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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 may be published. Although our aim is to offer the best of the best, we continue to be fascinated by work that finds its way into journals other than our own. There is much to learn from it 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 . . .

LOCATION OF INTRA- AND EXTRA-ARTICULAR HIP IMPINGEMENT IS DIFFERENT IN PATIENTS WITH PINCER-TYPE AND MIXED-TYPE FEMOROACETABULAR IMPINGEMENT DUE TO ACETABULAR RETROVERSION OR PROTRUSIO ACETABULI ON 3D CT-BASED IMPINGEMENT SIMULATION

In this multi-centre study, the authors from Bern and Fribourg, Switzerland and Birmingham, USA [1] report that diagnosis and surgical treatment of hips with different types of pincer femoroacetabular impingement (FAI), such as protrusio acetabuli and acetabular retroversion, remain controversial because actual three-dimensional (3D) acetabular coverage and location of impingement cannot be studied via standard two-dimensional imaging. It remains unclear whether pincer hips exhibit intra- or extra-articular FAI.

In this cross-sectional study, the authors attempt to determine the 3D femoral head coverage in these subgroups of pincer FAI, the impingement-free range of motion (ROM) through use of osseous models based on 3D computed tomography (CT) scans and the osseous intra- and extra-articular 3D impingement zones by the use of 3D impingement simulation.

They state that it is a retrospective, comparative, controlled study involving 70 hips in 50 patients. There were 24 patients (44 hips) with symptomatic pincer-type or mixed-type FAI and 26 patients (26 hips) with normal hips. Surface models based on 3D CT scans were reconstructed and compared for hips with acetabular retroversion (30 hips), hips with protrusio acetabuli (14 hips) and normal asymptomatic hips (26 hips). Impingement-free ROM and location of impingement were determined for all hips through the use of validated 3D collision detection software based on CT-based 3D models. No abnormal morphologic features of the anterior iliac inferior spine were detected.

It was found that the mean total femoral head coverage was significantly increased in hips with protrusio acetabuli (92% ± 7%) and acetabular retroversion (71% ± 5%) compared with normal hips (66% ± 6%). In addition, the mean flexion was significantly decreased in hips with protrusio acetabuli (104° ± 9°) and acetabular retroversion (116° ± 6°) compared with normal hips (125° ± 13°). Mean internal rotation in 90° of flexion was significantly decreased in hips with protrusio acetabuli (16° ± 12°) compared with normal hips (35° ± 13°). The prevalence of extra-articular subspine impingement was significantly higher in hips with acetabular retroversion (87%) compared with hips with protrusio acetabuli (14%) and normal hips (0%) and was combined with intra-articular impingement. The location of anterior impingement differed significantly between hips with protrusio acetabuli and normal hips.

The authors conclude that using CT-based 3D hip models, hips with pincer-type and mixed-type FAI have significantly larger femoral head coverage and different osseous ROM and location of impingement compared with normal hips. Additionally, intra- and extra-articular subspine impingement was detected predominantly in hips with acetabular retroversion. Acetabular rim trimming during hip arthroscopy or open surgical hip dislocation should be performed with caution for these hips. Patient-specific

analysis of location of impingement using 3D CT could theoretically improve diagnosis and planning of surgical treatment.

THERE IS POOR ACCURACY IN DOCUMENTING THE LOCATION OF LABRAL AND CHONDRAL LESIONS OBSERVED DURING HIP ARTHROSCOPY

In a cadaver study, Hariri *et al.* [2] from CA, USA try to determine and compare the accuracy and interobserver reliability of the different methods for localizing acetabular labral, acetabular chondral and femoral head chondral lesions with hip arthroscopy.

They used three cadaver hips, which were placed in the supine position. Three labral, three femoral chondral and six acetabular chondral lesions were made in each cadaver using electrocautery. Six surgeons classified the lesions according to different classification systems (clock-face, geographic and Method G) using hip arthroscopy and standardized portals. Identification of each lesion was performed after conclusion of the study through open dissection and surgical hip dislocation to be used as the 'gold standard'. Accuracy was calculated as the number of correct answers divided by total number of responses for a given system. The interobserver reliability was calculated using the kappa coefficient. The different classification methods were compared.

The clock-face method had an accuracy of 74% and interobserver reliability of 0.19 while the geographic method had an accuracy of 50% and interobserver reliability of 0.21 for acetabular labral lesion identification The acetabular chondral lesion identification accuracy was 56% for Method G, 66% for Method G-simp and 63% for the geographic system with an interobserver reliability of 0.31, 0.34 and 0.40, respectively. Femoral chondral lesion identification accuracy was 74% for Method G, 43% for the geographic method and 59% for the geographic-simp system with interobserver reliability of 0.37, 0.34 and 0.40, respectively. The Method G was significantly more accurate than the geographic system.

