Systematic Review

How Much Arthritis Is Too Much for Hip Arthroscopy: A Systematic Review

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Purpose: The purpose of this study was to determine the extent of preoperative osteoarthritis (OA) that precludes benefit from hip arthroscopy by systematically reviewing the literature on hip arthroscopy in the setting of OA. **Methods:** We searched the Medline and PubMed databases using the following Medical Subject Heading terms: arthritis, osteoarthritis, chondral damage, chondral injury, chondral delamination, and hip arthroscopy. Two authors independently reviewed the literature and included articles if they were in the English language; commented on preoperative factors, parameters, physical examination, or diagnostic testing that may be evidence of cartilage damage and/or arthritis; contained outcome data on patients undergoing hip arthroscopy; and had a sample size of at least 10 patients with arthritic changes in the hip. We excluded review articles, technique articles, articles with overlapping patient populations, articles with hip arthroscopy used as an adjunct to an open procedure, articles with inflammatory and septic arthritis, and articles with a mean age younger than 18 years. **Results:** Our search identified 518 articles, of which 15 met the inclusion and exclusion criteria. Two thousand fifty-one hips underwent arthroscopy at a mean patient age of 40.2 years. Of these, 1,195 hips had signs of OA. There were 345 conversions to total hip arthroplasty/surface replacement arthroplasty. Of these patients, 274 had OA. Eight patient-reported outcome instruments were used. Factors influencing outcomes were preoperative OA, age, chondral damage, femoroacetabular impingement, and duration of symptoms. **Conclusions:** Current evidence is insufficient to define a cutoff for how much arthritis is too much for hip arthroscopy. However, this analysis shows that patients with a Tönnis grade of 1 or greater or a joint space of 2 mm or less are less likely to benefit from hip arthroscopy and more likely to require conversion to total hip arthroplasty/surface replacement arthroplasty. Postoperative scores on patient-reported outcome instruments are lower in the arthritic population at follow-up compared with their nonarthritic counterparts. **Level of Evidence:** Level IV, systematic review of Level III and IV studies.

Since its introduction in 1931 by Burman,[1] hip arthroscopy has evolved as a diagnostic and therapeutic procedure over the past few decades in treating various hip pathologies. As diagnostic skills and surgical techniques continue to improve in identifying and managing hip disorders, the indications for hip arthroscopy are expanding to treat both intra-articular and extra-articular hip pathology.[2,3] There have been numerous studies suggesting the importance of hip arthroscopy in the identification of intra-articular lesions of the hip, which can aid in the diagnosis of early osteoarthritis (OA).[4-7] However, its efficacy as a treatment option in this patient population has not been defined.[3] There may be a beneficial role for hip arthroscopy in patients with a certain level of OA, beyond which the outcomes may be less certain.

OA is the most common nontraumatic disease of the hip, with more than 285,000 total hip arthroplasties (THAs) performed each year in the United States according to the Agency for Healthcare Research and Quality. Before reaching end-stage joint degeneration and undergoing THA, patients may go through a gradual increase in symptomatology for varied amounts of time, during which hip arthroscopy may be useful in temporizing the disease process.[8] Previous literature has dismissed the use of arthroscopic lavage or debridement in the knee for OA.[9] However, there still exist clinical situations in mild to moderate OA of the knee (such as

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Table 1. Inclusion and Exclusion Criteria Used to Identify Articles for Systematic Review

Inclusion Criteria	Exclusion Criteria
English language	Review articles
Commented on preoperative factors, parameters, physical examination, or diagnostic testing that may be evidence of cartilage damage and/or arthritis	Technique articles
Contained outcome data on patients undergoing hip arthroscopy	Contained overlapping patient populations
Samples size of ≥10 patients with arthritic changes in hip	Hip arthroscopy used as an adjunct to an open procedure
	Inflammatory and/or septic arthritis
	Mean age <18 yr

mechanical derangement) that may benefit from arthroscopy.[10] Such specific scenarios in the realm of hip arthroscopy have yet to be identified.

As with any operative procedure, multiple studies emphasize the importance of proper patient selection in achieving favorable results after hip arthroscopy.[11-16] The purpose of this study was to determine the extent of preoperative OA that precludes benefit from hip arthroscopy by systematically reviewing the literature on hip arthroscopy in the setting of OA. In doing so, we hoped to refine the indications for hip arthroscopy by delineating how much OA is too much for successful arthroscopic treatment.

