**ePoster #: 101**  
*Ligamentum Teres Tears Due To Bony Impingement - Their Identification And Treatment.*

Hip Arthroscopy Australia  
Melbourne, Victoria, AUSTRALIA

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**Category:** Advanced / Innovative Hip Arthroscopic Techniques

**Summary:**  
We present a new mechanism causing Ligamentum teres tears, demonstrate treatment, and report the outcome of this treatment in nine patients.

**Data:**  
Ligamentum Teres tears are found in 4-15% of arthroscopic hip procedures, and are the third most common cause of hip pain found at arthroscopy in athletes. The cause of these tears is often not clear. We describe a new mechanism of Ligamentum Teres tear, where the Ligament impinges against a prominent bony process of the posterior wall of the acetabular fossa, during internal rotation of the hip.

This bone is best imaged with sagittal CT scans, and these scans demonstrate four patterns of bone conformation. Type 1 is oblique, Type 2 square, Type 3 overhanging (small), and Type 4 overhanging (large).

In a series of nine cases described, surgical debridement of the ligament, combined with decompression and excision of the bony prominence resulted in rapid, marked relief of pain. MHHS improved from 54 to 77 by 6 weeks and 83 at 1 year, NAHS from 53 to 67 at 6 weeks and 86 at 1 year.

No patient had recurrent symptoms.

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**ePoster #: 102**  
*Endoscopic Treatment Of Calcinosis Circumscripta Of The Hip Joint: A Report Of Several Cases Of Arthroscopic Removal Of A Calcific Deposition Between Labrum And Capsule*

St. Petrus Hospital Bonn  
Bonn, GERMANY

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**Category:** Advanced / Innovative Hip Arthroscopic Techniques

**Summary:**  
We recommend the endoscopic approach, which is effective and minimally invasive, for treatment of calcinosis circumscripta and other calcifications in the hip joint. Especially in young patients, with a high activity level and without any symptoms of hip osteoarthritis, the hip arthroscopy is the ideal treatment.

**Data:**  
We present five cases of arthroscopic removal of a calcific deposition in terms of the disease calcinosis circumscripta between labrum and capsule of the hip joint. Case 1: A 42-yearold woman was presented with complaints of a two-year history of right hip pain. Radiographs showed a calcific deposition in the area of the acetabular roof. Arthroscopy showed a calcific deposition between labrum and capsule in the form of calcinosis circumscripta. At the four-month follow-up she was symptom-free with a painless full range of motion. Case 2: A 48 year-old slim woman was presented with complaints of right hip pain over the last six month. The preoperative radiographs showed a hip with a calcific deposition lateral to the pronounced acetabular roof. At the four-month follow-up after removal she was also symptom-free . To the best of our knowledge, these are the first ones with calcinosis circumscripta treated using hip arthroscopy. We recommend the endoscopic approach, which is effective and minimally invasive, for treatment of calcinosis circumscripta and other calcifications in the hip joint. Especially in young patients, with a high activity level and without any symptoms of hip osteoarthritis, the hip arthroscopy is the ideal treatment.
Two of these cases are already published in the Journal: 
Arthroscopy-The Journal of arthroscopic and related 
surgery in August 2010 Vol. 28 No.8

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**ePoster #: 103**

**Hip Arthroscopy In A Patient With A Previous Van Ness Rotationplasty**

Shriners Hospital for Children, Portland Portland, Oregon, USA

**Dennis R. Roy, MD, USA, Presenting Author**

**Category:** Advanced / Innovative Hip Arthroscopic Techniques

**Summary:**
The arthroscopic technique and surgical findings in a patient with recalcitrant hip pain who had a previous Van Ness Rotationplasty for PFFD is presented.

**Data:**
Van Ness rotationplasty is a reconstructive option in patients with PFFD that fuses the knee and rotates the lower extremity 180 degrees converting the ankle joint into a knee joint; thereby, allowing it to function with a below knee prosthesis. The neurovascular anatomy is also altered with this reconstruction. A case is presented of a 15 year old female who was born with an Aitken Type A PFFD and associated Achtermen and Kalamchi Type II fibular hemimelia who was treated at 3 years of age with a Van Ness rotationplasty. Subsequent valgus osteotomies for coxa vara was performed at ages 5, 8 and 11 years. She presented with progressive hip pain of 2 years duration, worse with activities (volleyball, which she had to give up) but also without apparent provocation.

Hip arthroscopy was performed in the supine position on a fracture table. Her 3-ray foot was padded and placed into a traction boot which was rotated to the face down position. A distension distraction technique was utilized for access to the central compartment. Anterolateral and mid-anterior portals were utilized. A bifurcated labrum was identified with the accessory limb attaching to the center of the femoral head. The accessory limb was resected revealing an area of denuded cartilage in the posterior acetabulum. Short term follow-up (1 year) showed improvement in her pain and a resumption of her activities in her prosthesis.

Hip arthroscopy allowed safe management of the intra-articular pathology in this patient with a previous rotationplasty

**ePoster #: 104**

**Use Of Platelet Rich Plasma In Arthroscopic Surgery of Femoroacetabular Impingement: A Prospective Study**

Meds 
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**Category:** Advanced / Innovative Hip Arthroscopic Techniques

**Summary:**
To assess the effect of Platelet Rich Plasma (PRP) in arthroscopic surgery of femoroacetabular impingement.

**Data:**
Purpose:
To assess the effect of Platelet Rich Plasma (PRP) in arthroscopic surgery of femoroacetabular impingement.

Methods:
49 cases were included in a prospective experimental study .. The Group I has 30 cases treated with PRP; the control group (Group II) has 19 cases not treated with PRP. Pain was measured using the VAS scale one day after surgery. MRI scans were performed and interpreted by an blind radiologist (sinovitis , labrum attachment) three months after surgery. We performed a Harris Hip Score (HHS) at three months after surgery. Statistical analysis.
Results:
VAS scale: group I patients had on average half the pain score (53%) than group II patients. In HHS: the average of group I patients was only 4 percentage points higher than the average of group II patients. MRI 36.7% of group I patients had no synovitis, as opposed to 21.1% of group II patients. 31.6% of group II patients had synovitis, against 26.7% of group I patients. The odds of homogeneous to heterogeneous labrum was similar for both groups, so the odds ratio was close to 1.

Conclusions:
PRP had a positive effect on the decrease of pain and synovitis.

PRP had no effect on HHS after three months or on the quality of labrum attachment.

Level of Evidence: Level II. A prospective, experimental study.

debridement or reconstruction. By preserving articular cartilage in the region of labral deficit with meticulous rim trimming, the resultant undermined free chondral margin (“pseudolabrum”) may immediately restore a fluid seal function and may theoretically enhance hip preservation.