The authors concluded that there was poor to fair accuracy and interobserver reliability of the reporting systems for localization of labral, acetabular chondral and femoral chondral lesions encountered during hip arthroscopy. Their study suggests that there is a need for a new method that is easy to use, reliable, reproducible and accurate.

REDUCTION OF POSTOPERATIVE HIP ARTHROSCOPY PAIN WITH AN ULTRASOUND-GUIDED FASCIA ILIACA BLOCK: A PROSPECTIVE RANDOMIZED CONTROLLED TRIAL

In this prospective randomized controlled trial, the authors from SC and AZ, USA [3] note that the ultrasound-guided fascia iliaca blocks have been used for pain control after hip arthroscopy. However, there is little evidence regarding their effectiveness in comparison with other pain-control modalities in patients who have undergone hip arthroscopy. They compare the efficacy of ultrasound-guided fascia iliac block with intra-articular ropivacaine in controlling pain after hip arthroscopy.

Between 2015 and 2017, a total of 95 patients undergoing hip arthroscopy were randomly assigned to two groups. The first group received an ultrasound-guided fascia iliaca block with 50–60 ml of 0.35% ropivacaine. The second group received an intra-articular injection of 20 ml of 0.5% ropivacaine at the completion of the surgical case. Primary outcomes were postoperative pain scores in the recovery room; at postanesthesia care unit (PACU) discharge; and at 2 weeks, 6 weeks and 3 months. Secondary outcomes included intraoperative and PACU narcotic usage (converted to morphine equivalent use) as well as readmission rates, PACU recovery time and postoperative nausea and vomiting.

The postoperative pain across all points did not significantly differ between the two groups. Intraoperative and PACU narcotics did not differ significantly between the groups. Readmission rates, PACU recovery time, and postoperative nausea and vomiting did not significantly differ between the groups. There were no associated complications in either group.

The authors concluded that ultrasound-guided fascia iliaca block for hip arthroscopy had no clinical advantage when compared with one-time intra-articular ropivacaine injection.

ROUTINE INTER-PORTAL CAPSULAR REPAIR DOES NOT LEAD TO SUPERIOR CLINICAL OUTCOME FOLLOWING ARTHROSCOPIC FAI CORRECTION WITH LABRAL REPAIR

The authors from Waterford, Ireland [4] evaluate the impact of routine capsular repair on clinical outcome in a consecutive series of patients undergoing arthroscopic correction of symptomatic femoroacetabular impingement (FAI).

Between 2009 and 2015, patients were assigned to one of two groups based on whether or not a capsular repair was performed as part of their index hip arthroscopic

procedure. Exclusion criteria included prior underlying hip conditions, Tönnis > 1, age > 45 years, labrum not repaired. Patients were assessed pre-operatively and 2 years postoperatively using patient-reported outcome measures (PROMs) including the modified Harris hip score (mHHS), UCLA activity scale, short form-36, WOMAC osteoarthritis index and measures of range of hip movements. The incidence of any subsequent revision surgery within 2 years was recorded. Gender and age groups were specifically analysed.

In the 966 consecutive cases (96.4% follow-up) that were included, there were 508 patients in Group A (no repair) and 458 patients in Group B (repair). Average age for all cases was 28.1 ± 7.0 years. There were significant improvements in all PROMs following surgery for both groups. Statistical significance between groups at 2 years was observed for SF36 and WOMAC, both higher in Group A. Both groups similarly met minimal clinically important difference (MCID) (mHHS, $P = 0.414$ and 0.605; UCLA, $P = 0.549$ and 0.614; SF36, $P = 0.455$ and 0.079; WOMAC, $P = 0.425$ and 0.750 for distribution and anchor-based methods, respectively). Thirty-eight (7.8%) cases in Group A and 24 (5.4%) cases in Group B required repeat hip arthroscopy (HA). None (0%) of the cases in Group A and two (0.45%) of the cases in Group B required total hip replacement (THR). There was significantly lower rate of repeat HA among 25–34 years age group (8.6% versus 3.9%) where capsular repair was performed. No significant difference in the rate of repeat HA was found between the groups for males or females. Adhesions were more common in the repair group (79.2% versus 55.3%) with further capsular repair/plication required more frequently in the unrepaired group (50% versus 25%), however differences between groups were not significant. Internal rotation was greater in Group A compared with Group B at 2 years. Female patients with capsular repair had reduced PROM scores at 2 years compared with females without repair.

