Use of Hip Arthroscopy and Risk of Conversion to Total Hip Arthroplasty: A Population-Based Analysis

William W. Schairer, M.D., Benedict U. Nwachukwu, M.D., M.B.A., Frank McCormick, M.D., Stephen Lyman, Ph.D., and David Mayman, M.D.

Purpose: To use population-level data to (1) evaluate the conversion rate of total hip arthroplasty (THA) within 2 years of hip arthroscopy and (2) assess the influence of age, arthritis, and obesity on the rate of conversion to THA. **Methods:** We used the State Ambulatory Surgery Databases and State Inpatient Databases for California and Florida from 2005 through 2012, which contain 100% of patient visits. Hip arthroscopy patients were tracked for subsequent primary THA within 2 years. Out-of-state patients and patients with less than 2 years follow-up were excluded. Multivariate analysis identified risks for subsequent hip arthroplasty after arthroscopy. **Results:** We identified 7,351 patients who underwent hip arthroscopy with 2 years follow-up. The mean age was 43.9 ± 13.7 years, and 58.8% were female patients. Overall, 11.7% of patients underwent THA conversion within 2 years. The conversion rate was lowest in patients aged younger than 40 years (3.0%) and highest in the 60- to 69-year-old group (35.0%) ($P < .001$). We found an increased risk of THA conversion in older patients and in patients with osteoarthritis or obesity at the time of hip arthroscopy. Patients treated at high-volume hip arthroscopy centers had a lower THA conversion rate than those treated at low-volume centers (15.1% *v* 9.7%, $P < .001$). **Conclusions:** Hip arthroscopy is performed in patients of various ages, including middle-aged and elderly patients. Older patients have a higher rate of conversion to THA, as do patients with osteoarthritis or obesity. **Level of Evidence:** Level III, retrospective comparative study.

See commentary on page 594

The use of hip arthroscopy in the United States has undergone rapid growth, with an estimated increase of over 600% between 2006 and 2010.[1,2] Indications for hip arthroscopy include femoroacetabular impingement (FAI), labral tears, loose bodies, septic arthritis, osteonecrosis, and synovial abnormalities.[3,4] Traditional open procedures to address hip pathology such as surgical hip dislocation[5] and periacetabular osteotomy[6] are technically challenging.[7] Thus arthroscopic approaches have gained popularity with less required soft-tissue dissection and a faster recovery time compared with open procedures.

Recently, there has been an improved understanding of the static and dynamic stabilizers of the hip, which has helped to explain the degenerative mechanisms associated with FAI. Altered mechanics and instability resulting from symptomatic FAI are posited to lead to labral injury and chondral degeneration, which in turn progress to hip osteoarthritis.[7-9] Thus, in patients with symptomatic FAI, hip arthroscopy with chondrolabral osteoplasty is performed to relieve symptoms by restoring the native anatomy and potentially preventing the onset of early osteoarthritis, especially in young active patients. Originally described in young adults, arthroscopic intervention for FAI has also been described in older individuals.[10-12]

Although the indications for hip arthroscopy are expanding, hip arthroscopy is most commonly used to address FAI and subsequent labral tears.[1] Treatment of FAI attempts to delay the need for a total hip arthroplasty (THA), although, due to the relatively young field of hip-preservation, long-term data is not yet available to confirm this. There have been institutional case series describing progression to THA after hip arthroscopy[10-12]; however, there is a paucity of

From the Hospital for Special Surgery (W.W.S., B.U.N., S.L., D.M.), New York, New York; and LESS Institute (F.M.), Miami, Florida, U.S.A.

Presented at the American Academy of Orthopaedic Surgeons Annual Meeting, Las Vegas, NV, March 2015.

The authors report the following potential conflict of interest or source of funding: F.M. receives support from Zimmer. S.L. receives support from Agency for Healthcare Research and Quality. D.M. receives support from Mako, Smith & Nephew, and OrthoAlign.

Received April 6, 2015; accepted October 2, 2015.

Address correspondence to William W. Schairer, M.D., Hospital for Special Surgery, 535 E 70th St, New York, NY 10021, U.S.A. E-mail: schairerw@hss.edu

0749-8063/15255/$36.00

http://dx.doi.org/10.1016/j.arthro.2015.10.002

population-based evidence assessing progression to THA after hip arthroscopy, as well as the risk factors for failed hip arthroscopy.

Thus the purpose of this study was to use population-level data to (1) evaluate the conversion rate of THA within 2 years of hip arthroscopy and (2) assess the influence of increased age and diagnoses of osteoarthritis and obesity on the rate of arthroplasty conversion. Our hypothesis was that we would find higher rates of THA conversion in patients who were older and had diagnoses of arthritis or obesity.