Methods

In May 2014 we searched the Medline and PubMed databases for articles pertaining to hip arthroscopy in the setting of arthritis. Articles were identified using the following Medical Subject Heading terms: arthritis, osteoarthritis, chondral damage, chondral injury, chondral delamination, and hip arthroscopy. Two reviewers (P.L., C.G.) independently reviewed the titles and abstracts to select relevant articles for full-text review. Articles without abstracts were chosen for full-text review by default. Both reviewers then examined the full-text articles for eligibility. Articles were included based on the following criteria: (1) they were in the English language; (2) they commented on preoperative factors, parameters, physical examination, or diagnostic testing that may be evidence of cartilage damage and/or arthritis; (3) they contained outcome data on patients undergoing hip arthroscopy; and (4) they had a sample size of at least 10 patients with arthritic changes in the hip. We excluded review articles, technique articles, articles with overlapping patient populations, articles with hip arthroscopy used as an adjunct to an open procedure, articles with inflammatory and septic arthritis, and articles with a mean age younger than 18 years (Table 1). In addition, the bibliographies of identified articles were searched for relevant articles for full-text review.

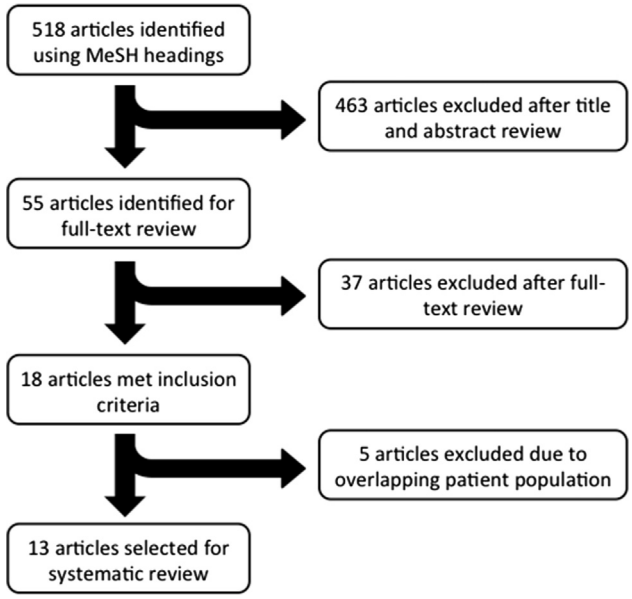

Fig 1. Flowchart of search strategy. (MeSH, Medical Subject Heading.)

We performed a full-text review of the chosen articles to determine the demographic characteristics of the patients included, mean follow-up, number of patients with and without arthritic changes, and number of patients who underwent conversion to THA or hip surface replacement arthroplasty (SRA) after hip arthroscopy in each subset, as well as the mean times to these conversions. Articles reporting the conversion rates to THA were then used to compare the nonarthritic and arthritic populations using the χ^2 test.

Results

In May 2014 our literature search identified 518 articles from the Medline and PubMed databases. After title and abstract review, we selected 55 articles for full-text review. Of these, 23 articles met the inclusion criteria for this systematic review. We excluded 8 articles that reported on the same patient populations as 5 articles by the same authors in more recent publications in the literature (Fig 1). The characteristics and findings of the remaining 15 articles that have been selected for this systematic review are presented in Table 2.[11,12,16-29]

There were 14 articles with Level IV evidence and 1 article with Level III evidence. There were a total of 2,051 hips that underwent an arthroscopic procedure with a mean patient age of 40.2 years (range, 31 to 58.2 years). The mean follow-up period was 41.5 months (range, 4 to 120 months). One article did not report the duration of follow-up. Fourteen articles reported on the

