

Caution Should be Taken in Performing Surgical Hip Dislocation for the Treatment of Femoroacetabular Impingement in Patients Over the Age of 40

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Received: 13 December 2011/Accepted: 6 August 2012 /Published online: 19 September 2012
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Abstract *Background:* Open and arthroscopic procedures are treatment options for patients with femoroacetabular impingement (FAI). Age has been found to be a predictive factor in the outcome of patients undergoing periacetabular osteotomy (PAO) for hip dysplasia. It is unclear if older age contraindicates joint preservation through a surgical hip dislocation (SHD). *Questions/Purpose:* The purpose of this retrospective case series was to evaluate the short-term outcomes of patients over 40 years of age without radiographic evidence of end-stage arthritis who underwent SHD for the treatment of FAI and to determine whether older age should be a contraindication for joint-preserving procedures in these patients. Our specific aims included (1) documenting the intraoperative findings and procedures, (2) assessing pain relief provided, and (3) assessing treatment failures and postoperative complications, noting the number of patients that ultimately required total hip arthroplasty (THA). *Patients and Methods:* All patients at age 40 and older who had SHD for the treatment of FAI were identified from a series of patients treated with SHD. Clinical notes, radiographs, and operative reports were reviewed to determine clinical results, complications, and the need for additional procedures. The minimum follow-up was 1 year (mean 3.9 years; range 1–8 years). *Results:* At final follow-up, 11/22 (50%) of hips had pain relief, while 11/22 (50%) either continued having significant symptoms or required

THA. Five (23%) reported nontrochanteric pain symptoms that were the same or worse than before surgery, and six hips (27%) underwent subsequent THA). The average time between SHD and THA was 1.9 years (0.9–6.2). The average age of patients who went on to require THA was 45 (42–50) years. *Conclusions:* Surgical hip dislocation can be used for the treatment of FAI in patients over age 40, but strict selection criteria should be adhered to, as only half of the patients experienced significant improvement in their hip pain. THA was required in one-third of hips for continued pain and radiographic progression of arthritis. SHD for treatment of pathology that is not amenable to hip arthroscopy should remain a surgical option in older patients with FAI only if joint degeneration is not present.

Keywords hip offset · femoroacetabular impingement · joint preservation · surgical hip dislocation

Introduction

Femoroacetabular impingement (FAI) has been described as a prearthritic mechanism caused by repetitive abutment of the femoral head and neck junction against the acetabulum. It occurs more commonly in the young adult or adolescent, who is athletically active. Some patients, however, may present with symptoms later in life (older than 40 years of age) that may warrant surgical treatment after failed conservative management.

Although the surgical treatment for FAI has become more common, there continues to be debate regarding the indications, contraindications, preferred treatment for labral pathology [5, 17, 18], and the best surgical approach to treat the problem in a given patient. Surgical alternatives include hip arthroscopy, mini-open approaches, and surgical hip dislocation (SHD) [7, 12]. Surgical hip dislocation has a greater potential for surgical morbidity, but it provides the best exposure to diagnose and treat FAI and allows for

Level of Evidence: Level IV: Therapeutic Case Series.

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optimal intraoperative evaluation of the results of the surgical treatment. It has produced favorable clinical outcomes [1, 3, 5, 14, 15]. Because of its associated morbidity, its use in patients older than 40 is now relatively rare in most surgeons' hands but may be warranted if pathology cannot be treated through other approaches.

The indications and contraindications to SHD have been well described in the literature [21]. Age over 40 has been associated with less favorable results in patients undergoing other joint-preserving procedures about the hip, specifically PAO for hip dysplasia [11]. Beck et al. reported that age over 40 should be considered a relative contraindication to SHD for FAI [3]. Older age, however, is likely a surrogate for the degree of cartilage damage and has not been evaluated as an independent variable affecting outcome.

The purpose of this retrospective case series was to evaluate the short-term outcomes of patients over 40 without radiographic evidence of end-stage arthritis who underwent SHD for the treatment of FAI and to determine whether older age should be a contraindication for joint-preserving procedures in these patients. Our specific aims included (1) documenting the intraoperative findings and procedures, (2) assessing pain relief provided, and (3) assessing treatment failures and postoperative complications, noting the number of patients that ultimately required total hip arthroplasty (THA).