Methods

Data Sources

The State Ambulatory Surgery Databases (SASD) and the State Inpatient Databases (SID) are administrative claims databases maintained by and publicly available from the Healthcare Cost and Utilization Project, which is managed by the Agency for Healthcare Research and Quality. These databases contain complete records for each available state for ambulatory surgical cases and inpatient hospital admissions, respectively. Descriptions of patient visits include variables such as patient age, sex, insurance, and race, as well as *International Classification of Diseases, Ninth Revision* (ICD-9) diagnosis codes. The SASD contains Current Procedural Terminology (CPT) procedure codes, whereas the SID contains ICD-9 procedure codes. In addition, certain states provide for anonymous tracking of patients over time. We combined the SASD and SID for California (2005-2011) and Florida (2005-2012). The Hospital for Special Surgery Institutional Review Board approved this study.

Patient Selection

We selected all patients who underwent hip arthroscopy in the SASD using Current Procedural Terminology codes 29860, 29861, 29862, and 29863. Patients with less than 2 years of available follow-up were excluded to allow accurate assessment of the rate of THA within 2 years of hip arthroscopy. Thus we included patients who underwent hip arthroscopy in California from 2005-2009 and in Florida from 2005-2010 (the most recent available years for the SID were 2011 for California and 2012 for Florida). In addition, to ensure accurate follow-up, patients who did not identify California or Florida as their home state were excluded because these patients may be more likely to possibly seek medical care outside the geographical scope of our data.

A total of 10,328 patients who underwent hip arthroscopy were identified. There were 267 patients excluded for being out of state. In addition, 2,710 patients were excluded for having less than 2 years of available follow-up in the SID. The final cohort contained 7,351 patients who underwent hip arthroscopy (Fig 1).

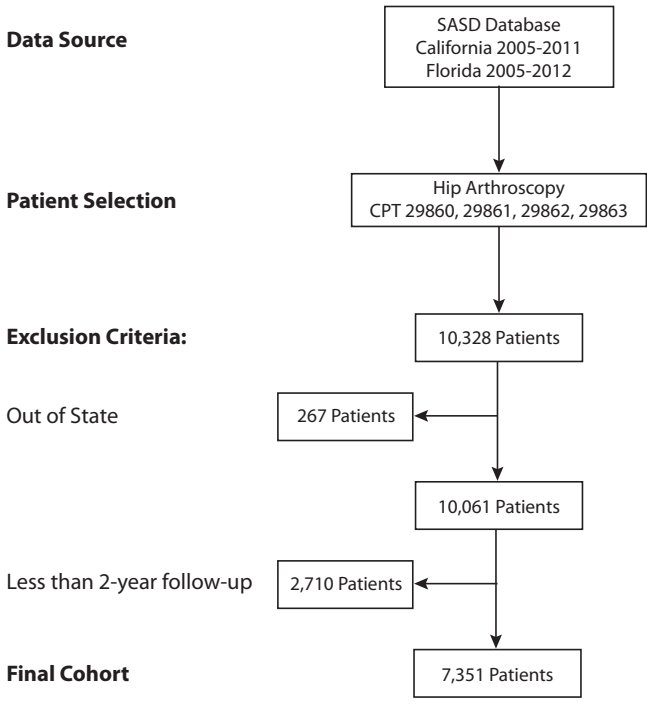

Fig 1. Patient selection algorithm. (CPT, Current Procedural Terminology; SASD, State Ambulatory Surgery Databases.)

Patients were grouped by age, defined as less than 40 years, 40 to 49 years, 50 to 59 years, 60 to 69 years, and 70 years or older. Diagnosis of osteoarthritis and obesity was determined using the Clinical Classifications Software, which is defined by groups of ICD-9 diagnosis codes.[13] The volume of hip arthroscopy procedures was calculated annually for each hospital and defined for this study as low (< 10), medium (10 to 49), or high (≥ 50) volume, which was determined roughly by tertiles of the number of arthroscopy procedures. Hospital costs were estimated from hospital charges using the cost-to-charge ratio provided by the Healthcare Cost and Utilization Project and were adjusted for geographical differences in wages and also for inflation using the consumer price index[14]; values are expressed in 2013 US dollars.

THA Conversion

All patients identified from SASD ambulatory surgery data who underwent hip arthroscopy were tracked for 2 years using the SID and monitored for inpatient hospital admission for a primary THA (ICD-9 procedure code 81.51). Because administrative databases do not contain information on procedure laterality, we assumed that primary THA occurred on the same symptomatic hip.

Statistical Analysis

Comparisons were performed using a *t*-test for continuous variables and a χ^2 test for categorical variables. The rate of conversion to THA was measured