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Research article

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Hip arthroscopy failure rates: a healthcare database analysis in the United States

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ABSTRACT

With hip arthroscopy cases, there has been a concomitant increase in complications and the need for revision surgery. This study aims to further contribute to the literature regarding hip arthroscopy failure rates and associated patient factors following an index hip arthroscopy procedure. The PearlDiver database was queried for patients who had undergone hip arthroscopy. International Classification of Diseases, 10th Revision, Clinical Modification codes were used to ensure that follow-up was performed on the ipsilateral limb. Hip arthroscopy failure was defined specifically as subsequent ipsilateral total hip arthroplasty (THA) and reoperation, which were examined in all patients that met inclusion criteria. Independent patient variables, including psychiatric comorbidities, preoperative SSRI use, smoking, and obesity, were examined to identify an association with failure rates. A Student *t*-test, with a significance set at $P < 0.05$, was used for statistical comparisons of postoperative outcomes. Odds ratios were used to calculate the probability of short-term hip reoperation in patients with the above independent variables. A total of 19 067 hip arthroscopy patients were included in this study. Within 2 years from the index hip arthroscopy, there was an 11.42% failure rate as defined by subsequent reoperation and 7.16% failure rate as defined by revision to THA, with a total revision surgery rate of 18.58%. The most common reoperation procedure was revision femoroplasty (72%). Patients with an active diagnosis of a psychiatric comorbidity in the year leading up to a hip arthroscopy procedure were 1.74 times more likely to require a hip reoperation within 1 year (95% CI, 1.55–1.95).

INTRODUCTION

Hip arthroscopy is a minimally invasive surgical technique for the treatment of intra-articular hip pathology that has been increasingly utilized over the past two decades in the USA [1, 2]. Previous studies have reported safe and reliable improvement in function and pain levels in appropriately indicated patients undergoing hip arthroscopy, particularly in the treatment of femoroacetabular impingement (FAI) syndrome [3–9]. Using Current Procedure Technology (CPT) codes from the American Board of Orthopaedic Surgery database, two previous studies demonstrated dramatic increases in hip arthroscopy case volume from 1999 through 2010 [7, 8]. Both Montgomery *et al.* and Sing *et al.* analyzed a large patient records database (PearlDiver) and reported an increase in hip arthroscopy cases of 365% from 2004 to 2009 and 250% from 2007 to 2011, respectively [10, 11]. In a more recent large cross-sectional population study, the volume of hip arthroscopy surgery doubled from 2010 to 2014 and then plateaued between 2014 and 2017 [12].

With the significant rise in hip arthroscopy cases, however, there has been a concomitant increase in complications and the need for revision surgery, with studies reporting the need for revision surgery in up to 16.9% of patients [8, 13–16]. Patient-specific factors have been identified in the literature as contributing to failures in hip arthroscopy, including age, pre-existing hip osteoarthritis, smoking, obesity, and psychiatric illness, specifically depression and anxiety [17–21]. Nonpatient specific factors may include patient selection, monitoring patient-reported outcomes, and assessing the appropriateness of hip arthroscopy in specific cases. Cevallos *et al.* in their large cross-sectional cohort study reported a 2-year revision rate of 19%, with 15.1%

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undergoing a revision arthroscopy and 3.9% converting to total hip arthroplasty (THA) [12]. Patients younger than 30 years were more likely to undergo revision hip arthroscopy surgery, whereas patients older than 50 years were more likely to convert to THA within 2 years. Other than age, however, independent patient factors and variables associated with failure were not assessed.

The purpose of this study is to further elucidate recent trends of hip arthroscopy failure rates in the USA using a large cross-sectional cohort for assessment of revision surgery and rates of conversion to THA. Further, to our knowledge, we are the first to evaluate an association between failure rates and independent patient variables, including psychiatric comorbidities, preoperative selective serotonin reuptake inhibitor (SSRI) use, tobacco smoking, and obesity. We hypothesize that psychiatric comorbidities, smoking, obesity, and preoperative SSRI use are significantly associated with increased hip arthroscopy failure rates.