Table 2. Findings From Selected Articles

Study	Year	Level of Evidence	No. of Hips	Mean Age, yr (range)	Follow-up, mo (range)	Measure of OA	PROI	Results	Total Conversions to THA/SRA	Conversion Rate in OA, %	Mean Time to Conversion to THA/SRA, mo (range)
Skendzel et al.[16]	2014	III	466 63 with limited joint spaces	40.6	73 (60-97)	Joint space >2 mm or <2 mm	WOMAC mHHS HOS SF-12	Patients who underwent conversion to THA were more likely older and female and had a higher α angle Survivorship of 86% in patients with joint space >2 mm *v* 20% in patients with joint space <2 mm at 5 yr Most patients with joint space >2 mm who underwent conversion to THA had grade 4 chondral defects Among patients with native hips at follow-up, higher HOS-ADL scores were found in those with joint space >2 mm *v* those with joint space <2 mm	117	86	81 (78.2-83.2)
Bogunovic et al.[17]	2013	IV	60 17 with OA grade ≥2	36 (15-71)	Not reported	Tönnis	None	Residual/unaddressed FAI was most common cause of failed hip arthroscopy 53% of failures were addressed with open joint-preserving procedures	22	100	31 (1.9-70)
Meftah et al.[28]	2011	IV	50 21 with OA	40.1 (19-77)	8.4	Joint space narrowing <3 mm, subchondral sclerosis, osteophytes	HHS Patient satisfaction	HHS improved by 8.8 points in OA group, which was statistically lower than in non-OA group All dissatisfied patients (16%) had OA OA was strongest predictor of low HHS and satisfaction Age and sex showed no correlation	2	5	58.2 (54-62.4)
Larson et al.[12]	2011	IV	227 58 with OA grade ≥2	38.25 (14-65)	27 (12-60)	Tönnis	mHHS SF-12 VAS	Radiographic joint space narrowing and duration of symptoms were predictors of high failure rates Radiographic joint space narrowing, increasing MRI chondral grade, and duration of symptoms were predictors of lower mHHS	21	34	Not reported

(continued)

Table 2. Continued

Study	Year	Level of Evidence	No. of Hips	Mean Age, yr (range)	Follow-up, mo (range)	Measure of OA	PROI	Results	Total Conversions to THA/SRA	Conversion Rate in OA, %	Mean Time to Conversion to THA/SRA, mo (range)
Horisberger et al.[23]	2010	IV	105 1 with grade 0 OA 76 with grade 1 OA 28 with grade 2 OA Grade 3 OA excluded	40.9 (17-66)	27.6 (15.6-49.2)	Tönnis	NAHS VAS	Preoperative NAHS was negatively correlated with THA	9	5 in grade 1 patients 18 in grade 2 patients	Not reported
Haviv and O'Donnell[21]	2010	IV	564 All with OA	55 (32-80)	3.2 (1-64)	Tönnis	None	Milder arthritis, young age, and multiple arthroscopies increase time to THA	90	16	18 (0.72-61.2)
Gedouin et al.[20]	2010	IV	111 36 with grade 1 OA	31 (16-49)	10	Tönnis	WOMAC Patient satisfaction	Functional and satisfaction scores differed significantly between patients with and without OA at end of follow-up Functional improvement was lower in case of preoperative OA but remained significant Age and type of impingement had no functional impact independent of OA status	5	14	12 (11-15)
Byrd and Jones[18]	2010	IV	52 14 with OA	38 (14-84)	120	Subchondral sclerosis or erosions, joint space narrowing, and osteophyte formation	mHHS	50% of arthritic patients had measurable improvement at 2 yr, 36% remained improved at 5 yr, and 79% had undergone THA by 10 yr Better results were found in second to fourth decades, in patients with symptoms for <18 mo, and in patients with CE angle between 26° and 40° Labral resection had poor results in arthritic patients Treatment of chondral lesions fared poorly in arthritic patients compared with nonarthritic counterparts	14	79	Not reported

(continued)

