

# Prevalence and Course of Treatment of Common Hip Diagnoses Presenting to a Sports Medicine Clinic

Lianna Mack, BS; C. Nathan Vannatta, PT, DPT; Cary Rasmussen, MS; Andrew Borgert, PhD

## ABSTRACT

**Background:** Hip-related pain and pathology can have an overall negative impact on health-related quality of life. Prompt diagnosis and treatment of symptoms at the hip may expedite the recovery process and allow for an earlier return to normal activity. Knowing the prevalence of a condition can help facilitate the diagnostic process. However, the prevalence of hip diagnoses and associated courses of treatment have not been described.

**Methods:** A retrospective study was performed on patients presenting to a sports medicine clinic. Information on demographics, duration of pain, course of treatment, history of previous injury or surgery, and mechanism of injury was collected. Multivariate linear regression and multivariate logistic regression were utilized to describe differences in course of treatment between diagnostic groups.

**Results:** Six hundred eighteen patients were included in this study, with 641 hips analyzed. Femoroacetabular impingement syndrome (FAIS) was the most frequent diagnosis (212 hips), followed by “musculotendinous pain” and “hip pain, not otherwise specified.” Of those diagnosed with FAIS, 30.1% had secondary diagnoses in other categories. Home exercise programs were the most commonly prescribed treatment, followed by injections and physical therapy. Having a diagnosis of FAIS or chondrolabral pathology increased the odds of surgery.

**Conclusion:** Femoroacetabular impingement syndrome was the most common diagnosis in our cohort and had the highest frequency of concurrent diagnoses. A combination of a home exercise program, injection, and physical therapy made up the typical course of treatment, while surgery was utilized less frequently.

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**Author Affiliations:** Author Affiliations: Gunderson Health System, La Crosse, Wis (Mack, Vannatta, Rasmussen, Borgert).

**Corresponding Author:** C. Nathan Vannatta, PT, DPT, SCS, Department of Sports Physical Therapy, Gunderson Health System, 3111 Gunderson Dr, Onalaska, WI 54650, Mail Stop NC1-002; phone 608.775.8986; email cnvan-nat@gundersenhealth.org.

## INTRODUCTION

Hip-related pain has been reported to have a significant impact on overall health status, especially later in life.<sup>1,2</sup> Injuries to the hip have commonly been reported in young athletes, as well.<sup>3</sup> Recognizing and diagnosing hip pathology early on may be important in helping clinicians provide prevention strategies and treatment options.<sup>4,5</sup> This may be of particular relevance in those athletes whose bony anatomy is consistent with joint morphology associated with femoroacetabular impingement syndrome (FAIS), as this has been purported as a risk factor for developing intra-articular hip injury such as acetabular labral tears (ALT) and osteoarthritis.<sup>4,6</sup>

Successful treatment of hip-related pain and injury is facilitated by accurate diagnosis, after which recovery can be expedited by prompt treatment or management of symptoms. One aspect affecting the time to treatment is how long it takes to reach a diagnosis. A recent study found that patients may visit, on average, 3.3 providers over a period of nearly 2 years before being diagnosed with a labral tear.<sup>7</sup> When

making these diagnoses, knowledge of prevalence, results of special tests of the hip, and the strength of these tests may be utilized. Unfortunately, the diagnostic accuracy of hip physical examination tests is variable, making accurate diagnosis increasingly difficult.<sup>8,9</sup>

One element assisting with diagnostic accuracy is knowledge of the prevalence of a given condition to help establish pretest

probability.<sup>7,10,11</sup> Combined with the results of physical examination tests, the likelihood of certain conditions can be assessed. The combination of pretest probability and likelihood ratios from established clinical tests can substantially shift the probability of a particular diagnosis being present in an individual and assist with clinical decision making.<sup>12</sup> Studies investigating the prevalence of ALTs identified tears in 69% (n=45) of participants aged 15 to 66 years of age<sup>13</sup> and 66% (n=100) of patients 17 to 76 years of age.<sup>14</sup> However, no study, to our knowledge, has investigated the prevalence of a variety of diagnoses present at the hip. As little is known about the prevalence of different hip conditions,<sup>3,15</sup> accurate diagnosis of hip conditions remains a clinical challenge.