MATERIALS AND METHODS

The PearlDiver Mariner Patient Claims Database (PearlDiver Technologies, Colorado Springs, CO, USA) is a large US healthcare database that provides demographic information and longitudinally tracks patients with associated medical and procedural codes. This database includes claims of more than 182 million distinct patients, representing nearly 55% of the U.S. population. The PearlDiver database contains International Classification of Diseases, 9th Revision, Clinical Modification (ICD-9 CM) and 10th Revision, Clinical Modification (ICD-10 CM) codes, CPT codes, and National Drug Codes.

The PearlDiver database was used to identify patients who had undergone a hip arthroscopy procedure between 1 October 2015 and 31 October 2018 for this study. Patients who had undergone hip arthroscopy were identified by database query (CPT codes 29 860, 29 861, 29 862, 29 863, 29 914, 29 915, and 29 916) with a minimum 2-year follow-up from the primary procedure for prospective analysis [12]. ICD-10 CM codes were used to confirm laterality of the index procedure. Hip arthroscopy failure was defined specifically as subsequent ipsilateral THA (CPT-27 130) and reoperation, which were examined in all patients that met inclusion criteria. Demographic data in this study included age groups divided by 10 years (e.g. 20–29 year age range, 70–79 year age range) and sex (males versus females). Reoperation was defined by revision hip arthroscopy or one of several procedures as reported in Table 1.

Independent patient variables were also examined in all queried patients and included the presence of psychiatric diagnoses, preoperative SSRI use, tobacco use, and obesity (Table 2). The relationships between revision hip arthroscopy failure and these variables were assessed using a student t-test for statistical comparisons of postoperative outcomes, with a significance set at $P < .05$. Odds ratios were used to calculate the probability of short-term hip reoperation in patients with the above independent variables.

RESULTS

Over the 3-year study period from 1 October 2015 to 31 October 2018, a total of 19 067 patients underwent hip arthroscopy procedures. The most common age group was patients in the 40–49 years age range (25%). Female patients comprised 71% of the total patients, while male patients accounted for the remaining 29%. Within 2 years from the index hip arthroscopy, there was an 11.42% failure rate as defined by subsequent reoperation and 7.16% failure rate as defined by revision to THA, with a total revision surgery rate of 18.58% (reoperation and THA combined). Specifically with regards to non-THA reoperations, Fig. 1 illustrates the cumulative hazard (a hip-related reoperation) as well as survival (hip arthroscopy procedures uncomplicated by subsequent reoperation) in months following the index hip arthroscopy procedure using Kaplan–Meier curves. The most common reoperation procedures were revision femoroplasty (72%), labral repair (62%), acetabuloplasty (28%), and debridement (14%) (Table 3).

Within the first year following index hip arthroscopy, queried results found that 8.52% of patients required reoperation and 4.72% required THA, for a cumulative revision rate of 13.24% (reoperation and THA combined) (Table 4). When comparing reoperation rates in males versus females, male patients in the 20–29 age group were significantly more likely to undergo reoperation within the first year ($P = .028$) when compared to female patients in the same age group. In contrast, female patients 40–49 years of age were significantly more likely to undergo reoperation within the first year ($P = .047$) when compared to male patients in the same age group (Table 5). Above 50 years

Table 1. CPT codes that defined reoperation

CPT codes queried	Description
CPT-29 861	Hip arthrscopy with loose/foreign body removal
CPT-29 862	Hip arthroscopy with chondroplasty, abrasian arthroplasty, and/or labrum resection
CPT-29 863	Hip arthroscopy with synovectomy
CPT-29 914	Hip arthroscopy with femoroplasty
CPT-29 915	Hip arthroscopy with acetabuloplasty
CPT-29 916	Hip arthroscopy with labral repair
CPT-26 990	Incision and drainage, pelvis or hip joint area; deep abscess or hematoma
CPT-26 991	Incision and drainage, pelvis or hip joint area; infected bursa
CPT-27 086	Removal of foreign body, pelvis or hip; subcutaneous tissue
CPT-27 087	Removal of foreign body, pelvis or hip; deep (subfascial or intramuscular)
CPT-27 235	Percutaneous skeletal fixation of femoral fracture, proximal end, neck
CPT-27 236	Open treatment of femoral fracture, proximal end, neck, internal fixation, or prosthetic replacement
CPT-27 253	Open treatment of hip dislocation, without internal fixation
CPT-27 254	Open treatment of hip dislocation, without acetabular wall and femoral head fracture
CPT-27 256	Treatment of spontaneous hip dislocation; without anesthesia, without manipulation
CPT-27 257	Treatment of spontaneous hip dislocation; with manipulation, requiring anesthesia