Patients and Methods

This is an institutional review board-approved retrospective case series. We reviewed a consecutive series of 21 patients (22 hips), with FAI, aged 40 years and older, who were treated with SHD at the Mayo Clinic in Rochester, Minnesota between August 2002 and February 2011. Cases were identified using a computerized database compiled by the Mayo Clinic Surgical Index. Of the 22 hips, seven were in women and 14 in men with an average age of 44 years (40–50). Patient follow-up was documented until the last clinic visit, follow-up phone interview, or date of THA. The average length of clinical follow-up was 3.8 years (range, 0.9–8.4). No patients were lost to follow-up. Four hips (18%) had failed previous arthroscopy. Nine patients (43%) had radiographic evidence of *coxa profunda*.

Earlier in the series, all patients at our institution diagnosed with FAI were treated with SHD. Hip arthroscopy has been performed since 2009 for the management of FAI, unless the structural deformity would not be amenable to arthroscopic correction such as patients with global overcoverage or if the patient had previous failure of hip arthroscopy. Patients with radiographic evidence of OA (Tönnis grade 3) are not candidates for SHD. MR arthrography was used to aid in treatment decision making, and patients with evidence of advanced cartilage damage of the acetabulum or femoral head were also excluded.

Surgical hip dislocation for the treatment of FAI was initially described by Ganz et al. in 2001 [7]. The patient is placed in the lateral decubitus position. The hip is exposed and dislocated anteriorly using a trochanteric flip osteotomy.

The external rotators remain intact, and the vascular supply to the femoral head, protected [8]. The hip is exposed via Z-shaped capsulotomy and examined for evidence impingement. Surgical hip dislocation of the joint provides a full exposure of the acetabulum, and a complete 360° view of the femoral head.

Surgical treatment included femoral head and/or neck osteochondroplasty. Acetabular rim trimming was performed in cases of anterior overcoverage. The chondral surface was inspected for damage and debrided as needed. The labrum was inspected and probed, and (1) debrided if it was not torn from its acetabular insertion and the rim did not need trimming, (2) repaired or reattached if it was torn or if it was taken down after rim trimming, or (3) reconstructed with suture anchors to the rim if it was previously resected or if too thin for reattachment.

The postoperative therapy, weight bearing, and follow-up protocols varied depending on what was done at the time of surgery. After surgery, patients generally remained in the hospital for 2–3 days. Inpatient physical therapy included toe-touch weight bearing the day following surgery. Outpatient physical therapy primarily included abductor-strengthening routines and follow-up therapy visits as recommended by our physical therapy colleagues. Patients were allowed to ambulate with the use of crutches for 4 weeks, followed by the use of a cane or walker.

After discharge, patients were evaluated clinically within 6–8 weeks and at 4–6 months if needed. If possible, patients were also routinely evaluated annually. Patients experiencing persistent pain were evaluated sooner and more often if needed. Follow-up visits included both clinical and plain film radiographic evaluation. Hardware removal was indicated in cases of persistent trochanteric pain or irritation and was generally performed once there was radiographic evidence of trochanteric healing.

Radiographs were reviewed, and the structural deformity was noted as described by Clohisy et al. [4]. Preoperative magnetic resonance imaging was available in 12 hips, and plain film radiographs were available for all. Cam FAI was the prominent deformity in six hips, pincer FAI in nine hips, while mixed cam–pincer was seen in seven hips. Nine patients (43%) had radiographic evidence of *coxa profunda* as previously defined [2]. Preoperatively, 15 hips were judged to have Tönnis grade 1 osteoarthritis, and seven hips had grade 2.

Clinical results were assessed by review of medical history and standardized clinical outcome tools when available. Clinical outcome scores were not obtained preoperatively. The primary outcome measures were changes in nontrochanteric hip pain as subjectively reported by each patient (“much better,” “better,” “the same,” “worse,” or “much worse”) and progression to total hip arthroplasty. Treatment failure was defined as continued or worsening pain or conversion to THA. Total hip arthroplasty was indicated in cases of worsening pain, radiographic progression of osteoarthritis, and/or failure of symptomatic improvement after SHD, with evidence of intraoperative cartilage damage. A final follow-up, UCLA activity scores were obtained for all who did not require THA.