Lastly, knowledge of the expected course of treatment for different diagnoses may assist with determining prognosis and educating patients on available treatments and their respective outcomes. Informing patients of the possible courses for their hip problem may help them make informed decisions about their health care and allow them to better control their pain.<sup>16,17</sup> Therefore, it is the aim of this study to investigate the prevalence of hip-related diagnoses occurring in a sports medicine clinic in patients under the age of 50 to assist in establishing pretest probabilities that may facilitate diagnosis. The secondary aim of this study is to describe the frequency of treatments received by individuals with differing diagnoses.

## METHODS

A retrospective review was performed on all patients aged 14 to 49 years with a primary complaint of hip pain seen in the Sports Medicine Department at a medium-sized Midwestern health care system from January 1, 2012 through December 31, 2015. The Sports Medicine Department consists of 2 full-time orthopedic surgeons, 2 part-time nonoperative physicians, 3 full-time physician assistants, and several support staff, including athletic trainers, registered nurses, and medical assistants. The department also has an associated Physical Therapy Department consisting of 9 physical therapists and 6 physical therapist assistants. Referral to this clinic is often through self-referral to the orthopedic providers but can also occur through the health system's internal medicine, family practice, pediatric, and urgent care services.

This study received Institutional Review Board approval. Patients with a body mass index (BMI) greater than or equal to 40 kg/m<sup>2</sup> at their initial presentation or with pain patterns that may suggest pain pathology associated with other joints, such as iliotibial band syndrome presenting as lateral knee pain or lumbar radicular/referred pain, were excluded. Eligibility criteria were determined to include a younger, more active population. Pain localization criteria were utilized in an attempt to capture diagnoses that were local to the hip joint and associated structures.

Charts were reviewed manually, and the final diagnoses as described within the physician's documentation for each patient were recorded. Diagnoses of labral tear, chondral lesions, fractures,

dislocations, or FAIS were all assisted by the provider's review of imaging studies. Syndromes such as piriformis syndrome, iliotibial (IT) band syndrome, or snapping hip syndrome were diagnosed based on clinical judgement.

Demographic and anthropometric data collected included age, sex, race, and BMI. Hip-specific data included pain laterality, previous injury and/or surgery to the involved hip, duration of pain, and mechanism of injury. Traumatic injuries were defined as those due to falling, twisting, or an outside force.

Prescriptions for treatment were recorded from the evaluating physicians' documentation and grouped to include information on surgeries undergone, injections received, attendance at physical therapy, provision with a home exercise program, or if the patient was lost to follow-up. Only injections that were received for treatment of hip pain were recorded. Other injections, such as those utilized during magnetic resonance arthrograms, were not considered part of treatment. Home exercise programs were defined as exercise prescribed by a physician, athletic trainer, or physical therapist with no additional follow-up. Patients were considered to have had physical therapy if there was a record of them attending at least 1 physical therapy appointment within the clinic system. Finally, patients were designated as lost to follow-up if their provider scheduled them for an additional appointment, physical therapy, or an injection, but the patient did not present for the treatment or provide an update on his or her hip pain. Final treatment outcomes were not consistently reported, and thus are not included in this review.

## Statistical Analysis

Associations between demographic factors, clinical outcomes, and hip pathologies were assessed via univariate and multivariate statistical analyses. Univariate tests included the  $\chi^2$  and Fisher's exact tests. Multivariate linear and logistic regressions were utilized with a stepwise variable selection technique, with a *P*-value <0.20 required for initial inclusion of predictor variables in the model, and *P*<0.10 required for the variable to remain in the model. All analyses were performed using the SAS v9.4 software suite (SAS Foundation, Cary, North Carolina).

## RESULTS

### Demographics

Medical records from 709 patients were gathered. After screening for inclusion/exclusion criteria, 618 patients who fit the study criteria remained, with 641 hips being analyzed (Figure). Those with 2 unique episodes of pain were treated as independent incidences of hip pain. Demographic and medical history information of the cohort is included in Table 1.