Methods:
All patients from our database that underwent arthroscopic hip labralization met our inclusion criteria of cam-pincer FAI diagnosis and the index procedure plus acetabulo- and femoroplasty with completed pre-operative and post-operative nonarthritic hip scores (NAHS) with minimum 1 year follow-up. There was 100% participation. Patients were also queried as to satisfaction and electronic medical record review was performed. Our preliminary clinical outcomes and surgical technique video are presented.

Results:
6 patients (1 male, 5 female) of average age 47 years (range 37-54) with pre-operative diagnoses of cam-pincer femoroacetabular impingement with average follow-up of 21 months (range 12-35) underwent arthroscopic hip labralization along with acetabulo-femoroplasty. Patient satisfaction was high (4 highly satisfied, 2 satisfied). Pre-operative NAHS averaged 52 (range 24-77) and post-operative NAHS averaged 90 (range 76-100) with an average improvement of 38 (range 9-63) (P=0.031, Wilcoxon signed rank test). There were no complications, revision surgeries or conversions or scheduled conversions to total or resurfacing arthroplasties.

Discussion:
By restoration of the labral fluid seal effect for symptomatic improvement and theoretical hip preservation, arthroscopic labral reconstruction is emerging with encouraging outcomes. Patients with severe anatomic and/or functional labral insufficiency deemed borderline candidates for reconstruction may benefit from hip labralization as an attractive option to labrectomy or reconstruction. It is a relatively simple and quick procedure without harvest morbidity that can be performed in patients undergoing rim reduction while

ePoster #: 105

Arthroscopic Hip Labralization: An Alternative To Hip Labral Reconstruction?

Kaiser West Los Angeles Medical Center
Los Angeles, California, USA

Dean K. Matsuda, MD, USA, Presenting Author

Category: Advanced / Innovative Hip Arthroscopic Techniques

Summary:
Arthroscopic hip labralization is a relatively simple and fast procedure without harvest morbidity that can be performed in patients requiring rim reduction with early encouraging outcomes.

Data:
Introduction:
Arthroscopic hip labral reconstruction has been used in the management of the non-salvageable labrum in hopes of restoring labral function and enhancing hip preservation. Optimal candidates may be relatively young active patients without significant coxarthrosis. For patients with non-salvageable labrae that are older and/or have somewhat more chondral damage, we have developed an arthroscopic alternative to labral
offering the potential for immediate fluid seal restoration. Further investigation is merited to determine if our findings are durable, hip-preservative, and comparable to those of labral reconstruction if studied with similar cohorts.

Conclusion:
Arthroscopic hip labralization offers an attractive option to labrectomy and labral reconstruction with early encouraging outcomes in select patients with severe labral insufficiency.

ePoster #: 106
A New External Fixator Design For A Safer And More Comfortable Hip Arthroscopy

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Category: Advanced / Innovative Hip Arthroscopic Techniques

Summary:
We designed a new external fixator for obtaining rotation and flexion to hip joint during distraction without complications associated with traction table.

Data:
Purpose:
Because of the anatomic constraints of the femoroacetabular joint, hip arthroscopy is harder and more challenging than other joint arthroscopies. Complications associated with traction table and gaining no motion of the hip joint during distraction on the traction table is the difficulties that aren’t observed in the other joint arthroscopies. The purpose of this cadaveric study is to report a new design of an external fixator that allows hip flexion and rotation during hip distraction without the risks associated with the use of traction table.

Method:
Four hips of 2 fresh frozen cadavers were prepared without degeneration and arthrosis on plain radiographs. We applied our external fixator by 2 pins to the supraacetabular region proximally and 2 pins to midshaft of the femur distally in supine position. Joints were distracted by the help of clicker under fluoroscopic control. Central and peripheral compartments were fully executed from standard arthroscopic portals. Flexion and rotation degrees were recorded.

Results:
Obtaining the distraction in the fluoroscopic control, central and peripheral compartment arthroscopic visualization was performed. By the help of the device, 30 degrees of flexion and 30 degrees of rotational movements of the hip were easily obtained during distraction and an easier intervention to the hip joint could be performed in all hips.

Discussion and Conclusions:
There were some reports of external fixators for hip arthroscopy to avoid the complications about traction table. But usually these fixators were used only for distraction in lateral position, not able to make hip flexion and rotational movements during distraction. Our device allows hip flexion and rotation during surgery and thus enables better view and easy intervention to hip joint. Furthermore our design can be easily applied and don’t cause complications due to traction table.

ePoster #: 107
Arthroscopic Application Of A Purely Autologous 3-Dimensional ACT Product In The Hip

Orthopaedic and Trauma Surgery Center
University Medical Center Mannheim, GERMANY

Stefan Fickert, MD, GERMANY, Presenting Author

Category: Advanced / Innovative Hip Arthroscopic Techniques

Summary:
The technique of arthroscopic application of a purely autologous 3-dimentional ACT product in the hip is demonstrated.

Data:
Currently, diseases of the cartilage in the hip treated almost exclusively by arthroscopic removal or microfracture. In contrast ACT at the knee is the best
Characteristics of the Transplant Chondrosphere
Chondrosphere consists of human autologous spheroids in 0.9% NaCl suspension and are used for transplantation into isolated cartilage defects of joints. The spheroids derive from human autologous chondrocytes, which can produce cartilage-specific matrix and are able to build a 3-dimensional structure under defined cell culture conditions. The major advantage of these spheroids is that they are purely autologous in a sense that neither during the manufacturing process nor for the transplantation, xenogenous material is used, which reduces the risk of rejections or incompatibilities or viral contaminations. While chondrocyte cell suspensions start differentiating and secreting matrix proteins not until their transplantation into the cartilage defect, the chondrocytes in the spheroids are in a more advanced differentiation state already before being transplanted.

ePoster #: 108
Arthroscopic Treatment Of Synovial Chondromatosis Of The Hip

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Category: Advanced / Innovative Hip Arthroscopic Techniques

Summary:
The treatment of synovial chondromatosis of the hip using arthroscopic loose body removal and synovectomy is relatively successful.

Data:
Background:
Recently, arthroscopic loose body removal and synovectomy have been performed as treatments for synovial chondromatosis of the hip joint. However, there has been no report on the outcomes of arthroscopic treatments to date.
Hypothesis:
Arthroscopic treatment is effective for synovial chondromatosis of the hip joint and has advantages such as low recurrence rates, faster return to daily activities of life, and few surgical complications.

Study design: Case series

Methods:
From June 1996 to July 2008, we evaluated 24 patients with synovial chondromatosis of the hip who could be followed up after arthroscopic loose bodies removal and synovectomy. Common arthroscopic portals were anterior, anterolateral, and posterolateral portals. In some cases, we applied a medial portal for removal of loose bodies in the posteromedial pouch. Pre-operative and post-operative assessment was made through simple radiographs, 3D CT, MRI, VAS score, range of motion, and Harris hip score.