Table 2. Continued

Study	Year	Level of Evidence	No. of Hips	Mean Age, yr (range)	Follow-up, mo (range)	Measure of OA	PROI	Results	Total Conversions to THA/SRA	Conversion Rate in OA, %	Mean Time to Conversion to THA/SRA, mo (range)
Kamath et al.[25]	2009	IV	52 15 with OA	42 (25-76)	58 (28-102)	Not reported	mHHS	In OA group, 40.4% had no chondromalacia, 32.7% had grade I or II changes, and 26.9% had grade III or IV changes Grades of intraoperative chondromalacia did not predict postoperative outcome	3	13	8 (6-11)
Kim et al.[26]	2007	IV	43 22 with grade 1 OA	40 (18-68)	50 (12-96)	Tönnis	JOA score	74% had improved results Patients with FAI had no improvement	Not reported	NA	NA
Jerosch et al.[24]	2006	IV	22 All with OA	52 (28-65)	25 (12-40)	MRI based	HHS	Clinical improvement in 18 of 22 patients. Return to ADL in 8 wk	4	18	15 (6-24)
Walton et al.[29]	2004	IV	70 39 with chondral degeneration 26 with OA	47 (22-87)	4	Not reported	Modified Farjo and Glick classification system classifies patient outcomes as good or poor depending on pain, mechanical symptoms, ADL, and ability to work and play sport	77% of patients with evidence of OA on plain radiographs had poor clinical results 13% of patients with no chondral degeneration on any investigation had poor clinical results Labral tears or loose bodies have a favorable chance at success with therapeutic arthroscopy compared than chondral degeneration	17	44	Not reported
Helenius et al.[22]	2001	IV	68 All with OA	58.2	25.5 (3-48)	Meschan	Simple patient report of pain better/worse	Severity of OA on preoperative radiographs correlated significantly ($P = .035$) with subjective result after hip arthroscopy One-sided chondropathy had more symptomatic relief than double-sided chondropathy (88% *v* 69%, $P = .12$)	12	NA	Not reported

(continued)

Table 2. Continued

Study	Year	Level of Evidence	No. of Hips	Mean Age, yr (range)	Follow-up, mo (range)	Measure of OA	PROI	Results	Total Conversions to THA/SRA	Conversion Rate in OA, %	Mean Time to Conversion to THA/SRA, mo (range)
Margheritini and Villar[27]	1999	IV	133 All with OA	42.2	18	Clinical examination, radiologic evidence (osteophytes or joint space narrowing)	mHHS	61% showed improvements in score, of which 36% had good scores (mHHS >71 and <81) or excellent scores (mHHS >81 and <91) 39% had recurrent symptoms, of which 16% underwent conversion to THA Mean mHHS preoperatively and at 1 yr of follow-up was 47.8 and 58.7, respectively	21	16	6.8
Farjo et al.[19]	1999	IV	28 14 with OA or dysplasia	41 (14-70)	34 (13-100)	Not reported	Farjo and Glick classification system	Correlation between outcome and presence of arthritis on radiography ($P = .008$), arthroscopically determined presence of femoral chondromalacia ($P = .0004$), and acetabular chondromalacia ($P = .003$) 71% of patients without arthritis had good results	8	43	Not reported

ADL, Activities of Daily Living; CE, center edge angle; FAI, femoroacetabular impingement; HHS, Harris Hip Score; HOS, Hip Outcome Score; JOA, Japanese Orthopaedic Association; mHHS, modified Harris Hip Score; MRI, magnetic resonance imaging; NA, not applicable; NAHS, Non-Arthritic Hip Score; OA, osteoarthritis; PROI, patient-reported outcome instrument; SF-12, Short Form 12; VAS, visual analog scale; WOMAC, Western Ontario and McMaster Osteoarthritis Index.

Table 3. Demographic Characteristics of Patient Populations in Selected Articles

Demographic Characteristic	Nonarthritic	Arthritic	Total
No. of patients	856	1,195	2,051
Mean age, yr	37.4*	45.7‡	40.21
Mean follow-up, mo	37.4†	31.8§	41.47
Conversion to THA/SRA	71*	274‖	345
Mean time to conversion to THA/SRA, mo	26.1*	17.1‡	23.0

THA/SRA, total hip arthroplasty/surface replacement arthroplasty.
*Based on 2 articles.
†Based on 4 articles.
‡Based on 6 articles.
§Based on 8 articles.
‖Based on 14 articles.

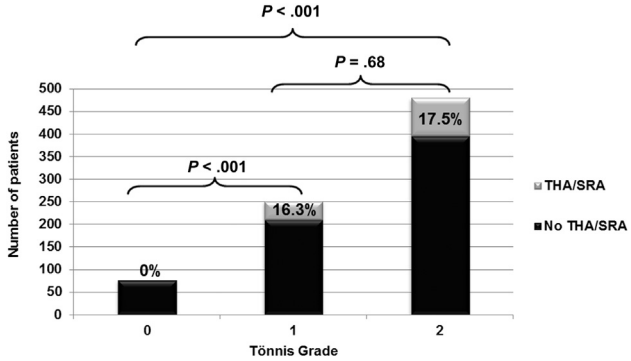

Fig 3. Proportion of patients who underwent conversion to total hip arthroplasty/surface replacement arthroplasty (THA/SRA) from articles using Tönnis grade.

conversion to THA/SRA after hip arthroscopy. In these articles there were a total of 345 conversions. The mean time to conversion based on the 6 articles reporting these data was 23.0 months (range, 7 to 58.2 months) in all patients. Table 3 shows the demographic data extracted from the selected articles.