### Diagnoses

There were nearly 50 different diagnoses given by the clinicians (Appendix A). To assist with statistical analyses, 7 broad groups

of diagnoses were formed (FAIS; muscle and tendon pain; chondrolabral pain; arthritis; fracture, dislocation, or contusion; pain, not otherwise specified; and other). FAIS was the most common diagnosis (33.1%). Musculotendinous pain was the second most common diagnosis (30.1%), followed by pain, not otherwise specified (25.9%); fracture, dislocation, or contusion (7.2%); chondrolabral pathology (6.7%); arthritis (5.8%); and other disorders (2.2%). Rates of each diagnosis were similar across sex, although chondrolabral pathology (OR=5.27, CI=2.04-13.65,  $P=0.0006$ ) and pain, not otherwise specified (OR=1.99, CI=1.34-2.95,  $P=0.0007$ ), were more likely to occur in females.

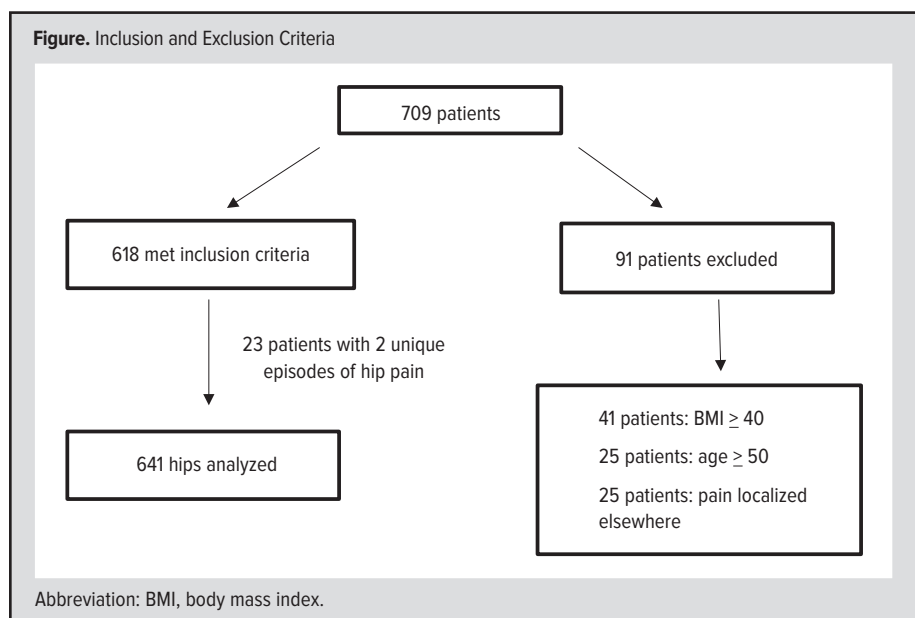
Those with a diagnosis of arthritis experienced the longest duration of pain, with a mean of 16.9±7.5 months. FAIS (15.9±8.8 months) or chondrolabral pathology (16.1±8.2 months) were also more likely to have a longer duration of pain. Those diagnosed with fractures, dislocations, or contusions or musculotendinous pain had a shorter duration of symptoms, with means of 3.8±5.1 months and 6.2±7.4 months, respectively.

Patients with multiple diagnoses at the same hip were included in multiple categories. Of the 641 total hips receiving a diagnosis, 577 (90.0%) were given 1 diagnosis, while the remaining patients had more than 1 identified diagnosis. FAIS and chondrolabral pathology occurred together more frequently than any other diagnoses. Over two-thirds (72.1%) of all hips with chondrolabral pathology concurrently experienced FAIS. Alternatively, only 30.1% of those diagnosed with FAIS had an additional diagnosis at the involved hip, and only 14.6% had chondrolabral pathology (Table 2). Fractures, dislocations, and contusions resulted in a single diagnosis in all cases and a similar trend was seen in pain, not otherwise specified (Table 2).