Results:
Postoperative mean follow-up period was 41 months. There were no major complications. Patients were able to walk weight-bearing on average 2 days after surgery, and could be discharged in an average of 3.5 days (3–5 days) after surgery. In post-operative radiologic imaging, four cases showed progression of joint osteoarthritis and one case of them underwent total hip arthroplasty. The VAS score before surgery was 8.1±1.3 and 3.1±1.4 after surgery. Range of motion of the hip joint before surgery was increased after surgery, except in one patient who required a third operation. Harris hip score before surgery had a median range of 39±6.9 and improved to an average of 82±10.2 after surgery. Eighteen patients (75%) had a good or excellent outcome. Symptomatic disease recurred in four patients (16.7%) and one of four patients showed recurrence again.

Conclusion:
The treatment of synovial chondromatosis of the hip using arthroscopic loose body removal and synovectomy is relatively successful and rehabilitation of patients is faster, therefore making it an effective treatment with satisfactory results after surgery. However, a technical limitation of arthroscopy was the difficulty in approaching the posterolateral and posteromedial area of the peripheral compartment.

**ePoster #: 109**
**Arthroscopic Repair Of Acetabular Chondral Delamination With Fast-Fix™ Meniscal Sutures**

Cambridge Spire, Euromedica Thessaloniki
Cambridge, Thessaloniki, UNITED KINGDOM

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Richard N. Villar, BSc (Hons), MA, MS, FRCS, UNITED KINGDOM

**Category:** Advanced / Innovative Hip Arthroscopic Techniques

**Summary:**
We describe a direct cartilage suture repair technique with the use of a meniscal repair system in 36 patients. The preliminary results of this technique are favourable.

**Data:**
Lesions to articular cartilage can be difficult to treat and may directly impact surgical outcome following hip arthroscopy. We describe a direct cartilage suture repair technique with the use of a meniscal repair system in 36 patients who underwent hip arthroscopy for the treatment of femoroacetabular impingement. Inclusion criteria were patients who were found to have chondral delamination and early chondral flap formation on the acetabulum, with small associated labral lesions that required only minor debridement. The chondral separation was located at the chondrolabral junction in all cases. The unstable chondral flap was restabilised using the FAST-FIX (Smith & Nephew, Andover, USA) meniscal suture system following microfracture to the underlying subchondral bone. Osteochondroplasty for cam impingement was undertaken in all cases. All patients’ Modified Harris Hip Scores (MHHS) were recorded pre-operatively, and at six, 12, 24 and 52 weeks, and then yearly. A paired t-test was used to compare paired samples. There was a significant improvement demonstrated in the MHHS (p < 0.001) at a mean of 22 months (15 to 42) post-operatively. This was reflected in a statistically significant improvement in reduction of pain (p < 0.001), but not in function (p =
0.081). No patients needed revision procedures for recurrent symptoms. The preliminary results of this technique are favourable, and we continue to monitor the patients closely. Also we believe that further research is required to establish the true potential of cartilage viability in such lesions.

**ePoster #: 110**

*Arthroscopic Hip Labral Reconstruction with Gracilis Autograft*

Kaiser West Los Angeles Medical Center
Los Angeles, California, USA

**Dean K. Matsuda, MD, USA, Presenting Author**
Raoul Burchette, MA, MS, USA

**Category:** Advanced / Innovative Hip Arthroscopic Techniques

**Summary:**
This case series with matched controls demonstrates a beneficial contribution of arthroscopic hip labral reconstruction with gracilis autograft in multi-step surgeries for femoroacetabular impingement.

**Data:**
Introduction:
The labrum appears to have a significant role in hip preservation which has fostered a growing trend towards labral preservation. However, during surgery, the labrum may not be salvageable by current repair methods. Arthroscopic hip labral reconstruction with the gracilis tendon offers potential benefits of a homogeneous autograft requiring no post-harvest manipulation via a user-friendly harvest from the knee familiar to many surgeons.

Methods:
Our initial consecutive series of patients undergoing this procedure completed pre- and post-operative self-assessed nonarthritic hips scores (NAHS), underwent chart review and were queried as to complications and knee pain. Two control groups were obtained from a concurrent prospective clinical outcome study at the same institution with 24 month minimum followup. We first looked at the significance of changes in non-arthritic hip score (NAHS) among the study group using the Wilcoxon signed rank test. We used two approaches to form comparable groups. The first was 1 to1 matching of the 8 cases to 8 controls (cam-pincer femoroacetabular impingement (FAI) patients without labral reconstruction). We matched on five-year age group, gender, Tonnis grade, and pre-operative NAHS. The second approach was by linear regression of post-operative NAHS for all patients, adjusting for surgery group, age, body mass index (BMI), osteoarthritis (Tonnis 0, 1 or 2), and pre-operative NAHS.

Results:
8 consecutive patients (7 male, 1 female) of average age 34.6 years (range 18-58) with average 17.3 month followup (range 12-27) in patients with cam-pincer FAI (5 without osteoarthritis, 3 with Tonnis 1) that underwent concurrent acetabular and femoral osteoplasties with labral reconstruction showed a high level of satisfaction (7 highly satisfied, 1 moderately satisfied) and a 49 point improvement in NAHS (P=0.008) with average pre-operative score of 41.9 (range 25-64) and average post-operative score of 91.0 (range 83-98). Compared to matched controls, patients undergoing labral reconstruction had a lower self-assessed pre-operative NAHS but equal or better post-operative scores. The coefficients from the linear regression of post-operative NAHS on age, BMI, gender, Tonnis grade, surgery group (whether or not labral reconstruction) and pre-operative NAHS showed only surgery group (p = 0.002) and pre-operative NAHS (p = 0.006) were statistically significant predictors of post-operative NAHS (r2 = 0.26). The effect of the labral reconstruction as an isolated study entity was an 18.2 point improvement in NAHS. There were no major complications or arthroplasty conversions.

Discussion:
Arthroscopic labral reconstruction with gracilis autograft has a beneficial clinical effect in select patients with non-salvageable labrae. These patients may have clinical outcomes comparable to those undergoing labral refixation despite having more severe labral pathology and lower pre-operative NAHS. By using 1-to-1 matched controls and regression analyses, we were able to elucidate a significant contribution of labral reconstruction in these multi-step procedures.
Conclusion:
Arthroscopic hip labral reconstruction using gracilis autograft may provide an attractive option in the management of select patients with severe labral insufficiency.

ePoster #: 201
Gene Expression Analysis Identifies The Human Acetabular Labrum And Meniscus As Metabolic Active Joint Tissues
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Category: Basic Science
Summary:
Our work suggests an important contribution of both meniscus and acetabular labrum to joint homeostasis at the biomolecular level and should be considered as an incentive for further research to explore the in-depth biological role of the meniscus and labrum in joint homeostasis in health and disease.