The articles identified 856 hips (mean patient age, 37.4 years) as having no to minimal arthritic changes and the other 1,195 (mean patient age, 45.7 years) as having signs of arthritis. The method of determining OA varied. However, 6 articles used the Tönnis grading system.[30] Two of these articles defined OA as a Tönnis grade of 2 or greater and 4 articles defined OA as a Tönnis grade of 1 or greater. Among other methods were the Meschan grade[31] (1 article), magnetic resonance imaging–based identification of degenerative changes (2 articles), joint space narrowing (3 articles), and a descriptive radiographic method (2 articles). One article did not report the method of determining OA on preoperative imaging.

In the nonarthritic group, there were 71 conversions to THA/SRA compared with 274 in the arthritic group. As determined by the χ^2 test, this difference in conversion between the 2 groups was statistically significant ($P < .001$) based on 13 articles (Fig 2), with 8.3% of nonarthritic patients undergoing conversion to THA/SRA versus 23% in the arthritic group. Two articles were exempt from this statistical analysis because either they did not report any conversion to THA/SRA or their selection criteria contained only patients with failed hip arthroscopy, which would bias the overall results. The mean time to conversion in the nonarthritic and arthritic groups was 26.1 months (based on 2 articles) and 17.1 months (based on 6 articles), respectively (Table 3).

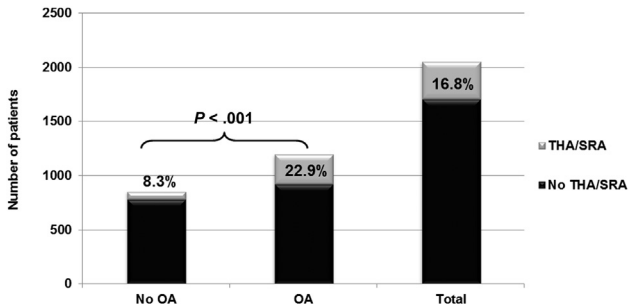

Fig 2. Proportion of patients undergoing hip arthroscopy who underwent conversion to total hip arthroplasty/surface replacement arthroplasty (THA/SRA). (OA, osteoarthritis.)

Analyzing the 6 articles reporting Tönnis grade as their method of determining OA,[12,17,20,21,23,26] we found that 1 reported no conversion to THA/SRA and 1 reported conversion only in patients with failed hip arthroscopy. These 2 articles were omitted from the statistical analysis for conversion rates using the Tönnis grade. The remaining 4 articles showed that there were no conversions (0%) to THA/SRA in patients with grade 0 OA, 41 conversions (16.3%) in patients with grade 1 OA, and 84 conversions (17.5%) in patients with grade 2 OA or greater (Fig 3). Using the χ^2 test with Yates correction, we found a significant difference in the conversion rates between patients with grade 0 and 1 OA ($P < .001$), as well as between patients with grade 0 OA and those with grade 2 OA or greater ($P < .001$). However, there was no statistically significant difference ($P = .68$) in the conversion rates between patients with grade 1 OA and those with grade 2 OA or greater.

Eight patient-reported outcome instruments (PROIs) were identified from analyzing all the articles. These comprised the Harris Hip Score, the modified Harris Hip Score (mHHS), the Western Ontario and McMaster Osteoarthritis Index, Short Form 12, visual analog scale, Hip Outcome Score (HOS), Non-Arthritic Hip Score, and Japanese Orthopaedic Association score, as well as a patient outcome classification system introduced by Farjo et al.[19] Two articles did not use a PROI. In these articles the outcome was measured as a revision hip procedure after a previously failed hip arthroscopy.[17,21]

Table 4. Factors Negatively Correlating With Outcomes

Factors	No. of Articles
Preoperative OA	10
Age	3
Chondral damage at arthroscopy	3
FAI	2
Duration of symptoms/preoperative NAHS/secondary gain	1

FAI, femoroacetabular impingement; NAHS, Non-Arthritic Hip Score; OA, osteoarthritis.