### Course of Treatment

Patients were provided with a home exercise program in 473 (73.9%) of cases. Patients who had pain, not otherwise specified (65.1%), or a fracture, dislocation, or contusion (54.4%) received a home exercise program less frequently (Table 3).

Across all diagnosis categories, 327 (51.0%) patients received at least 1 injection as part of their treatment (Table 3). Those experiencing chondrolabral pathology had the highest rate of injection. Treatment by injection was independently associated with both surgery (OR=5.28, CI=2.62-10.63,  $P<0.0001$ ) and increasing age (OR=1.03, CI=1.02-1.05,  $P=0.0002$ ). Diagnoses of chondrolabral pathology (OR=5.77, CI=1.63-20.59,  $P=0.0067$ ) or FAIS (OR=4.89, CI=2.96-8.09,  $P<0.0001$ ) increased the likeli-



**Table 1. Demographics and Medical History**

Age (years, mean ± SD)	30.4 ± 11.5
BMI (kg/m <sup>2</sup> , mean ± SD)	25.8 ± 5.1
Sex [n (%)]	
Male	225 (35.1)
Female	416 (64.9)
Race [n (%)]	
White	625 (97.5)
Black/African American	6 (0.9)
Asian	4 (0.6)
American Indian or Alaska Native	1 (0.2)
Unknown	5 (0.8)
Pain Laterality [n (%)]	
Right	310 (48.4)
Left	278 (43.4)
Bilateral	53 (8.3)
Previous Injury/Surgery [n (%)]	
Yes	69 (10.8)
No	572 (89.2)
Traumatic Injury [n (%)]	
Yes	95 (14.8)
No	546 (85.2)

Abbreviation: BMI, body mass index.

hood of receiving an injection during care. Meanwhile, diagnoses of musculotendinous pain (OR=0.48, CI=0.31-0.74,  $P=0.0008$ ) or fracture, dislocation, or contusion (OR=0.04, CI=0.00-0.27,  $P=0.0014$ ) decreased the likelihood of injection.

Overall, 325 (50.7%) patients received physical therapy, with patients experiencing chondrolabral pathology or FAIS having the highest rates of therapy (Table 3). Further, attending physical therapy was significantly more likely with a diagnosis of FAIS (OR=1.87, CI=1.26-2.78,  $P=0.0018$ ). A diagnosis of fracture, dislocation, or contusion reduced the likelihood of attending physical therapy (OR=0.35, CI=0.17-0.72,  $P=0.0045$ ). Patients with musculotendinous pain; arthritis; fracture, dislocation, or

**Table 2.** Incidence of Multiple Diagnoses

	Muscle and Tendon Pain	Arthritis	Chondro-labral Pathology	FAIS	Pain, Not Specified	Fracture, Dislocation Contusion	Other
Muscle and Tendon Pain	193 (100)	---	4 (2.1)	17 (8.8)	1 (0.5)	---	1 (0.5)
Arthritis	---	37 (100)	2 (5.4)	13 (35.1)	---	---	2 (5.4)
Chondrolabral Pathology	4 (9.3)	2 (4.7)	43 (100)	31 (72.1)	---	---	3 (7.0)
FAIS	17 (8.0)	13 (6.1)	31 (14.6)	212 (100)	---	---	3 (1.4)
Pain, not specified	1 (0.6)	---	---	---	166 (100)	---	---
Fracture, Dislocation, Contusion	---	---	---	---	---	46 (100)	---
Other	1 (7.1)	2 (14.3)	3 (21.4)	3 (21.4)	---	---	14 (100)

Cross tabulations of each diagnosis category. Data are displayed as n (%), with the percentage representing the proportion of the patients from the diagnosis category in the column on the left who also have the diagnosis listed in the first row.  
Abbreviation: FAIS, femoroacetabular impingement syndrome.