Table 2. ICD-9/-10 codes that defined each comorbidity analyzed

Comorbidities	Codes
Psychiatric diagnoses	ICD-10-D-F200, ICD-10-D-F201, ICD-10-D-F202, ICD-10-D-F203, ICD-10-D-F205, ICD-10-D-F2081, ICD-10-D-F2089, ICD-10-D-F209, ICD-10-D-F21, ICD-10-D-F22, ICD-10-D-F23, ICD-10-D-F24, ICD-10-D-F250, ICD-10-D-F251, ICD-10-D-F258, ICD-10-D-F259, ICD-10-D-F28, ICD-10-D-F29, ICD-10-D-F3010, ICD-10-D-F3011, ICD-10-D-F3012, ICD-10-D-F3013, ICD-10-D-F302, ICD-10-D-F303, ICD-10-D-F304, ICD-10-D-F308, ICD-10-D-F309, ICD-10-D-F310, ICD-10-D-F3110, ICD-10-D-F3111, ICD-10-D-F3112, ICD-10-D-F3113, ICD-10-D-F312, ICD-10-D-F3130, ICD-10-D-F3131, ICD-10-D-F3132, ICD-10-D-F314, ICD-10-D-F315, ICD-10-D-F3160, ICD-10-D-F3161, ICD-10-D-F3162, ICD-10-D-F3163, ICD-10-D-F3164, ICD-10-D-F3170, ICD-10-D-F3171, ICD-10-D-F3172, ICD-10-D-F3173, ICD-10-D-F3174, ICD-10-D-F3175, ICD-10-D-F3176, ICD-10-D-F3177, ICD-10-D-F3178, ICD-10-D-F3181, ICD-10-D-F3189, ICD-10-D-F319, ICD-10-D-F320, ICD-10-D-F321, ICD-10-D-F322, ICD-10-D-F323, ICD-10-D-F324, ICD-10-D-F325, ICD-10-D-F328, ICD-10-D-F3281, ICD-10-D-F3289, ICD-10-D-F329, ICD-10-D-F330, ICD-10-D-F331, ICD-10-D-F332, ICD-10-D-F333, ICD-10-D-F3340, ICD-10-D-F3341, ICD-10-D-F3342, ICD-10-D-F338, ICD-10-D-F339, ICD-10-D-F340, ICD-10-D-F341, ICD-10-D-F348, ICD-10-D-F3481, ICD-10-D-F3489, ICD-10-D-F349, ICD-10-D-F39, ICD-10-D-F4000, ICD-10-D-F4001, ICD-10-D-F4002, ICD-10-D-F4010, ICD-10-D-F4011, ICD-10-D-F40210, ICD-10-D-F40218, ICD-10-D-F40220, ICD-10-D-F40228, ICD-10-D-F40230, ICD-10-D-F40231, ICD-10-D-F40232, ICD-10-D-F40233, ICD-10-D-F40240, ICD-10-D-F40241, ICD-10-D-F40242, ICD-10-D-F40243, ICD-10-D-F40248, ICD-10-D-F40290, ICD-10-D-F40291, ICD-10-D-F40298, ICD-10-D-F408, ICD-10-D-F409, ICD-10-D-F410, ICD-10-D-F411, ICD-10-D-F413, ICD-10-D-F418, ICD-10-D-F419, ICD-10-D-F42, ICD-10-D-F422, ICD-10-D-F423, ICD-10-D-F424, ICD-10-D-F428, ICD-10-D-F429, ICD-10-D-F430, ICD-10-D-F4310, ICD-10-D-F4311, ICD-10-D-F4312, ICD-10-D-F4320, ICD-10-D-F4321, ICD-10-D-F4322, ICD-10-D-F4323, ICD-10-D-F4324, ICD-10-D-F4325, ICD-10-D-F4329, ICD-10-D-F438, ICD-10-D-F439, ICD-10-D-F440, ICD-10-D-F441, ICD-10-D-F442, ICD-10-D-F444, ICD-10-D-F445, ICD-10-D-F446, ICD-10-D-F447, ICD-10-D-F4481, ICD-10-D-F4489, ICD-10-D-F449, ICD-10-D-F450, ICD-10-D-F451, ICD-10-D-F4520, ICD-10-D-F4521, ICD-10-D-F4522, ICD-10-D-F4529, ICD-10-D-F4541, ICD-10-D-F4542, ICD-10-D-F458, ICD-10-D-F459, ICD-10-D-F481, ICD-10-D-F482, ICD-10-D-F488, ICD-10-D-F489
Preoperative SSRI use	DRUG-CITALOPRAM_HBR, DRUG-ESCITALOPRAM_OXALATE, DRUG-FLUOXETINE_HCL, DRUG-FLUVOXAMINE_MALEATE, DRUG-PAROXETINE_HCL, DRUG-SERTRALINE_HCL, DRUG-CELEXA, DRUG-LEXAPRO, DRUG-PROZAC, DRUG-SARAFEM, DRUG-SELFEMRA, DRUG-LUVOX_CR, DRUG-BRISDELLE, DRUG-PAXIL, DRUG-PEXEVA, DRUG-ZOLOFT, DRUG-VIIBRYD, GENERIC_DRUG-CITALOPRAM_HYDROBROMIDE, GENERIC_DRUG-ESCITALOPRAM_OXALATE, GENERIC_DRUG-FLUVOXAMINE_MALEATE, GENERIC_DRUG-PAROXETINE_HCL, GENERIC_DRUG-SERTRALINE_HCL, GENERIC_DRUG-VILAZODONE_HCL
Tobacco use	ICD-9-D-3051, ICD-9-D-98 984, ICD-9-D-V1582, ICD-9-D-3051, ICD-10-D-F17220, ICD-10-D-F17221, ICD-10-D-F17223, ICD-10-D-F17228, ICD-10-D-F17229, ICD-10-D-F17290, ICD-10-D-F17291, ICD-10-D-F17293, ICD-10-D-F17298, ICD-10-D-F17299, ICD-10-D-Z720, ICD-10-D-F17200, ICD-10-D-F17201, ICD-10-D-F17203, ICD-10-D-F17208, ICD-10-D-F17209, ICD-10-D-F17210, ICD-10-D-F17211, ICD-10-D-F17213, ICD-10-D-F17218, ICD-10-D-F17219, ICD-10-D-F17220, ICD-10-D-F17221, ICD-10-D-F17223, ICD-10-D-F17228, ICD-10-D-F17229, ICD-10-D-F17290, ICD-10-D-F17291, ICD-10-D-F17293, ICD-10-D-F17298, ICD-10-D-F17299, ICD-10-D-Z716, ICD-10-D-Z720, ICD-10-D-Z87891
Obesity	ICD-9-D-2780, ICD-9-D-27 800, ICD-9-D-27 801, ICD-9-D-27 802, ICD-9-D-27 803, ICD-10-D-E660:ICD-10-D-E669

