

What the papers say

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The *Journal of Hip Preservation Surgery (JHPS)* is not the only place where work in the field of hip preservation can be published. Although our aim is to offer the best of the best, we are continually fascinated by work, which finds its way into journals other than our own. There is much to learn from it, and so *JHPS* has selected six recent and topical subjects for those who seek a summary of what is taking place in our ever-fascinating world of hip preservation. What you see here are the mildly edited abstracts of the original articles, to give them what *JHPS* hopes is a more readable feel. If you are pushed for time, what follows should take you no more than 10 min to read. So here goes ...

THREE-DIMENSIONAL QUANTIFICATION OF CAM RESECTION USING MRI BONE MODELS: A COMPARISON OF 2 TECHNIQUES

The authors from the United States [1] note that the current clinical standard for the evaluation of cam deformity in femoroacetabular impingement syndrome is based on radiographic measurements, which limit the ability to quantify the complex 3-dimensional (3D) morphology of the proximal femur. Their aim was to compare magnetic resonance imaging (MRI)-based metrics for the quantification of cam resection as derived using a best-fit sphere alpha angle (BFS-AA) method and using a 3D preoperative–postoperative surface model subtraction (PP-SMS) in a descriptive laboratory study.

In this study, seven cadaveric hemipelvises underwent 1.5-T MRI before and after arthroscopic femoral osteochondroplasty, and 3D bone models of the proximal femur were reconstructed from the MRI scans. The alpha angles were measured radially along clockfaces using a BFS-AA method from the literature and plotted as continuous curves for the pre- and postoperative models. The difference between the areas under the curve for the pre- and postoperative models was then introduced in the current study as the BFS-AA-based metric to quantify the cam resection. The cam resection was also quantified using a 3D PP-SMS method, previously described in the literature using the metrics of surface area (FSA), volume (FV) and height [maximum (FH_{max}) and mean (FH_{mean})]. Bivariate correlation analyses were performed to compare the metrics quantifying

the cam resection as derived from the BFS-AA and PP-SMS methods.

The mean ± SD maximum pre- and postoperative alpha angle measurements were $59.73^\circ \pm 15.38^\circ$ and $48.02^\circ \pm 13.14^\circ$, respectively. The mean for each metric quantifying the cam resection with the PP-SMS method was as follows: FSA, $540.9 \pm 150.7 \text{ mm}^2$; FV, $1019.2 \pm 486.2 \text{ mm}^3$; FH_{max}, $3.6 \pm 1.0 \text{ mm}$ and FH_{mean}, $1.8 \pm 0.5 \text{ mm}$. Bivariate correlations between the BFS-AA- and PP-SMS-based metrics were strong: FSA ($r = 0.817$, $P = 0.012$), FV ($r = 0.888$, $P = 0.004$), FH_{max} ($r = 0.786$, $P = 0.018$) and FH_{mean} ($r = 0.679$, $P = 0.047$). The authors concluded that strong positive correlations were appreciated between the BFS-AA and PP-SMS methods quantifying the cam resection.

UPDATES ON MANAGEMENT OF AVASCULAR NECROSIS USING HIP ARTHROSCOPY FOR CORE DECOMPRESSION

Kunze *et al.* [2] note that osteonecrosis of the femoral head (ONFH) is caused when circulation within the femoral head is disrupted. The etiology of this disease is characterized by either traumatic events or atraumatic risk factors, such as chronic alcohol consumption or glucocorticoid use. ONFH commonly presents as pain in the groin, gluteus muscles and/or knee with reductions in the internal rotation range of motion of the hip. ONFH pathology can be confirmed with radiographic or advanced imaging and characterized by stage, size and location of the lesion. Treatment for ONFH consists of conservative and therapeutic methods as well as surgical intervention. Historically, ONFH has been treated using total hip arthroplasty (THA), but with increasing incidence in a younger, active population, measures to preserve the native hip joint have been explored. Recent advances in hip arthroscopy and arthroscopy-assisted core decompression have led to improved outcomes, reduced pain and higher hip survival rates for early-onset ONFH compared with more invasive approaches such as THA. Biologic treatments combined with arthroscopic core decompression have also shown improved outcomes and quality of life in few reports, suggesting a potential role for biologic adjuncts. In this study, the authors have provided a comprehensive review

and update on the literature surrounding arthroscopy-assisted core decompression for patients with ONFH.