Data:
Objective:
The biomechanical role of human acetabular labrum and meniscus in hip and knee joint is well known. However, little is known about the metabolic characteristics of these structures. Therefore, the aim of this study was to investigate expression and release of pro-inflammatory cytokines and enzymes by these cell types.

Methods:
Human acetabular labrum cells (n=9), meniscus cells (n=11) and chondrocytes (n=11) were isolated and cultured in alginate beads during 10 days. Five samples of each tissue were additionally stimulated with IL-1 during 24 hours. The gene expression levels and secretion of different enzymes and cytokines known to be involved in connective tissue metabolism were examined to assess the metabolic characteristics of the 3 cell types.

Results:
Gene expression data confirmed the fibrocartilaginous origin of human acetabular labrum and meniscus compared to articular cartilage, as revealed by COL2A1 and COL1A1 levels. MMPs, TIMP-1, ADAMTS-4, ADAMTS-5 and IL-6 are constitutively expressed in all 3 cell types. Furthermore, these genes are highly dependent on IL-1 exposure. In general, meniscus and labrum cells showed a higher MMP and cytokine expression compared to articular chondrocytes.

Conclusions:
Our data show that meniscus and acetabular labrum are constituted from metabolically highly active cell types, expressing and secreting cytokines and proteases. Thus, besides the biomechanical role, these tissues have undoubtedly an metabolic role in joint biology and homeostasis. This study should be considered as an incentive for further research to explore the in-depth biological role of the meniscus and labrum in joint homeostasis in health and disease.

E-Poster #: 202
The Ligamentum Capitis Femoris – An Arthroscopic Evaluation Of Function In Situ
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Erich Brenner, Prof. Dr. Med. Univ., AUSTRIA
Category: Basic Science
Summary:
The mechanic stabilising effect of the LCF
Data:
Introduction:
Reviewing the literature there’s evidence that lesions of the ligamentum capitis femoris (LCF) can have quite a
pathologic value. By now the arthroscopically performed reduction, resection or trimming of ruptured or injured ligaments that cause impingement are state of the art. Latest examinations of the ligament found similarities to the ACL, whereas one can separate three different bundles in the LCF compared to two in the ACL. These findings lead to the question whether reconstructions of the LCF are worth to be considered. As there’s nothing known about the definite function of the LCF in adults we performed this study to gain more information about this topic.

Material and Methods:
Cadaver hips were prepared down to joint capsule and bone. Parts of the lamina quadrangularis were removed by means either of hammer and chisel or high speed cutters to open the fossa from the peliac side. 30° and 70° angled optics were used to examine the performance of the LCF during different movements of the joint.

Results:
Every different form of appearance of the LCF described in the literature (ovaloid, flat, round, ....) could be found during different movements of the hip joint. We couldn’t separate three different bundles, we could proof a “continuous recruitment of fibres” when taking different positions; in nearly every movement of the joint parts of the LCF get tightened. As already known the LCF gets the highest tension in flexion-adduction-external rotation and in extension-abduction-external rotation of the hip. The most unstressening position for the LCF is in 0° rotation (extension or flexion), whereas every kind of rotation (internal or external) tightens different sections of the LCF. The more the rotation gets, the more fibres get recruited.

Summary:
The described technique of examining the LCF offers the opportunity to see and evaluate the actions of the LCF during the full range of motion of the hip joint respectively the tensioning of fibres in different positions. Reviewing the literature it’s one of the first examinations of the LCF performed in situ. The LCF gets tensioned in every form of rotation, independent of the flexion-extension-position. In flexion-adduction-internal rotation (impingement-position) the posterior fibres are strongly tensioned. The other positions show tensioning of different fibres depending on the motion. This supports the theory of the mechanic stabilising effect of the LCF in hip joints.

**ePoster #: 203**
*Increasing Alpha Angle Is Predictive Of Athletic Related Groin Pain In NFL Prospects*

Minnesota Orthopedic Sports Medicine Institute
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Bryan Kelly, MD, USA
Rahul Jain, MD, USA
M. Russell Giveans, PhD, USA

**Category:** Basic Science

**Summary:**
Increasing alpha angle (larger cam lesions) was the only radiographic independent predictor of athletic related groin pain in this cohort.

**Data:**
Introduction:
There is limited data evaluating the relationship between athletic related groin pain and radiographic hip pathomorphology in elite athletes. Our hypothesis was that athletes with a history of or current athletic related groin pain would have greater degrees of hip pathomorphology and femoroacetabular impingement (FAI) compared to those without.

Summary:
Increasing alpha angle (larger cam lesions) was the only radiographic independent predictor of athletic related groin pain in this cohort.

**Methods:**
The study population included all male collegiate football players undergoing evaluation and hip radiographs at the NFL Scouting Combine in 2009 and 2010. All
Radiographs were evaluated with a detailed evaluation for hip pathomorphology. Symptoms were recorded as symptomatic or asymptomatic with respect to athletic related groin pain for comparative purposes.

Results:
125 players (239 hips) had hip radiographs and were included in the final study group. There were 68 players and 75 hips in the symptomatic group and 57 players and 164 hips in the asymptomatic group. Although the symptomatic group had larger cam lesions (higher alpha angle) \((p=0.01)\) and a greater prevalence of combined-type FAI \((p=0.007)\) and osteitis pubis \((p=0.014)\), increasing alpha angle (larger cam lesions) was the only independent predictor of athletic related groin pain. There was no correlation, however, between symptoms \((p=0.331)\), the presence of FAI \((p=0.438)\), player position \((p=0.386)\), or body mass index (BMI) \((p=0.651)\), and whether the player was drafted by an NFL team.

Conclusion:
Radiographic signs of FAI were frequently seen in collegiate NFL prospects. Although osteitis pubis, combined-type FAI, and larger cam lesions were more prevalent in the symptomatic group, increasing size of the cam lesion was the only independent predictor for athletic related groin pain.

Key Terms: Hip, Femoroacetabular Impingement (FAI), NFL

Level of Evidence: IV

**ePoster #: 205**
**Periarticular Calcifications About The Acetabulum: Classification And Prevalence**

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David Brcka, MD, USA
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**Category:** Basic Science

**Summary:**
Calcifications near the acetabulum have often been called Os Acetabuli. However, we have identified 3 distinct morphologies of periarticular calcifications that represent different etiologies.