**Table 3.** Number of Patients in Each Diagnosis Category and the Treatments They Received

	Treatments Utilized				
	Physical Therapy n (%)	Medication n (%)	Injection n (%)	Surgery n (%)	HEP n (%)
FAIS	145 (68.4)	167 (78.8)	183 (86.3)	106 (50.0)	176 (83.0)
Musculotendinous pain	90 (46.6)	91 (47.2)	58 (30.1)	12 (6.2)	150 (78.1)
Chondrolabral pathology	32 (74.4)	34 (79.1)	40 (93.0)	25 (58.1)	39 (90.7)
Arthritis	18 (48.7)	28 (75.7)	27 (73.0)	18 (48.7)	26 (70.3)
Fracture, dislocation, contusion	10 (21.7)	17 (37.0)	1 (2.2)	3 (6.5)	25 (54.4)
Pain, not specified	78 (47.0)	77 (46.4)	67 (40.4)	5 (3.0)	108 (65.1)
Other	7 (50.0)	10 (71.4)	10 (71.4)	4 (28.6)	10 (71.4)

Abbreviations: FAIS, femoroacetabular impingement syndrome; HEP, home exercise program.

contusion; pain, not otherwise specified; or in the “Other” category received physical therapy in about 50% of cases.

Surgery was used to treat hip pain in 21.4% of patients (Table 3). The most common type of surgery was hip arthroscopy with femoroplasty (107 cases), followed by arthroscopy with acetabuloplasty (83 cases). More than 1 procedure was often performed during arthroscopy, such as femoroplasty with labral repair. Hip arthroplasty was rare in our population.

Patients experiencing chondrolabral pathology had the highest rates of surgery, followed by patients diagnosed with FAIS or arthritis. A diagnosis of musculotendinous pain significantly reduced the probability of requiring surgery (OR = 0.21, CI = 0.09-0.49,  $P = 0.0003$ ), as did pain, not otherwise specified (OR = 0.13, CI = 0.04-0.41,  $P = 0.0006$ ). Diagnoses of arthritis (OR = 2.32, CI = 0.97-5.54,  $P = 0.0591$ ), chondrolabral pathology (OR = 2.43, CI = 1.19-4.95,  $P = 0.0147$ ), or FAIS (OR = 3.79, CI = 1.80-7.97,  $P = 0.0004$ ) were all positive predictors of surgery.

Only 47 (7.3%) patients were lost to follow-up.

## DISCUSSION

The purpose of this study was to examine the prevalence of hip-related diagnoses in patients under the age of 50 presenting to a sports medicine clinic. Additionally, we aimed to describe the course of treatment for various diagnoses.

Our results indicated differences in the course of treatment and duration of pain between the diagnostic categories. This information may be utilized to assist with estimates of pretest probabilities of certain categories of hip diagnoses. It also may assist clinicians in diagnosing and educating patients on typical treatment courses.

FAIS, chondrolabral pathology, and arthritis were associated with longer durations of pain, whereas musculotendinous pain and fractures, dislocations, and contusions had shorter durations of pain. Thus,

a reported longer history of pain during the clinical examination may increase the clinician’s suspicion of FAIS, chondrolabral pathology, or arthritis.

There was a high rate of co-occurrence between arthritis and FAIS, which further supports the findings of previous literature suggesting an association between the bony morphology of FAIS and subsequent development of arthritic changes<sup>18</sup> (Table 2). Alternatively, patients with pain, not otherwise specified, or a fracture, dislocation, or contusion rarely had any other diagnosis (Table 2). This is not entirely unexpected as there is less ambiguity surrounding the diagnosis of fractures, dislocations, or contusions compared to other diagnoses.

The rate of labral tears and chondrolabral pain found in this study is lower than that reported by other studies. Various studies have found the prevalence of labral tears in those with hip or groin pain to range anywhere from 22% to 55%, with 1 study suggesting rates as high as 90%.<sup>17</sup> However, age has been associated with a higher prevalence of labral tears, and our patients were under age 50.<sup>13</sup> Another factor leading to the low rate of chondrolabral pain reported may be due to not all patients undergoing advanced imaging for this pathology, and thus the number of patients with asymptomatic labral tears may not have been captured in this study. Nonetheless, females were found to be 5 times more likely to have chondrolabral diagnoses than males, which could be due



to underlying anatomical differences between the 2 groups. This is consistent with previous findings indicating that labral tears occur more frequently in females.<sup>19</sup>