One article reported patient responses to pain being better or worse after surgery.[22]

There were 7 factors identified by the articles that correlated negatively with outcomes after hip arthroscopy: preoperative OA, age, chondral damage at arthroscopy, femoroacetabular impingement (FAI), duration of symptoms, preoperative Non-Arthritic Hip Score, and secondary gain. Among these, preoperative OA was the most common negatively correlating factor, with 10 articles reporting it as such (Table 4).

Discussion

The presence of OA negatively affects efforts to achieve open or arthroscopic joint preservation.[9,32,33] Indications for hip arthroscopy have broadened with surgical innovation over the past few years. The purpose of this study was to determine the extent of preoperative OA that precludes benefit from hip arthroscopy by systematically reviewing the literature on hip arthroscopy in the setting of OA. We reviewed 15 articles that discussed hip arthroscopy in the context of OA of the hip. We decided to appoint a conversion to THA/SRA in a patient as an objective measure of failure of hip arthroscopy in joint preservation in this population with degenerative hip disease. Thirteen articles discussed conversion rates in their populations. The total conversion rate was 16.8%, with a significantly greater number of patients with documented OA based on various methods undergoing conversion to THA/SRA compared with the nonarthritic population. Furthermore, this difference was also reflected when we analyzed conversions using the Tönnis grade as a marker for OA. Interestingly, there was no significant difference in conversion rates between patients with Tönnis grade 1 and those with grade 2 or greater. OA was the most commonly noted factor correlating negatively with outcomes in hip arthroscopy based on 10 articles.

In their article Skendzel et al.[16] aimed to determine whether patients with narrow joint spaces had inferior results after hip arthroscopy in the setting of FAI using 4 PROIs (HOS, Western Ontario and McMaster Osteoarthritis Index, mHHS, and Short Form 12) and conversion to THA to calculate survivorship. They defined a narrow joint space as a measurement of 2 mm or less on any 1 of 3 points on a supine anteroposterior pelvis radiograph, namely, the lateral sourcil, the medial sourcil, and above the level of the fovea. This article did have a selection bias because patients with severe or progressive OA were excluded. Among the 466 patients analyzed, 117 hips (25%) underwent conversion to THA at a mean of 31.6 months after hip arthroscopy. Fifty-four of these patients had a narrow joint space, which comprised 86% of the total patients with a narrow joint space in the study. In contrast, there were 63 patients who underwent conversion to THA who had a preserved joint space, which comprised 16% of the total patients with a preserved joint space evaluated in this study. The authors reported a mean survival time of 40 months in patients with narrow joint spaces compared with 88 months in those with preserved joint spaces. In addition, in the 323 patients who did not undergo THA, at a mean follow-up of 73 months, the preserved joint space group had a 15-point improvement in the HOS—Activities of Daily Living subset compared with a 6-point decrease in the narrow joint space group. In 2013 another study by the same group showed that a joint space of 2 mm or less predicted progression to THA after hip arthroscopy 80% of the time in patients older than 50 years.[14] Furthermore, they have also shown that this group of patients is 39 times more likely to progress to THA and have a lower mHHS postoperatively after hip arthroscopy for FAI.[15]

Larson et al.[12] looked at a similar dichotomy in their population of patients undergoing arthroscopic FAI correction. In this study OA was graded using the Tönnis classification, and the arthritic group was defined as those patients with a Tönnis grade of 2 or greater. Furthermore, Larson et al. subclassified the arthritic group into those with mild to moderate joint space narrowing (MM-OA) and those with advanced joint space narrowing (A-OA) based on a joint space measurement of greater or less than 2 mm or narrowing of greater or less than 50% compared with the contralateral or prior radiographs. Of the 227 hips undergoing hip arthroscopy in this study, 58 were identified as arthritic, and of these, 22 had advanced joint space narrowing. Failure was measured as an mHHS lower than 70 or conversion to THA. There was a 52% failure rate in the arthritic group compared with 12% in the nonarthritic group. Furthermore, the failure rate in the A-OA subgroup was 82% compared with 33% in the MM-OA subgroup. The rate of conversion to THA was 0.6% in the nonarthritic group compared with 34% in the arthritic group. In the latter group the rate was even higher (57%) in the A-OA subgroup compared with that in the MM-OA subgroup (22%). In addition, the A-OA subgroup had no improvements at any time in the mHHS postoperatively.