**Data:**
Introduction:
Calcifications near the acetabulum have often been called Os Acetabuli. However, we have identified 3 distinct morphologies of periarticular calcifications that represent different etiologies.

Methods:
498 consecutive patients (996 hips) presented to 2 orthopedic surgeons at 2 centers for “hip” related complaints. There were 227 males and 271 females (age 38 years, range, 10 - 81). An anteroposterior radiograph of both hips and a lateral radiograph of each hip was obtained for all patients and reviewed for findings of cam and pincer femoroacetabular impingement (FAI), as well as dysplasia, degenerative changes (Tonnis grade) and peri-acetabular calcifications for both hips. These parameters were also evaluated with respect to symptoms, gender, age, and bilaterality.

Results:
The overall prevalence of peri-acetabular calcifications in hips was 11.5% (18.9%, patients), with 62.6% of calcifications in the symptomatic hip and 37.4% in the contralateral hip. One hundred eleven (22.3%) patients had calcification of at least 1 hip while 36 (7.2%) had bilateral peri-acetabular calcifications. 3 basic patterns of calcification were identified: Punctuate calcifications within the labrum (6.8% hips, 11.5% patients), Large rounded calcifications (os acetabuli) (2.9% hip, 4.8% patients), and large fragments with a vertical line of the superior-lateral acetabular rim, consistent with healed or non-healed stress fracture (1.5% hips, 2.6% patients). Additionally, 32 hips (3.2%) had an ossified labrum. Table 1 lists the prevalence and bilaterality as well as the relationships to gender, bony morphology, symptoms.

There was no difference in age \((p=.0503)\) or gender \((p=.187)\) between groups, and cam-type FAI was equally prevalent among the three types of periarticular calcifications and ossified labrums \((p=.089)\). Os acetabula
and Rim Fractures each had a higher prevalence of pincer-type (p<.05) or combined type (p<.01) impingement compared to both punctate calcifications and ossified labrums. When bilateral calcifications were identified, 66.7% were of the same type in both hips. There was no statistical evidence for association with degenerative changes between types of periacetabular calcifications or ossified labrums.

Conclusions:
Periacetabular calcifications are not uncommon. Three particular patterns of calcification are identified: punctate labral calcifications (11.5%), larger rounded calcifications (i.e. os acetabula) (4.8%) and acetabular stress fractures (2.6%), for a combined prevalence of 18.9% in patients presenting to an orthopaedic surgeon with “hip” related complaints. Os acetabula and acetabular stress fractures had a higher prevalence of pincer or combined-type FAI than punctate calcifications and ossified labrums, with no between group differences found for cam-type FAI, age or gender.

<table>
<thead>
<tr>
<th>Prevalence</th>
<th>Male</th>
<th>Female</th>
<th>Cam</th>
<th>Pincer</th>
<th>Combined FAI</th>
<th>Symptomatic Hip</th>
<th>Bilateral</th>
</tr>
</thead>
<tbody>
<tr>
<td>Punctate Calcification</td>
<td>68 hips (6.8%)</td>
<td>42 hips (61.8%)</td>
<td>26 hips (38.2%)</td>
<td>25.8%</td>
<td>16.1%</td>
<td>45.2%</td>
<td>66.2%</td>
</tr>
<tr>
<td>19.3%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Os Acetabuli</td>
<td>29 hips (2.9%)</td>
<td>20 hips (69%)</td>
<td>9 hips (31%)</td>
<td>15.4%</td>
<td>7.7%</td>
<td>76.9%</td>
<td>79.3%</td>
</tr>
<tr>
<td>Rim Fracture</td>
<td>15 hips (1.5%)</td>
<td>13 hips (86.7%)</td>
<td>2 hips (13.3%)</td>
<td>0.0%</td>
<td>0.0%</td>
<td>92.3%</td>
<td>86.7%</td>
</tr>
<tr>
<td>Ossified Labrum</td>
<td>32 hips (3.2%)</td>
<td>17 hips (53.1%)</td>
<td>15 hips (46.9%)</td>
<td>38.7%</td>
<td>19.4%</td>
<td>38.7%</td>
<td>59.4%</td>
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<tr>
<td>39.1%</td>
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</tbody>
</table>

**Category**: Basic Science

**Summary**: This study aims to define a local reference level of radiation with the use of fluoroscopy in hip arthroscopy.

**Data**:
Background:
Arthroscopic surgery of the hip is a rapidly expanding specialist technique requiring fluoroscopic guidance. However, the radiation effective dose for this type of surgery has not been reported previously been and the safety of this technique and the probability of iatrogenic radiation induced cancer is unknown.

Aim:
Our aim was to define a local reference level to guide surgeons establishing an arthroscopic hip practice and inform patients of the local and systemic radiation risk involved with this procedure.

Patients and Methods:
We collected dose area products (DAPs) for 50 consecutive patients undergoing arthroscopic surgery of the hip by an experienced hip arthroscopic surgeon. Radiation dose data, including total screening time and dose area product (DAP) were obtained from the hospital Computed Radiology Information System database. The effective dose provides an estimate of the risk of radiation-induced malignancy due to stochastic effects in later life following exposure of a given level of radiation. The effective dose and organ dose were derived using a PC-based Monte Carlo programme. These calculations assumed a tube voltage of 90 kVp and used a standard hermaphrodite phantom measuring 178.6cm and 73.2kg. The entrance skin dose (ESD), the amount of radiation absorbed at any given point on the skin, was also calculated by dividing the DAP by the irradiated beam area at the surface of the patient and then applying a back scatter factor of 1.43. A radiation threshold of 2Gy needs to be exceeded before significant radiation induced skin damage is evident.

Results and Conclusions:
The mean total fluoroscopy time was 1.10 minutes and the mean DAP value was 297.2 cGycm2. We calculated the entrance skin dose to be 52mGy to the area where
the beam was targeted (81 cm²). Using a phantom model the mean effective dose (MED) was calculated to be 0.328 mSv which we propose is used as the local reference level effective dose for arthroscopic hip surgery and suggest that this is a low and acceptable dose for patients contemplating this surgery.

**ePoster #: 207**

**An Anatomical Model For Function Of The Ligamentum Teres.**

Duquesne University
Pittsburgh, PA, USA

**Robroy Martin, PhD, PT, USA, Presenting Author**
Ben Kivlan, PT, USA
F. Richard Clemente, PhD, PT, USA
Hal Martin, DO, USA

**Category:** Basic Science

**Summary:**
This cadaveric study found in the combined position of flexion, abduction, and medial rotation the LT becomes the “floor” of the hip joint, stabilizing the femoral head from anterior/inferior subluxation; this endpoint was consistently obtained on repeated measures.

