

skeletal, radiographic or MRI) parameters. Likewise, histologic analysis of synovial membrane and articular cartilage including repair tissue did not show any differences between treatment groups.

**Conclusions:** We found that long-term improvement was enhanced in repair tissue firmness and aggrecan content following intraarticular administration of BMSC. These findings persisted even with strenuous exercise and may be of long-term clinical benefits in other species. We believe that these positive findings support further in vivo research, including human clinical trials to use BMSC to enhance outcomes of the microfracture procedure.

**Paper 11: Femoral Anteversion in the Hip: Comparison of Measurement by CT, MRI, and Physical Examination, and Relationship with Intra-Articular Findings** *ITAMAR BUSHERI BOTSER, MD, USA, PRESENTING AUTHOR*

*GEORGE CHUKWUKA OZOUDE, MD, USA*

*DOREA ELIZABETH MARTIN, BA, BS, USA*

*SIVARAJA KUPPUSWAMI, MD, USA*

*AHEED JAWEED SIDDIQI, MD, USA*

*BENJAMIN G. DOMB, MD, USA* · Hinsdale Orthopaedic Associates  
Chicago, IL, USA

**SUMMARY**

While high correlation was found between anteversion angle measurements by CT and MRI, significant discrepancies in the absolute anteversion number implies that they may not be interchangeable. The lack of a high correlation to range of motion suggests that femoral anteversion may represent an incomplete or oversimplified description of the complex rotational anatomy of the hip.

**DATA**

**Purpose:** Femoral rotational anatomy is thought to have important effects on the function and pathology of the hip joint. However, adequate assessment and description of rotation of the proximal femur have remained elusive, largely due to the 3-dimensional complexities involved. While anteversion has commonly been measured by CT or MRI, the clinical importance of those measurements is unknown. The purpose of this study was to evaluate the correlation between measurements of femoral anteversion by CT, MRI, and physical examination, and the relationship of anteversion with intraoperative findings.

**Methods:** Preoperative CT and MRI measurements of anteversion, along with clinical examination, were performed on 135 consecutive hips before hip arthroscopy

for non-arthritic hip injuries. Most hips were treated for labral tears and/or femoro-acetabular impingement (FAI). All studies were read preoperatively by two musculoskeletal-trained radiologists, and arthroscopic findings and procedural data were prospectively collected. Statistical analysis was performed for correlation between anteversion measurements by CT, MRI, and physical examination.

**Results:** CT and MRI measurements of femoral anteversion were highly correlated ( $r = 0.723$ ,  $p$  value  $< 0.00001$ ). However, more than 80% of the cases had a difference larger than  $5^\circ$  between the two measurements. Internal rotation on physical exam was moderately correlated with anteversion angles as measured by CT and MRI, with  $r$  values of 0.38 ( $p < 0.0001$ ) and 0.33 ( $p = 0.0001$ ), respectively. No correlation was found between external rotation measurements and CT or MRI anteversion values, with  $r$  values of  $-0.08$  ( $p = 0.38$ ) and  $-0.02$  ( $p = 0.81$ ), respectively. Patients who underwent iliopsoas release had larger anteversion angles, whereas patients who underwent femoral osteoplasty and microfracture had lower values of anteversion angles. No correlation was found between anteversion angle and intra-operative findings.

**Conclusion:** While high correlation was found between anteversion angle measurements by CT and MRI, significant discrepancies in the absolute anteversion number between the two techniques implies that they may not be interchangeable. The lack of a high correlation between anteversion and range of motion suggests that femoral anteversion may represent an incomplete or oversimplified description of the complex rotational anatomy of the hip. In addition, the absence of correlation between anteversion and arthroscopic findings calls into question the clinical relevance of femoral anteversion. Further research is needed to develop more complete assessment tools for femoral rotational anatomy, and to better understand its importance.

**Paper 12: Indirect Magnetic Resonance Arthrographic Correlation with Arthroscopy in the Evaluation of Articular Hip Pathology** *SUN-JUNG YOON, MD, PHD, KOREA, PRESENTING AUTHOR*

*JONG-HYUK PARK, MD, KOREA*

*MYUNG SIK PARK, MD, PHD, KOREA*

· Chonbuk National University Hospital  
Jeonju, Chonbuk, Korea

**SUMMARY**

Although indirect magnetic resonance arthrography is an effective mean of hip evaluation for labral tears, it has limited sensitivity to evaluate articular cartilage lesion. A

negative imaging study does not exclude important intraarticular pathology that can be identified and treated arthroscopically.