Byrd and Jones[18] reported the series with the longest follow-up among the chosen articles. They prospectively

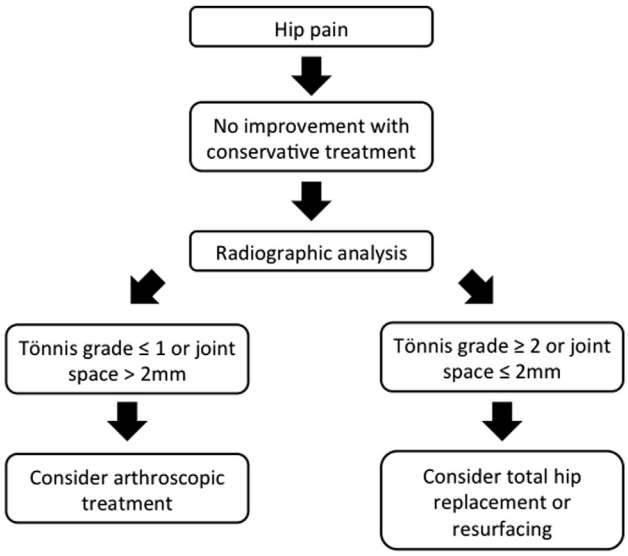

Fig 4. Proposed algorithm for patient selection for hip arthroscopy using radiographic parameters as a guide.

collected data on 52 consecutive arthroscopic hip procedures since 1993 and achieved 100% follow-up at 10 years. There were 14 conversions to THA (11 in those with OA). The median mHHS improvement was 25 points.

There were 4 articles that reported specifically on patients with grade 1 OA.[20,21,23,26] Of these articles, 2 reported conversion rates to THA in patients with grade 1 OA of between 5% and 14%.[20,23] On the basis of our statistical analysis, there was no difference when comparing the conversion rates between these patients and those with grade 2 OA or greater. However, we were only able to use 4 of the 15 studies to make this comparison. Kim et al.[26] did not report conversions to THA. Furthermore, they found that 56% of early OA patients had FAI compared with 29% of patients without OA. At a mean follow-up of 50 months, they found that arthroscopic debridement of early OA hips produced satisfactory results. However, this was insufficient in the presence of FAI, and the authors concluded that arthroscopic treatment of early OA of the hip failed if detectable FAI was present.

Further studies are needed to delineate which patients can benefit from hip arthroscopy in the setting of a Tönnis grade of 1 or lower or a joint space greater than 2 mm. On the basis of this systematic review, we propose the algorithm shown in Figure 4 to aid in patient selection for hip arthroscopy. We suggest that when evaluating a patient with hip pain after failure of conservative measures, one should proceed with radiographic analysis and consider hip arthroscopy in patients with a Tönnis grade of 1 or lower or a joint space greater than 2 mm. In patients with a Tönnis grade of 2 or greater or a joint space of 2 mm or less, THA/SRA should be considered instead of hip arthroscopy.

Limitations

There are a number of limitations to this systematic review. First, the number of articles in the arthroscopic hip literature reporting preoperative OA grading is limited. The focus, especially in recent literature with advances in management, has been on intraoperative grading of chondral damage. We elected to exclude these articles because they would not aid in refining the indications for hip arthroscopy preoperatively. Rather, they would provide more prognostic data once patients had already undergone hip arthroscopy. Second, the method of reporting preoperative OA varied among all the articles. Although the Tönnis grading system of measuring OA in patients was the most common, one cannot generalize it to other methods of grading, making grouping of patients into different categories of OA difficult. This variability in grading OA added to a notable amount of heterogeneity among the articles. We therefore included studies that graded OA according to joint space as well but limited our conclusions regarding the predictive value of the Tönnis grade to the 6 articles that included it. Third, we did not capture the population of patients in whom hip arthroscopy is used as an adjunct to an open procedure. In a recent systematic review by Redmond et al.,[34] it was shown that labral tears and chondral injury have been better recognized with concomitant hip arthroscopy during periacetabular osteotomy. Hence there may be a diagnostic role for hip arthroscopy in this patient population.

Conclusions

Current evidence is insufficient to define a cutoff for how much arthritis is too much for hip arthroscopy. However, this analysis shows that patients with a Tönnis grade of 1 or greater or a joint space of 2 mm or less are less likely to benefit from hip arthroscopy and more likely to require conversion to THA/SRA. Postoperative scores on PROIs are lower in the arthritic population at follow-up compared with their nonarthritic counterparts.

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