The authors thus concluded that the arthroscopic-assisted core decompression for ONFH has several purported benefits including the ability to visualize the joint surface to avoid penetration, perform diagnostic arthroscopy and address concomitant intra-articular pathology and the potential for more comprehensive and accurate debridement of the avascular bone lesions. Based on the available literature, this procedure may effectively reduce pain and increase survivorship of the native hip in patients with pre-collapse ONFH prior, with better outcomes in earlier pre-collapse stages. There is inadequate evidence to recommend the use of biologic adjuncts such as platelet-rich plasma in conjunction with these procedures. Future research is imperative to continue to understand the indications and outcomes of arthroscopic-assisted core decompression.

INCIDENCE OF SYMPTOMATIC FEMOROACETABULAR IMPINGEMENT: A 4-YEAR STUDY AT A NATIONAL COLLEGIATE ATHLETIC ASSOCIATION DIVISION I INSTITUTION

The authors from California, USA [3] state that the femoroacetabular impingement (FAI) is an increasingly recognized cause of hip pain in young athletes. Although there are multiple studies that describe the radiographic prevalence of FAI in athletes, its true incidence within this population is unknown. The purpose of their cohort study was to report on the overall and sport-specific incidence of symptomatic FAI in National Collegiate Athletic Association (NCAA) Division I athletes. Return-to-sport times were reported for patients treated operatively.

A retrospective review was conducted to identify all reported hip injuries within a large, multisport NCAA Division I institution. Hip injuries were stratified into FAI, general pain/dysfunction, musculotendinous, ligament, bursitis, bone stress, contusion and other. FAI was diagnosed based on history, physical examinations, imaging and symptomatic relief after a diagnostic injection. Descriptive statistics were used to calculate the overall and sport-specific incidence, and chi-square analysis was performed to identify contingency data.

In a 3-year period, a total of 5319 musculoskeletal injuries occurred in 1072 athletes. There were 491 (9.2%) hip injuries that occurred in 288 athletes, of which 40 injuries were FAI. The overall incidence of symptomatic FAI was 3.0% of the total population, 3.7% of all injured athletes and 13.9% of athletic hip injuries. There were no statistically significant differences in FAI rates among male and female athletes overall or among male and female athletes within similar sports. Of the 19 athletes who were treated nonoperatively, 2 failed to return to play: 1 secondary to multiple musculoskeletal injuries and 1 related to cardiac issues. There were 21 hips in 20 patients that were treated operatively, with 1 athlete failing to return to sport. Return to play occurred at a mean of 202 days (range: 81–360 days) after hip arthroscopic.

The authors concluded in this large, multisport NCAA Division I cohort, the overall incidence of symptomatic FAI was 3.0% and represented 13.9% of hip injuries. The successful management of FAI with return to play was achieved by both nonoperative and operative treatment methods. The relatively

low incidence of symptomatic FAI, despite reports of a high prevalence of FAI morphology in athletes, serves to emphasize the importance of clinical evaluations in treating patients with FAI.

EDEMA OF THE LIGAMENTUM TERES AS A NOVEL MRI MARKER FOR NON-TRAUMATIC PAINFUL HIP PATHOLOGY: A RETROSPECTIVE OBSERVATIONAL STUDY

The authors from Doha, Qatar [4] report that the ligamentum teres has been recognized as an important stabilizer of the hip joint and can be affected by various hip pathologies. This study aims to introduce ligamentum teres edema as an MRI marker to diagnose the underlying cause of hip pathology, mainly FAI and adult developmental dysplasia of the hip (ADDH), in nontraumatic patients.

Adult patients presenting with nontraumatic hip pain of variable duration and ligamentum teres edema on MRI between 2014 and 2020 were included. A high-resolution standard MRI hip protocol was used for all patients in this series. MRI and plain radiographs were assessed. Ligamentum teres edema, alpha angle, center edge angle of Wiberg and retroversion were assessed.

In total, 55 patients with 110 hip joints [males: 29 (52.7%), females: 26 (47.3%)] of different ethnicities were included in this study. Out of the 55 patients with ligamentum teres edema, 1 had only unilateral right-sided FAI, 7 had only unilateral left-sided FAI and 46 (94 hip joints) had either bilateral FAI or ADDH. Therefore, eight (14.5%) patients with unilateral FAI had the absence of the contralateral FAI or ADDH (6.5% false-positive) despite the presence of ligamentum teres edema bilaterally, and the rest of the patients with bilateral ligamentum teres edema (102 joints: 92.7% positive predictive value) had findings of either FAI or ADDH.

The authors concluded that the ligamentum teres edema can be considered as an early MRI marker to diagnose the underlying pathology of symptomatic painful hip disorders, especially FAI.