**Data:**

**Purpose:**
The ligamentum teres (LT) has historically been disregarded as an important stabilizing structure of the hip. However, disruption of the LT is prevalent in athletic population, particularly those with hypermobility. The purpose of this study was to explore the LT’s potential as a hip stabilizer. Objectively we wanted to define the position of the hip at the LT’s endpoint of excursion and describe the position of the LT relative to the hip joint.

We hypothesized that we could reliably obtain the position of the hip as limited by the LT.

**Number of Subjects:**
Eight embalmed Caucasian cadavers (4 male; 4 female) with a lifespan ranging between 72-89 years were utilized for this study.

**Methods:**
Dissection of the cadavers was complete to remove all soft tissue attachment of the femur and acetabulum, leaving only the LT intact. The hip joint was then placed in combined movements of flexion/extension, abduction/adduction, and medial/lateral rotation. The hip position where the LT was taut was recorded using an inclinometer relative to hip flexion/extension and abduction/adduction angles. These angles were recorded on repeated trials. Rotational position of the hip joint at the endpoint was described as either medial or lateral rotation. Intraclass correlation coefficients (ICC) were calculated to determine the test re-test reliability in obtaining an endpoint for both flexion and abduction. Repeated measures ANOVA was used to assess for differences in relative endpoint position.

**Results:**
The LT endpoint was obtained at an average of 101° flexion (range 94-112°; SD 5.5°; 95% CI 96°-105°), 20° abduction (range 12-32°; SD 7.0°; 95% CI 14°-26°) and relative medial rotation. In this position the LT assumed an anterior and inferior orientation relative to the femoral head in all cadavers, forming a “sling-like” structure to support the hip joint inferiorly. ICC for flexion and abduction were 0.92 and 0.91, respectively. There were no significant differences in the repeated measures or in side-to-side comparisons. A gender difference (p<.05) was noted as females reached an endpoint in less degrees of abduction (15°+3.80) than the males (25°+6.54).

**Conclusion:**
In the combined position of flexion, abduction, and medial rotation the LT became the “floor” of the hip joint, potentially stabilizing the femoral head from anterior/inferior subluxation. This endpoint was consistently obtained with repeated measures. There does seem to be variation between genders in the abduction angle for the LT endpoint.

**Clinical Relevance:**
This study found the LT to have a potential stabilizing role for the hip in the combined position of flexion, abduction, and medial rotation. The knowledge gained
by this study may help in the clinical assessment and
treatment of those with LT pathology.

**ePoster #: 208**
**The Etiology Of Residual Symptoms After Hip Arthroscopic Treatment Of Femoroacetabular Impingement : Analysis Using Finite Element Modeling**
Chungnam National University Hospital
Daejeon, SOUTH KOREA

Deuk-Soo Hwang, MD,PhD, SOUTH KOREA, Presenting Author
Jung-Bum Lee, MD, SOUTH KOREA
Chan Kang, MD, SOUTH KOREA
Pilsung Kim, MD, SOUTH KOREA

**Category:** Basic Science

**Summary:**
Finite element model analysis of FAI indicated that incomplete removal of a bump was the cause of pain, and that accurate location of the lesion and adequate bump removal are the definitive factors in reducing pain.

**Data:**
Purpose:
To analyze, using finite element model analysis, the causes of postoperative pain in patients who had arthroscopic treatment for femoroacetabular impingement (FAI).

Materials and Methods:
Ten patients with FAI treated by arthroscopic surgery between July 2004 and July 2007 were selected. Five cases whose condition improved to a pain score of 3 postoperatively were assigned to comparative group A and 5 cases who had a second operation done due to a pain score of 1 were assigned to experimental group B. Finite element model analysis was done for the impingement test position. Femoral offset and alpha angle were measured to compare with contact pressure or von Mises stress.

Results:
Preoperative von Mises stress and contact pressure were all higher in group B than group A. Maximal stress and pressure location was the anterolateral surface of the femoral head and neck, and this location was removed more accurately in group A.

Conclusion:
Finite element model analysis of FAI indicated that incomplete removal of a bump was the cause of pain, and that accurate location of the lesion and adequate bump removal are the definitive factors in reducing pain.

**ePoster #: 209**
**Effect Of Acetabular Rim Resection On Anterior Rim Angle: A Cadaveric Study**
Midwest Orthopedics - Rush University Medical Cent Chicago, IL, USA

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Ethan S. Lea, MD, MS, USA
Christopher Gross, MD, USA
Katherine Manno, BS, USA
Vamshi Yelavarthi, BS, USA
Joseph Barker, MD, USA
James Williams, MD, USA
Walt Virkus, MD, USA
Charles Bush-Joseph, MD, USA

**Category:** Basic Science

**Summary:**
Femoro-acetabular impingement (FAI) is a source of hip pain and early degenerative joint disease. Currently, studies on arthroscopic treatment of pincer type FAI have only described changes in the acetabular center edge angle of the hip. Therefore, the purpose of this study is to establish additional radiographic parameters to detect acetabular changes during rim trimming for pincer type FAI.

**Data:**
Introduction:
Femoro-acetabular impingement (FAI) has been extensively studied as a source of hip pain and osteoarthritis of the hip. This disease is well characterized by two different types of impingement caused by osseous abnormalities: CAM (femur head) and pincer (acetabulum). The focus of this study is on the pincer type FAI. Arthroscopic treatment of the pincer type FAI has been previously described, but these studies have only reported on the change in the
acetabular center edge angle of the hip without much additional study of the remainder of the acetabulum cavity dimensions. The purpose of the present study was to further examine the significant changes within the acetabulum cavity upon completion of acetabulum rim trimming for pincer type FAI.

Methods:
Cadaver specimens with Tönnis grade 0 or 1 were included in the study. Specimens with greater than Tönnis grade 2, deformity, or metal implants were excluded. Eleven cadaveric hips met the study criteria and were dissected with removal of all tissue, exposing the acetabulum and femoral head. Specimens were marked 5mm from the 12 o'clock (superior) to 3 o'clock (anterior) position on the acetabulum with a digital caliper. An osteotome was used to remove the 5mm of the acetabular rim. The trimmed acetabulum was smoothed out using a dremel (Bosch Tool Corp, Mount Pleasant, IL). Pre- and post-operative radiographs were taken of the anterioposterior (AP) view of the hip socket as well as the false profile. Measurements were performed by two separate observers and averaged. Inter- and intra-observer reliability was obtained for all measurements. Dimensions analyzed were as follows: tön尼斯 angle, center edge angle (CEA), anterior rim angle (angle between the line marked from the center of the femur head to the posterior inferior margin of the sourcil and the best fit line parallel to the anterior ridge of the acetabulum), the anterior wall angle (angle formed by the anterior wall and a horizontal line through sourcil), and the anterior margin ratio (distance from the anterior edge of the acetabulum to the sourcil over the distance from the center of the femur head to the sourcil).