of age, there was a trend of patients undergoing THA more often in the first year compared to reoperation.

Between the first and second year following an index hip arthroscopy, queried results found that 2.90% of patients required a reoperation and 2.44% required THA, for a total revision rate of 5.34% (Table 4). Overall, female patients were significantly more likely to undergo reoperation ($P < .001$) in the second year when compared to male patients. Female patients 10–19 years of age ($P = .002$) and 30–39 years of age ($P = .006$) were significantly more likely to undergo reoperation in the second year after index hip arthroscopy (Table 5). Above 40 years of age, there was a trend of patients undergoing THA more often in the second year rather than reoperation.

Patients who were noted to have an active diagnosis of a psychiatric comorbidity in the year leading up to a hip arthroscopy procedure were 1.74 times more likely to require a hip reoperation within 1 year [95% confidence interval (CI), 1.55–1.95]. Patients who were prescribed SSRIs within 3 months prior to an index hip arthroscopy were 1.19 times more likely to require a hip reoperation within 1 year (95% CI, 1.05–1.37). Patients who were noted to use tobacco products in the 6 months prior to an index hip arthroscopy were 1.55 times more likely to require a hip reoperation within 1 year (95% CI, 1.31–1.84). Patients who were noted to have an active diagnosis of obesity in the year prior to an index hip arthroscopy were 1.55 times more likely to require a hip reoperation within 1 year (95% CI, 1.32–1.82) (Table 6).