Results

At the time of SHD, 17/22 hips (77%) of patients had significant chondral damage and 21/22 hips (95%) had labral pathology. Twelve hips had labral debridements and four had labral repair. Three had the labrum taken down and then re-fixed, and two underwent labral reconstruction (one using *ligamentum teres capitis*, the other using tensor fascia). All 22 hips underwent osteochondroplasty of the head/neck junction. There were no major intraoperative complications. Eight hips (36%) underwent subsequent hardware removal.

At final follow-up, 11 hips (50%) had pain relief (four, “better”; seven, “much better”), while 11 hips (29%) were judged to be clinical failures. Five of these hips progressed to THA (Table 1), and the remaining six failed due persistent pain (“the same” as before SHD in five hips as before surgery, and “much worse” in one hip). Of all hips that failed treatment, six were Tönnis grade 1, and five were Tönnis grade 2. All four hips that were found to have damaged femoral head articular cartilage at SHD eventually failed treatment: two for persistent pain, two for progression to THA. Four of the failures demonstrated pincer impingement, three cam impingement (Fig. 1), and four mixed cam–pincer. The average postoperative UCLA activity score for all patients without THA was 7 (range, 4–10). The “non-THA failure” and “treatment success” subgroups both also had a postoperative average UCLA activity score of 7.

The average time between SHD and total hip was 1.9 years (0.9–4.2). The average age at SHD in the six patients who went on to require THA was 45 years (range, 42–50), and the average age of those who did not was 43 years (range, 40–48). None of the hips requiring THA had pure cam impingement; three had pincer and three had mixed cam–pincer. The incidence of (1) acetabular cartilage damage and (2) joint space narrowing >2 mm was similar between the hips that progressed to THA and those that did not (Table 2). At the time of SHD, one THA patient underwent labral reconstruction using *ligamentum teres capitis* [19], one was the only patient who required bone grafting of a subchondral cyst, one patient underwent microfracture of the acetabulum, a fourth underwent microfracture of the femoral head, a fifth had significant chondral delamination,



Fig. 1. Radiograph of a 41-year-old male with bilateral hip pain consistent with bilateral cam-type impingement

and the sixth had mild chondral damage with an atrophic labrum.

Discussion

Previous authors have suggested that older age is associated with higher likelihood of failure of conversion to THA after surgical hip preservation. Our study suggests that when treating patients older than 40 years, caution must be taken, as 6 out of 22 hips have undergone THA at an average of only 1.9 years, while another five continue with severe pain same as preoperatively. There were, however, good results in this age group, and age alone should not be a contraindication, but it may be indicative of more substantial cartilage damage that requires special attention prior to proceeding with joint preservation.

Older age has been associated with worse results after hip joint preservation surgery. Matheny et al. reported that age over 35 years was an independent risk factor for treatment failure in patients undergoing Bernese periacetabular osteotomy [11]. Millis et al. have reported similarly concerning results in patients over 40 undergoing PAO [13]. In a retrospective review of 100 cases using mini-open anterior Hueter approach with arthroscopic assistance, Laude et al. reported best results in patients younger than 40 with a Tönnis grade of zero [9]. Our study suggests that older patients may have reasonable expectations for pain

Table 1 Preoperative details on patients who required THA

Case	Age, gender	Significant findings at SHD	Tönnis grade
1	41, M	Large anterior osteophyte	1
2	48, F	Large, loculated femoral neck cysts; ICRS grade 3 chondral damage anteriorly; bucket-handle labral tear	1
3	50, F	Previous arthroscopic labral tear repair; labral ossification	2
4	48, M	Chondral flap tears; subchondral bone exposure leumann	2
5	42, M	Chondral delamination	1
6	42, M	Atrophic labrum; mild chondral damage	1

Table 2 THA vs. non-THA

Findings	THA (%)	Non-THA (%)
Type of impingement		
Cam	0/6 (0)	6 (37)
Pincer	3/6 (50)	6 (37)
Mixed	3/6 (50)	4 (25)
Average pre-op Tönnis grade	1.5	1.25
>2-mm joint space narrowing	2/6 (33)	4/16 (25)
Cartilage damage		
Acetabular	4/6 (66)	10/16 (63)
Femoral head	2/6 (33)	2/16 (13)

relief (50% in the present series), but there is also a considerable possibility that they may go on to require a THA. Our rate of conversion to THA was relatively similar to those reported by Beck et al. (26%, mean 37.2 months to conversion, mean age 36 years) [3] and Murphy et al. (30%, mean time to conversion unreported, mean age 35 years) [16]. The lack of complications, however, is encouraging, and is consistent with a multicenter retrospective analysis by Sink et al. that did not find a significant increase in the incidence of complications with age after SHD [20].