Results:
Each of the 11 hips included in this study underwent a rim reduction of 5 mm from 12 o’clock to 3 o’clock. The mean pre-operative tön尼斯 angle was 8.05°. The mean post-operative tön尼斯 angle was measured as 10.53°. The mean change in tön尼斯 angle after resection was 2.48° (range, 0.5° to 7.60°), with p-value < 0.05. The mean pre-operative CEA was 42.65. The mean post-operative CEA was measured as 36.89. The mean change of the CEA after resection was 5.76° (range, 5° to 12.10°), p < 0.05. The mean pre-operative anterior margin ratio was 0.70. The mean post-operative anterior margin ratio was measured as 0.60. The mean change of the anterior margin ratio after resection was 10.7% (range, 2.1% to 17.8%), p < 0.05. Interclass correlation coefficient for the radiographic measurements of the anterior rim angle was 0.77 (95% confidence interval) and intraclass correlation coefficient was 0.98. The mean pre-operative anterior rim angle was 81.36°. The mean post-operative anterior rim angle was measured as 86.55°. The mean change of ARA after resection was 5.18° (range, 0.65° to 12.8°), p < 0.05. Interclass correlation coefficient for the radiographic measurements of the anterior rim angle was 0.91 (95% confidence interval) and intraclass correlation coefficient was 0.99. The mean pre-operative anterior wall angle was 34.77°. The mean post-operative anterior wall angle was measured as 29.23°. The mean change of the AWA after resection was 5.55° (range, 2.1° to 9.3°), p < 0.05. Interclass correlation coefficient for the radiographic measurements of the anterior rim angle was 0.92 (95% confidence interval) and intraclass correlation coefficient was 0.90.

Discussion:
This study showed that a rim trimming procedure commonly used for the treatment of pincer type femoro-acetabular impingement (FAI) implements significant change on multiple measurements of the acetabular morphology besides the CEA. A consistent decrease of the anterior margin ratio, anterior wall angle and increase of the anterior rim angle on the post-operative acetabulum were verified: two acetabulum measurements previously unrecognized or utilized in clinical evaluation. The data collected from the AP pelvis and false profile radiographs demonstrated acetabular dimensional changes that were comparable for all specimens. Validity of dimensional changes was confirmed through comparison to angle changes found in the literature for well studied dimensions, specifically center edge angle, indicating that the overall post-operative morphological change of the acetabulum is consistent with current knowledge of rim trimming procedures used in treatment of pincer type FAI. Statistical analysis showed that measurements of both pre and post-operative data sets obtained from the two
observers were statistically significant through strong interclass and intraclass correlation coefficients. The new parameters, both anterior rim angle and anterior margin ratio, can be used as a means to further examine acetabular coverage pre- and post-operatively. Much more investigation and analysis of the acetabulum anatomy is necessary to be able to fully understand the effects of rim trimming treatment on hip 3D morphology. The present study provides a foundation for a more thorough interpretation of the changes of acetabular dimensions after surgical resection.

**ePoster #: 301**  
*Prevalence Of Acetabular Lesions In Elderly Patients With Femoral Neck Fracture*

Kyung Hee University  
Seoul, KOREA

**Yoon Je Cho, MD, PhD, KOREA, Presenting Author**  
Sang Joon Kwak, MD, KOREA  
Young Soo Chun, MD, PhD, KOREA  
Kee Hyung Rhyu, MD, PhD, KOREA  
Myung Chul Yoo, MD, PhD, KOREA

**Category:** Chondral and Labral Treatment

**Summary:**  
The possible nature of inguinal pain and acetabular erosion in elderly patients treated by hemiarthroplasty for femoral neck fracture can be a labral lesion which was exist before

**Data:**  
**Purpose:**  
The goal of this study was to determine the prevalence of acetabular labral and cartilage lesions in patients with femoral neck fracture and to verify whether they are related to the inguinal pain and acetabular erosion in elderly patients treated by hemiarthroplasty.

**Materials and Methods:**  
We prospectively evaluated acetabular labral and cartilage lesions in 28 hips in 28 patients from July 2010 to March 2011. Mean age of the patients were 76.1(range, 58-88) years old. The fracture patterns according to the Garden classification were type 1 in 3 hips, type 3 in 15 hips, and type 4 in 10 hips. The acetabular lesions were evaluated using arthroscopy during hemiarthroplasty or total hip arthroplasty procedure. They were graded according to the morphology, extent, and location of the lesion.

**Results:**  
Twenty-eight hips(100%) had the labral lesion. Labral tears were found in 14 hips(50%) and 5 hips(17.9%) of them were associated with degenerative erosion. Degenerative torn-out of the labrum were found in the other 14 hips(50%). Twenty-five hips(89.3%) had an acetabular cartilage lesion. Degeneration of cartilage were found in 16 hips(57.1%) and contusional lesion were found in 6 hips(21.4%). Two hips(7.1%) were involved by degenerative and contusional lesion at the same time. On the radiologic evaluation, 12 hips(42.9%) had abnormal bony morphologies(A hip with acetabular dysplasia and 11 hips with femoroacetabular impingement(FAI)) on the contralateral hip. Before the trauma, 13 hips(46.4%) have had a pain around the hip joint and 9 hips of them(9/13. 69.2%) were associated with contralateral FAI or acetabular dysplasia. There was no statistical correlation between abnormal bony morphologies on the contralateral hip and the presence of acetabular cartilage(p=0.211) and labral lesions(p=0.164). However, there was a statistical correlation between the presence of abnormal bony morphologies on the contralateral hip and the previous hip pain (p<0.01).

**Conclusion:**  
Based on these findings, we developed a high prevalence of labral and cartilage lesions in elderly patients, regardless of the presence of abnormal bony morphologies of hip. The hip pain before experiencing femoral neck fracture, however, would be associated with the abnormal bony morphologies of hip. This information can help to define the possible nature of inguinal pain and acetabular erosion in elderly patients treated by hemiarthroplasty for femoral neck fracture, and to determine appropriate treatment option, hemiarthroplasty or total hip arthroplasty. We need to have clinical evaluation to define it.
ePoster #: 302

A New Classification Of Articular Cartilage Lesions Of The Hip

Post Street Orthopaedics and Sports Medicine
San Francisco, CA, USA

Thomas G. Sampson, MD, USA, Presenting Author

Category: Chondral and Labral Treatment

Summary:
A new classification of articular cartilage damage of the hip is proposed to better determine the etiology and arthroscopic treatments.