Some degree of exercise therapy can be expected for all hip pathologies, as 73.9% of patients received a home program and over 50% of patients received physical therapy. A similar proportion of patients received injections for their hip pain. In our cohort, those diagnosed with chondrolabral or FAIS pathology appear to be more likely to receive this form of treatment as part of their treatment. This seems to reflect current recommendations to trial a period of conservative care prior to surgical intervention for intra-articular pathology.<sup>8</sup>

Patients with a diagnosis of FAIS made up 77.4% of all surgeries and were significantly more likely to undergo surgery as part of their course of treatment (OR = 3.79, 95% CI = 1.80-7.97,  $P < 0.001$ ). Similarly, patients with a diagnosis of chondrolabral pathology were more likely to undergo surgery as part of treatment (OR = 2.43, 95% CI = 1.19-4.95,  $P = 0.015$ ). This is consistent with current trends showing an increase in the use of surgical treatment for the hip.<sup>6,17,20</sup>

These results may lead to the conclusion that surgery may be an expected result for patients with the diagnosis of FAIS or chondrolabral pathology. However, the results should not be interpreted to mean that surgery is the preferred course of treatment, as comparative studies investigating outcomes between surgical and conservative treatments are lacking.<sup>20</sup> There is evidence to support the benefits of early surgical management<sup>21,22</sup> and evidence to suggest that conservative management leads to clinical improvement with both of these diagnoses.<sup>23,24</sup> However, this trend of greater likelihood of surgery in those with a diagnosis of FAIS, ALTs, and osteoarthritis does seem to indicate a tendency of surgical treatment being selected in those with abnormal joint morphology.

### Limitations

Several limitations must be noted. This study is retrospective in nature and thus only describes the courses of treatment that occurred within this institution and cannot necessarily be used to predict positive outcomes with those treatments. Data on duration of symptoms, previous injury, and trauma were all self-reported by the patient, which may introduce recall bias. Although diagnoses of FAIS, labral tears, and fractures were supported with imaging, we cannot determine the accuracy of these diagnoses or to what extent imaging findings were correlated with the patients' symptomatology. Many of the diagnoses given were under the category of unspecified, or general, pain. It is likely that many of the patients diagnosed with pain actually had a more specific problem at their hip that went undiagnosed and, thus, the prevalence of more specific diagnoses may have been affected. Also, outcomes were not consistently reported and, thus, the treatment courses observed in this study cannot be used to

reflect positive outcomes or "best" practice. We are uncertain of the duration of different treatments or the rates of recurrence of pain. We also had a very homogeneous patient sample with the majority being white and female, which may affect the accuracy of the prevalence reported. Further, the subjects in this study were from a specialty sports medicine clinic which may limit the generalizability of the results.

### CONCLUSION

Diagnosis of hip-related pain remains a clinical challenge. Femoroacetabular impingement syndrome was the most common diagnosis in our cohort, followed by musculotendinous pain, and pain, not otherwise specified. The high rate of unspecified diagnoses suggests the need for continued efforts at consensus statements on defining and diagnosing hip pain. Consideration of pain duration may be helpful in the diagnosis of hip pain as FAIS, chondrolabral pathology, and osteoarthritis were associated with longer durations of pain; and fractures, contusions, and dislocations and musculotendinous pain were associated with a shorter duration of symptoms.

Some combination of a home exercise program, injection, and/or physical therapy can be expected as part of a typical course of treatment for all hip diagnoses. Physical therapy was more likely prescribed for those with FAIS or chondrolabral pathology, while those with a diagnosis of fracture, contusion, or dislocation were less likely to receive physical therapy. Injections were more common in those diagnosed with FAIS and chondrolabral pathology. Surgery occurred less often, but diagnoses suggesting abnormal joint morphology, such as FAIS, increased the likelihood of having surgery.

**Funding/Support:** None declared.

**Financial Disclosures:** None declared.

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