Older patients certainly differ from the typical FAI patient. Beck reported that over 80% of patients with FAI had a mixed cam–pincer impingement [1]. Phillipon et al., however, reported that patients with mixed cam and pincer impingement tended to be significantly older than both patients with pure pincer impingement (6.2 years difference) and patients with pure cam impingement (5.6 years difference) [16]. In our study, there was no appreciable difference in outcomes between male and female patients or between the three types of impingement, but our numbers are small.

FAI patients presenting with outright OA have been found to be older on average [16]. Labral pathology is also known to be more prevalent in older patients, often including diffuse degenerative changes such as calcification, thinning, and complex tears. In the present series, articular cartilage damage was highly prevalent, and labral pathology was almost universal despite preserved joint space on preoperative radiographs. Age is highly correlated with changes in labral shape and signal intensity on MR [10], underscoring the importance of careful imaging during preoperative evaluation. Because older patients are likely to have more extensive degenerative disease, patients should be selected carefully, and MR arthrography is the study of choice to document whether patients are candidates for surgery or not.

With the advent of hip arthroscopy, surgical hip dislocation has been relegated to the treatment of more complex cases requiring global rim trimming, resection of large cam lesions that are not amenable to arthroscopy, and, in select cases, where surgical hip dislocation is combined with other procedures (e.g., proximal femoral osteotomy, PAO, or relative neck lengthening). The decision to proceed with one approach over another is based on surgical expertise, surgical pathology, and, in many cases, patient age and activity.

In the past, surgical hip dislocation has been described as an invasive procedure that should generally be avoided in patients entering the fifth decade of life. These patients were likely to undergo either THA or hip arthroscopy to treat their underlying structural problem or cartilage damage. Many patients, however, would have been better served with surgical hip dislocation based on their structural deformity.

It has been our usual approach to allow structural deformity to guide surgical treatment. Thus, independent of age and activity level (relative contraindications including smoking and obesity), we perform SHD if the structural abnormality is better treated with an open approach [6, 17, 18]. If deformities can be treated arthroscopically, then hip arthroscopy is the ideal procedure for such patients. However, in those patients with deformities that hip arthroscopy cannot address, age alone should not be considered a contraindication

for SHD [1, 3, 5, 13, 15]. Nevertheless, this study clearly shows that caution should be exercised when performing joint preservation in patients older than 40.

Our study had limitations. There were a limited number of patients included in the study, there was no control group, and the length follow-up was relatively short. The data are retrospective, and we could not utilize a hip scoring system for outcome determination because most of our patients did not have documented, preoperative scores. Pain was assessed by follow-up telephone interview. Finally, we studied complications that had occurred at a center with experience performing the technique; this may be different when SHD is performed at centers with less experience.

As joint preservation surgery of the hip assumes a larger role in orthopedic surgery, these procedures will likely be offered to a more diverse group of patients. Surgical hip dislocation is an invasive surgical technique that offers a number of benefits over arthroscopy, but its invasiveness is certainly a drawback. Although it is most commonly performed on young patients, well-selected older patients over 40 years old can also benefit from this technique. A frank discussion about the outcomes associated with joint preservation, in general, should be part of preoperative counseling.

Disclosures Each author certifies that he or she has no commercial associations (e.g., consultancies, stock ownership, equity interest, patent/licensing arrangements, etc.) that might pose a conflict of interest in connection with the submitted article. One or more of the authors have received or may receive payments or benefits from a commercial entity that may be perceived as a potential conflict of interest. One or more of the authors' institution have received or may receive payments or benefits from a commercial entity that may be perceived as a potential conflict of interest.

Each author certifies that his or her institution has approved the human protocol for this investigation and that all investigations were conducted in conformity with ethical principles of research. This study was approved by the Institutional Review Board at Mayo Clinic. Work was performed at Mayo Clinic (Rochester, MN).

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