HIP ARTHROSCOPY UTILIZATION AND REOPERATION RATES IN ONTARIO: A POPULATION-BASED ANALYSIS COMPARING DIFFERENT AGE COHORTS

Degen *et al.* [5] from Ontario, Canada note that the older age (>40 years) and osteoarthritis (OA) are negative prognostic variables for hip arthroscopy, but their impact has not been quantified from a population standpoint. The purpose of this study was to perform a population-based analysis of hip arthroscopy utilization and associated 2- and 5-year reoperation rates and complications in different age cohorts.

Administrative databases from Ontario, Canada, were retrospectively reviewed to identify patients aged 18–60 years who underwent hip arthroscopy between 2006 and 2016. Patients were stratified into two cohorts: 18–39 and 40–60 years of age. Patients were followed for 2 and 5 years to capture the occurrence of subsequent surgery (repeat arthroscopy or THA) and postoperative complications.

A total of 1906 patients underwent hip arthroscopy, 818 (42.9%) of whom were aged 40–60 years. In the entire cohort,

revision surgery occurred in 6.5% and 15.1% of cases at 2 and 5 years, respectively. Revision surgery rates were significantly higher among patients aged 40–60 years at 2 (10.8% versus 3.2%) and 5 years (22.7% versus 8.2%) than among those aged 18–39 years. Revision rates were higher among patients aged 50–60 years than among those aged 40–49 years at 2 years (14.3% versus 9.1%). Complication rates did not differ between cohorts. Regression analysis revealed higher 2- and 5-year odds of secondary surgery in patients aged 40–49 years [odds ratio (OR) 2.68, 95% confidence interval (CI) 1.70–4.22; OR 2.82, 95% CI 1.87–4.25], patients aged 50–60 years (OR 4.39, 95% CI 2.67–7.22; OR 3.44, 95% CI 2.11–5.62) and those with OA (OR 2.41, 95% CI 1.39–4.20; $P=0.002$; OR 1.76, 95% CI 1.00–3.09).

The authors concluded that the revision surgery rates following hip arthroscopy are significantly higher among older patients and those with concomitant OA. Although the data have limitations, they provide useful information to guide surgical decision-making.

FIVE-YEAR FOLLOW-UP AFTER HIP ARTHROSCOPIC SURGERY IN THE HORSSENS-AARHUS FEMOROACETABULAR IMPINGEMENT (HAFAI) COHORT

In this study, the authors from Denmark [6] note that patients with femoroacetabular impingement syndrome (FAIS) are offered hip arthroscopic surgery to decrease hip pain, improve their function and decrease the development of hip OA. Nonetheless, long-term follow-up data are few.

The purpose of their study was to investigate patient-reported outcomes, clinical tests, reoperations and radiographic status 5 years after primary hip arthroscopy in patients with FAIS.

A total of 60 patients (age: 36 ± 9 years; 63% female) diagnosed with FAIS were included in this level-4 study and followed for 5 years after hip arthroscopy. Follow-up included Copenhagen Hip and Groin Outcome Score (HAGOS), Hip Sports Activity Scale and clinical tests [flexion, adduction and internal rotation (FADIR); flexion, abduction and external rotation (FABER); and psoas muscle/tendon major pain provocation]. Radiographic evaluation included lateral joint-space width (LJSW) and Tönnis classification for hip OA. Reoperations and conversion to total hip replacement (THR) were recorded. They calculated the proportion of patients who exceeded the minimal important change (MIC), achieved the Patient Acceptable Symptom State (PASS) and were within the 95% reference interval of age- and sex-matched persons with no hip problems. Changes were investigated using paired t -tests.

Compared with preoperatively, all HAGOS subscales were improved substantially 5 years after surgery (mean: ≥ 21 points), and 67–89% of patients reported improvements exceeding MIC. Between 56% and 80% achieved PASS, but only 7–24% reached the 95% reference interval for the HAGOS subscales. A total of 36% had a positive FADIR test and 25% had a positive FABER test, which were improvements compared with preoperatively. Patients with a positive FADIR test had significantly worse HAGOS subscales. Six patients (10%) had a THR since their primary hip arthroscopy. In the remaining patients, the mean LJSW was decreased (-0.4 mm), and hip OA had worsened in nine patients (23%).

The authors concluded that 5 years after surgery, the majority of patients experienced HAGOS improvements exceeding MIC while also showing an acceptable PASS. However, clinical tests, participation in physical activities and quality of life indicated that many patients still experience hip problems.

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CONFLICT OF INTEREST STATEMENT

None declared.

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