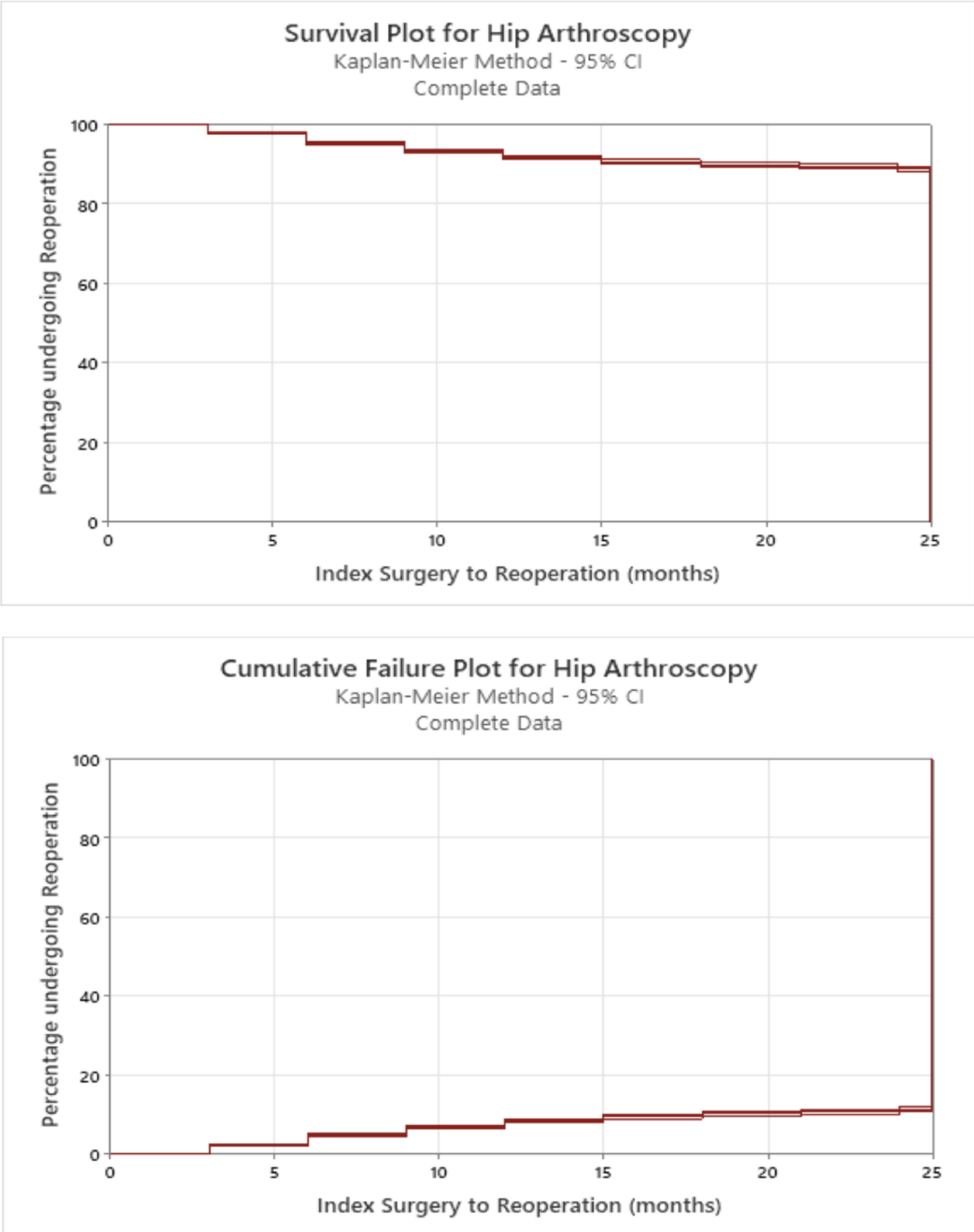

Figure 1. Kaplan–meier curve indicating the probability of reoperation over time for hip arthroscopy.