#### DATA

**Objective:** In this study, we compared indirect magnetic resonance arthrography results with hip arthroscopy findings to assess the diagnostic correlation this imaging technique in evaluation acetabular labral tears and cartilage lesion of the hip.

**Materials and Methods:** One hundred thirty consecutive patients (131 hips) with a clinical diagnosis of acetabular labral tear were assessed using indirect magnetic resonance arthrography and had hip arthroscopy after failing to improve with nonoperative treatment. Indirect magnetic resonance arthrography was performed on a 3.0-T magnet. Patients received IV gadolinium contrast material and exercised for 15 minutes. All arthroscopic procedures were performed by one orthopedic surgeon (MSP) who specialized in treating hip disorder.

**Results:** Indirect magnetic resonance arthrography detected 110 of 131 (95%) acetabular labral tears with 13 false positive studies (9.9%). Articular cartilage findings diagnosed by indirect magnetic resonance arthrography were confirmed by arthroscopy in 56 hips (62.7%). With respect to labral pathology, indirect magnetic resonance arthrography showed a sensitivity of 96%, specificity of 42%, positive predictive value of 89%, and negative predictive value 37%. With respect to articular cartilage pathology, indirect magnetic resonance arthrography had a sensitivity of 26%, specificity of 93%, positive predictive value 75%, and negative predictive value 63%.

**Conclusion:** Although indirect magnetic resonance arthrography is an effective mean of hip evaluation for labral tears, it has limited sensitivity to evaluate articular cartilage lesion. A negative imaging study does not exclude important intraarticular pathology that can be identified and treated arthroscopically.

#### **Paper 13: Cartilage Injury Caused By Hip Scope**

VICTOR MANUEL ILIZALITURRI JR., MD, MEXICO, PRESENTING AUTHOR

JAVIER CAMACHO-GALINDO, MD, MEXICO

HUMBERTO GONZALEZ UGALDE, MEXICO

ALBERTO N. EVIA RAMIREZ, MD, MEXICO · Instituto Nacional de Rehabilitación Mexico  
Mexico City, DF, Mexico

#### SUMMARY

100 patients followed for 2 years. Instrument produced articular injury in hip arthroscopy was studied. 68 had partial thickness cartilage injury more common at the

lateral femoral head. This seems to have no impact in results.

#### DATA

**Introduction:** Cartilage injury produced by instruments during hip arthroscopy is mentioned as a concern in the literature. The incidence and significance of this situation is unknown.

The purpose of this study is to identify the frequency of instrument produced intraarticular injury in the hip joint documenting the size, shape and location of the lesions and evaluating their clinical significance.

**Methods:** A consecutive series of patients that underwent hip arthroscopy between January 2007 and December 2008 was followed for 2 years after the procedure prospectively. Preoperative and last follow-up WOMAC scores and standard radiographs were used. No trauma cases or cases with existing full thickness cartilage lesions were included. No patients with previous surgery in the same hip or with bilateral hip pathology were included. After hip arthroscopy was completed a full diagnostic round was performed and instrument produced articular lesions were documented looking at their shape size and location using the geographic zone method. Lesions to the labrum were also recorded as piercing or not during entry.

**Results:** 51 female and 49 male patients were included in the study, average age was 31.4 (SD 5.4 range 16-41). Diagnosis: 66 Mixed femoroacetabular impingement (FAI), 18 cam FAI, 9 Pincer FAI, 6 Internal snapping hip, 1 synovitis.

Two different types of instrument produced lesions were identified and described as lines (needle marks) or troughs (cannula marks). Overall; 68 presented cartilage lesions, on the acetabulum there were 14 stripe lesions and no troughs (7 zone 3, 2 zone 6, 1 zone 4). On the head there were 54 stripes (19 zone 3, 18 zone 2, 3 zone 4) and 14 troughs (13 zone 3, 1 zone 2). Only one labrum was pierced at entry and no full thickness cartilage lesions were observed.

95% of the patients in the series were available for follow-up at 2 years. Overall and within groups there was significant improvement in WOMAC scale at 2 yr-follow-up ( $p < 0.001$ ) using the Wilcoxon T test. When we stratified analysis between type of lesion and WOMAC at last follow-up, we did not find significant differences ( $p = 0.08$ ).

**Discussion:** Our results indicate that partial thickness instrument produced cartilage injury is very common in hip arthroscopy. However this does not seem to have an impact in the results at short term follow-up.

100 patients followed for 2 years. Instrument produced articular injury in hip arthroscopy was studied. 68 had