The authors concluded that the arthroscopic correction of FAI with labral repair results in significant improvements in patient-reported outcomes at 2 years post-surgery, irrespective of whether the capsule is repaired or not. Routine capsular repair in a consecutive series of patients did not lead to superior outcomes compared with a non-repaired group. Similar proportions of cases in both groups were able to achieve MCID. In females, routinely repairing the capsule may lead to statistically inferior clinical outcome at 2 years post-surgery, although this may not be clinically significant. Routine capsular repair, however, may be beneficial in the younger, active patient, where a significant reduction in repeat arthroscopy was observed.

CONNECTIVE TISSUE PROGENITOR ANALYSIS OF BONE MARROW ASPIRATE CONCENTRATE HARVESTED FROM THE BODY OF THE ILIUM DURING ARTHROSCOPIC ACETABULAR LABRAL REPAIR

The number and concentration of progenitors of the bone marrow aspirate (BMA) harvest from the body of the ilium in comparison to other established aspiration sites were evaluated by authors from MA and CT, USA [5]. The inclusion criteria consisted of primary hip arthroscopy for acetabular labral tear. The BMA was performed by placing an aspiration needle into the body of ilium just proximal to the sourcil in 33 patients. The BMA was centrifuged and processed in the operating room, resulting in approximately 3–5 ml of bone marrow aspirate concentrate (BMAC). Samples of both BMA and BMAC were analysed.

The cohort of 30 patients had a mean number of nucleated cells of 24.0 million nucleated cells/cc of BMA. The BMAC samples had a mean CTP cells concentration of 879.3 stem cells/cc of BMAC, a mean CTP prevalence of 34.1 stem cells/million nucleated cells and a mean number of days to form colonies of 2.97 days. All four metrics of CTP harvest did not vary significantly with age, BMI, gender or laterality. The nucleated cell count was significantly associated with both CTP prevalence, $r^2 = 0.287$ and CTP concentration, $r^2 = 0.388$.

The authors concluded that the BMAC harvested from the body of the ilium during concurrent hip arthroscopy is a technically and biologically feasible option. Furthermore, the harvest site was found to have a CTP concentration that is similar or exceeds other published harvest sites. Finally, BMAC processing and application to areas of articular cartilage wear was performed efficiently and safely with no increase in morbidity or complications.

BILATERAL HIP ARTHROSCOPY IN HIGH-LEVEL ATHLETES: RESULTS OF A SHORTER INTERVAL BETWEEN STAGED BILATERAL HIP ARTHROSCOPIES

The authors from Phoenix, USA [6] state that hip arthroscopy is a safe and effective mechanism for treating femoroacetabular impingement symptoms in high-level athletes. Bilateral symptoms occur in a subset of this population. They discuss outcomes of bilateral hip arthroscopy in high-level athletes and compare a standard staged timeline for bilateral hip arthroscopic surgery versus an accelerated timeline.

In this cohort study, a retrospective review of all staged bilateral hip arthroscopies was performed on high-level athletes over a 3-year period. Patients were categorized into cohorts based upon when the second procedure was

performed (4–6 or >6 weeks after the index procedure). Exclusion criteria included any prior hip surgery, advanced arthritis, previous pelvic or femoral fracture, or inflammatory arthropathy. Demographics, radiographic measurements, operative reports of procedures performed and patient-reported outcomes (hip outcome score-activities of daily living, hip outcome score-sport specific subscale, modified Harris hip score, return to sports, return to same level of play) were compared between groups at 6-month, 1-year, and 2-year intervals, with the Student *t-test* used for continuous data and a chi-square test used for categorical data.

Fifty patients were identified, of which 22 were in the accelerated surgery (AS) group and 28 in the standard surgery (SS) group. Age and number of collegiate participants were greater in the AS group, whereas the number of high school participants and the time away from sports were higher in the SS group. Preoperative alpha angles were significantly larger among the AS group, but no differences were found in postoperative alpha angles, centre-edge angles or Tönnis grades. There was no significant difference seen in patient-reported outcomes between the two groups at 6-month, 1-year, and 2-year follow-up.

The authors concluded that bilateral hip arthroscopy performed 4–6 weeks apart is a safe and effective treatment option for athletes with bilateral femoroacetabular impingement and labral tears; the procedures entail a high rate of return to sports, return to the same level of sports and decreased time lost from sports. This information could be useful for an athlete deciding on whether to proceed with bilateral hip arthroscopy and deciding on the timing for the procedures.

CONFLICT OF INTEREST STATEMENT

None declared.

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