DISCUSSION

In this study using a large cross-sectional population, we found a high failure rate of 18.6% within 2 years of index hip arthroscopy, with 11.42% of cases undergoing a nonarthroplasty revision reoperation and 7.16% progressing to THA. Interestingly, a majority of these failures occurred within the first year of hip arthroscopy, accounting for 71% of all secondary procedures (THA and nonarthroplasty reoperations) identified in this study. Within the first year after surgery, males aged 20–29 and females aged 40–49 had increased rates of revision compared to their

Table 3. Number of patients that received reoperation in first and second year after index hip arthroscopy

CPT codes	Patients receiving reoperation in first year after index procedure[a]	Patients receiving reoperation in second year after index procedure[a]
CPT-29 914	1164 (71.7)	402 (72.8)
CPT-29 916	1014 (62.4)	338 (61.2)
CPT-29 915	451 (27.8)	156 (28.3)
CPT-29 862	222 (13.7)	48 (8.7)
CPT-29 863	117 (7.2)	43 (7.6)
CPT-29 861	91 (5.6)	15 (2.7)
CPT-26 990	8 (0.5)	3 (0.5)
CPT-27 235	5 (0.3)	3 (0.5)
CPT-27 236	3 (0.2)	2 (0.4)
CPT-26 991	0 (0.0)	0 (0.0)
CPT-27 086	0 (0.0)	0 (0.0)
CPT-27 087	0 (0.0)	0 (0.0)
CPT-27 253	0 (0.0)	0 (0.0)
CPT-27 254	0 (0.0)	0 (0.0)
CPT-27 256	0 (0.0)	0 (0.0)
CPT-27 257	0 (0.0)	0 (0.0)

[a]Data are presented as *n* (%).

Table 4. First and second year outcomes of hip arthroscopy

Hip arthroscopy failure rates[a]		
	First year after index procedure	Second year after index procedure
THA	900 (4.72)	466 (2.44)
Reoperation	1624 (8.52)	552 (2.90)

[a]Data are presented as *n* (%).

Table 5. Comparison of first and second year reoperation rates between male and female patients with a student *t*-test

First and second year reoperation rates[a]			
Age range (years)	Male patients ($n = 5532$)	Female patients ($n = 13\,535$)	*P* value
First year after index hip arthroscopy			
10–19	79 (14.0)	263 (13.8)	0.449
20–29	136 (13.2)	235 (10.9)	0.028[b]
30–39	115 (9.4)	238 (8.3)	0.126
40–49	80 (6.1)	255 (7.4)	0.047[b]
50–59	48 (4.9)	125 (5.5)	0.256
Second year after index hip arthroscopy			
10–19	13 (2.3)	97 (5.1)	0.002[b]
20–29	34 (3.3)	88 (4.1)	0.143
30–39	26 (2.1)	104 (3.6)	0.006[b]
40–49	35 (2.7)	98 (2.9)	0.347
50–59	12 (1.2)	40 (1.8)	0.137

[a]Data are presented as *n* (%).
[b]Statistically significant.

female and male counterparts, respectively. Between years 1 and 2 following surgery, females were more likely to undergo reoperation than males. Finally, several independent variables were identified that increase the risk of needing a revision surgery following hip arthroscopy, including (i) having a psychiatric comorbidity, (ii) taking SSRIs, (iii) tobacco use, and (iv) obesity.

Table 6. Odds ratios with 95% CI for comorbidities

Odds ratios for comorbidities			
Comorbidities	Odds ratio	95% CI	
Psychiatric diagnoses	1.74	1.55	1.95
Preoperative SSRI use	1.19	1.05	1.37
Tobacco use	1.55	1.31	1.84
Obesity	1.55	1.32	1.82

The operative failure of hip arthroscopy can be attributed to various factors, including residual structural deformities, underlying osteoarthritis, persistent FAI syndrome secondary to residual cam morphology, high-grade chondral damage, and labral pathology [22, 23]. Unaddressed development dysplasia of the hip and iatrogenic aggravation of hip dysplasia can also lead to failure after hip arthroscopy [24, 25]. Heterotopic ossification is identified as a common postoperative complication that can contribute to operative failure [26]. Moreover, factors such as recurrent labral tear, residual cam-type impingement, and capsular defects have been found to be common causes of failure in both primary and revision hip arthroscopy [27]. Additionally, the risk of THA after hip arthroscopy should be considered, as joint space predicts the need for THA after hip arthroscopy in patients 50 years and older [28].

