patients aged $\leq$18 years,[6,8,12,35,40,41,54] 2 studies included patients aged $\leq$19 years,[11,19] and 1 study included patients aged $\leq$16 years.[46] Given the limited data, a breakdown by sex and by sport could not be provided. Thus, we could not conclude if there are any differences between male and female patients in return-to-sport rates. In addition, most of our reviewed studies were case series by design, which limited the average level of evidence. Finally, skeletal maturity, as assessed by the status of the growth plate, was not reported in all studies.

CONCLUSION

In the setting of labral tears and FAI, hip arthroscopic surgery can safely be performed in adolescents and leads to significant functional improvement. Furthermore, athletic adolescents return to sport at high levels after hip arthroscopic surgery.

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