There has been a wide range of reported reoperation rates following hip arthroscopy, with several studies reporting rates between 0% and 20% [29, 30]. In our study, there was a combined 18.58% reoperation rate including revision to THA, which falls within the range of previously reported data, but is comparably higher than revision rates reported in larger and more recent studies. Truntzer et al. retrospectively analyzed the PearlDiver database between the years of 2007 and 2014 and reported a revision hip arthroscopy rate of 5.31% within 6 months of the index procedures [31]. Similarly, Harris *et al.*, in a 2013 systematic review of over 6000 patients across multiple databases, reported 6.3% of patients analyzed required reoperation following hip arthroscopy [8]. In addition, a meta-analysis conducted by Minkara *et al.* reported a pooled reoperation risk of 5.5% in the 1981 hip arthroscopy procedures analyzed over an average 30-month time period [32].

Conversion to THA following hip arthroscopy has also been the focus of multiple investigations in recent years. Similar to non-THA reoperations following hip arthroscopy, revision to THA has a similarly wide range of reported incidence, with the highest reported rate to our knowledge being 16% in a review conducted by Haviv *et al.* in 2010, although this study was conducted among osteoarthritic patients specifically [33]. In contrast, Harris *et al.*, in their large systematic review of over 6000 hip arthroscopy patients, found that among 6.3% of patients that required reoperation, the conversion rate to THA was a mere 2.9% [8]. This is in contrast to our reported data which shows a much higher conversion to THA rate of 7.16%. This assessment is corroborated in a large cohort of patients with a minimum 2 year follow-up conducted in 2021 by Hoit *et al.* This study examined 2545 patients who underwent unilateral hip arthroscopy and specifically analyzed their risk for subsequent THA and found the rate of THA to be 9.3% at an average time of 2 years following index procedure [34].

An interesting finding of our study was the differential in failure rates between 0–1 year and 1–2 years postoperatively. Within the first year following hip arthroscopy, queried results found that 8.52% of patients required reoperation and 4.72% required THA, for a cumulative revision rate of 13.24% (reoperation and THA combined). In contrast, between the first and second year following hip arthroscopy, we found that 2.90% of patients required a reoperation and 2.44% required THA, for a total revision rate of 5.34%. These data suggest that if patients successfully make it through the first year following surgery, there is a marked decrease in revision rate between years 1 and 2. Hence, while this study did not examine specific factors causing recurrent pain, consideration should be given to focus future studies on postoperative factors that may limit or prevent recurrent pain within the first year (i.e. conservative rehabilitation protocols, slower return to play, etc.) [35, 36].

Variables associated with failed hip arthroscopy reported in the literature include psychiatric comorbidities, higher BMI, intraoperative chondrolabral injury, and postoperative microinstability among others [8, 33, 37–40]. Studies have indicated an increased prevalence of psychiatric diagnoses among patients undergoing hip arthroscopic surgery [41]. The presence of mental disorders, including depression, has been associated with higher rates of postoperative complications, readmissions, and revision arthroscopic procedures following elective hip arthroscopy [42]. Furthermore, self-reported mental disorders have been shown to negatively influence patient-reported outcome measures after arthroscopic treatment of femoroacetabular impingement, indicating a potential link between psychiatric comorbidities and surgical outcomes in hip arthroscopy [43]. Our findings suggest that patient-specific factors such as psychiatric comorbidities and SSRI use significantly influence the likelihood of reoperation. Further discussion on the implications of these comorbidities is crucial, as they may affect patient selection and preoperative counseling.

Conversion rate to THA has independently been associated with advanced patient age and osteoarthritis specifically, especially in patients with a joint space <2 mm [30, 37]. In the context of patient gender, over 70% of the patients examined were female in our study. Female predominance among analyzed cohorts is a common finding across recent literature regarding hip arthroscopy outcomes. For example, in a 2021 systemic review of 18 585 cases conducted by Emara *et al.*, a female majority is noted in 6 of the 7 included studies [44]. It is also worth noting that female sex has been associated with higher risk of reoperation compared to males in multiple large prospective cohort analyses and systematic reviews following hip arthroscopy. In female patients, instability rather than impingement is often a prominent cause of hip pain, and hip arthroscopy alone may be insufficient to provide stability in these cases [15, 16, 45, 46]. Our data, however, did not show a significant difference in reoperation when comparing patient sex as a risk factor.

LIMITATIONS

Large healthcare database mining has significantly advanced orthopedic research in the past decade. However, interpreting data from these databases has limitations. The PearlDiver database, for example, relies on ICD-9, ICD-10, and CPT codes, which were not originally developed for research [47]. These codes, often derived from insurance claims, may only be valid for specific diagnoses or procedures and are susceptible to strategies for higher reimbursement [48]. Additionally, when patients switch insurance plans, there is a loss of data continuity.

Coded data from large healthcare databases are challenging to reproduce due to varying patient sampling strategies, differences in coding, and annual updates that may alter code definitions or add new ones [49, 50]. To manage this, databases like PearlDiver organize vast amounts of data, resulting in a 1–2 year lag before complete datasets are available for research. We ensured that only patients who remained in the PearlDiver database for the duration of the specified follow-up period were included in the study, minimizing data loss due to insurance changes. Periacetabular osteotomy (PAO) was not included as a reoperation code due to the lack of specificity in isolating a PAO cohort, which is a limitation despite being an increasingly important clinical procedure.

The shift from ICD-9 to ICD-10 in 2013 introduced challenges for retrospective data queries, though ICD-10 allows for more specific procedures and diagnoses, especially in laterality, an area where ICD-9 falls short. However, precise coding for certain hip diagnoses and arthroscopy procedures remains inadequate. Additionally, noncodable data, such as the severity of presurgical diagnoses and surgeon-specific factors like experience and training, limit the accuracy of large healthcare database analyses.

It should also be noted that due to the nature of highly powered large healthcare database analyses such as PearlDiver, the deduction of significance is likely when analyzing such large sample sizes. Authors of such studies must recognize that statistically significant findings on such a scale does not necessarily denote significance clinically.

CONCLUSION

Within 2 years from index hip arthroscopy, there was a total revision surgery rate of 18.58% (7.16% defined by revision to THA and 11.42% defined by other subsequent reoperation). Femoroplasty, labral repair, and acetabuloplasty are the most common reoperation procedures after index hip arthroscopy. Male patients, particularly in the 20–29 age group, are significantly more likely to undergo reoperation within the first year. In contrast, female patients, specifically in younger age groups, are significantly more likely to undergo reoperation within the second year after hip arthroscopy. The data suggest that if patients make it through the first year following surgery with no revision, there is a marked decrease in revision rate in the following year. Our study highlights the significant influence of psychiatric comorbidities, obesity, and SSRI use on the failure rates of hip arthroscopy. These findings emphasize the importance of comprehensive preoperative evaluations and targeted patient counseling to mitigate the risk of postoperative complications and reoperations. Future studies should explore the long-term outcomes of hip arthroscopy and develop refined protocols for managing high-risk patients, aiming to improve surgical success and patient satisfaction.

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CONFLICT OF INTEREST

M.B.E.: Stryker—Paid consultant; A.A.B.: Catalyst OrthoScience—Board or committee member, Mitek—Paid presenter or speaker; M.D.S.: AO Foundation—Paid presenter or speaker; DePuy, A Johnson & Johnson Company—Paid consultant; S.B.: AAOS—Board or committee member, AI Digital Ventures, LLC—Stock or stock Options, American Orthopaedic Society for Sports Medicine—Board or committee member, Arthroscopy Association of North America—Board or committee member, BMJ Publishing Group—Publishing royalties, financial or material support, Edge Surgical—Stock or stock Options, International Society of Hip Arthroscopy (ISHA)—Board or committee member, Joint Preservation Innovations, LLC—Other financial or material support; Stock or stock Options, Journal of Cartilage and Joint Preservation—Editorial or governing board, Journal of Orthopaedic Experience & Innovation—Editorial or governing board, Nova Science Publishers—Publishing royalties, financial or material support, Paid Speaker—Graymont Medical, LLC—Other financial or material support, Smith & Nephew—Other financial or material support, TDA Ventures, LLC—Stock or stock Options, The Doctors' Agents (www.thedoctorsagents.com)—Other financial or material support.

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DATA AVAILABILITY

The data underlying this manuscript were obtained from a query of the PearlDiver Mariner Patient Claims Database and are available in this manuscript.

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