Data:
A new classification of articular cartilage lesions of the femoral head and acetabulum is proposed to address both the etiology of the damage and direct correct treatment. Other classifications only describe damage in general terms and were based on open surgery. With the development of better recognition and extent of articular damage using arthroscopic techniques, an improved system of classification is necessary to recognize the causes of damage to implement the correct treatments. The new classification and its correlation to etiology and proposed arthroscopic surgery with early to late outcomes will be presented.

ePoster #: 303

Arthroscopic Treatment For Acetabular Labral Tears Of The Hip Without Bony Dysmorphism

Hip Arthroscopy Australia
Melbourne, Victoria, AUSTRALIA

John M. O'Donnell, MBBS, FRACS, FAOrthA, AUSTRALIA, Presenting Author

Barak Haviv, MBBS, ISRAEL

Category: Chondral and Labral Treatment

Summary:
We present an outcome study of the arthroscopic treatment of acetabular labral tears where all patients with associated bony abnormalities were excluded, and also identify factors associated with poorer outcomes in this group.

Data:

Background:
Surgical treatment for labral tears of the hip has shown good results in patients with bony impingement lesions; however, results are also affected by the correction of bony abnormalities. This study evaluates the outcome of arthroscopic treatment for acetabular labral tears without associated dysplasia or bony impingement lesions.

Hypothesis:
Based on the structural importance of the acetabular labrum, labral tear debridement or repair can relieve pain and improve function.

Study Design: Case series;
Level of evidence, 4.

Methods:
The study included 81 patients who were categorized according to 4 morphologic labral tear types. The tear type, degree of synovitis, and chondral damage were analyzed with the use of multivariate regression analysis and correlated to the clinical outcome. The outcome was assessed utilizing the modified Harris hip score (MHHS) and the nonarthritic hip score (NAHS).

Results:
There were 81 patients (81 hips), including 20 men and 61 women, with 41 right and 40 left hips. Their mean age was 44 years. Overall, at an average follow-up of 3 years the mean MHHS had improved by 18 points (95% confidence interval [CI], 13-23) and the mean NAHS by 17 points (95% CI, 12-22). An improvement after arthroscopic treatment was noticed in all types of labral tears of the hip. The level of synovitis and of chondral lesions was found to have a significant negative effect on the clinical outcome.

Conclusion:
Arthroscopic treatment for acetabular labral tears of the hip without dysplasia or bony impingement lesions has good short- to midterm results. The best outcome is expected in the absence of synovitis and chondral lesions.
ePoster #: 304

**Hip Labrum Tears Treated With Arthroscopic Debridement Versus Non-Operative Measures: Quality Of Life Outcomes**

Dartmouth Hitchcock Medical Center
Lebanon, NH, USA

**Gregory Mont Ford, MD, USA, Presenting Author**
Kevin F. Spratt, PhD, USA
Ivan Tomek, MD, USA

**Category:** Chondral and Labral Treatment

**Summary:**
Although insufficient follow up data precluded a sufficient enough number of non-operatively treated patients to detect differential efficacy between operative and non-operative care for labral tears, the large sample of operative patients demonstrated significant improvements from baseline in SF-12 PCS HRQoL outcome.

**Data:**

**Background:**
Hip arthroscopy for debridement of symptomatic labrum tears, along with many other expanding indications such as femoral acetabular impingement, has become more common. There is limited published information on patient Health Related Quality of Life (HRQoL) improvement after hip arthroscopy and, to our knowledge, no studies comparing operative and non-operative treatment of labral tears.

**Methods:**
In this cohort study, patient-reported questionnaires (SF-12 PCS and MCS) were completed as part of standard of care by patients who underwent either arthroscopic surgery for hip labrum tear or chose non-operative treatment. Longitudinal regression methods were used to assess SF12 PCS and MCS scores at baseline (pre-treatment), 1 month, 3 months, 6 months and 1 year with these follow-ups being compared to baseline estimates within and without, adjusting for selected patient factors.

**Results:**
Of 242 patients identified as having labral tears, 58 did not meet study inclusion criteria (43 were treated with arthroplasty, 2 had other prior hip related surgery, 1 had an open labral debridement, 6 had no labral pathology from arthroscopy findings, 6 were treated elsewhere). Of the remaining 184, 24 were treated non-operatively and 160 had one or more labral arthroscopies. Overall 84 of these patients were lost due to data-related exclusion criteria: 25 had insufficient baseline data, 32 had insufficient follow-up data, 10 did not have primary outcome scores (SF12 MCS or PCS scores) and 17 had inconsistent data. Comparing those included and excluded from analysis detected only one significant factor: of the 24 patients treated non-operatively 79% were lost to follow-up compared to 9.5% for patient treated with arthroscopy, p < .0001.

Of the remaining 100 patients, 5 were treated non-operatively, and 95 received arthroscopy (87 single and 8 multiple). Average patient age was 39.3 with a standard deviation of 11.7; 73% of the patients were female, average BMI was 25.1 (sd=7.5), 49% had OA, and 20% had FAI. Evaluation of the SF12 MCS and PCS for those treated with arthroscopy indicated significant changes across time. Estimated changes from baseline PCS scores, mean and standard error (34.9, 0.77), were not significantly different compared to 1-month follow up (33.7, 0.95), p < .34; but were significantly different – showing improvement – at 3-month (38.60, 0.96), p < .004; 6-month (41.9, 1.54), p < .0001); and 1-year follow up (42.9162, 1.43) p < .0001. Various combinations of adjustment factors had no significant impact of score estimates. No significant differences from baseline were observed for the SF12 MCS follow-up scores.

**Conclusions:**
Comparing operative procedures with non-operative treatment based on standard of practice data may be difficult in this cohort since so few patients treated non-operatively return for follow-up. For those 5 in this trial who did return, the pattern of results was similar to those treated with arthroscopy. Based on SF12 PCS scores, improvement with arthroscopy was minimal and not significantly better than baseline at 1 month, but was statistically different and, on average, demonstrated improvement from baseline at 3, 6 and 12 months. Further study with larger sample sizes are needed to provide reliable evaluation of the efficacy of non-operative care and differential efficacy between non-
operative and operative care. To provide a broader understanding of treatment efficacy, subsequent studies should also expand outcomes to include safety considerations including complications.

**ePoster #: 305**

*Recognition And Arthroscopic Treatment Of A Full-Thickness Acetabular Articular Cartilage Delamination Defect (FAACD)*.

Post Street Orthopaedics and Sports Medicine
San Francisco, CA, USA

**Thomas G. Sampson, MD, USA, Presenting Author**

**Category:** Chondral and Labral Treatment

**Summary:**
A method to recognize and treat full thickness acetabular articular cartilage delamination defects (FAACD) will be presented with intermediate outcomes showing it is an effective procedure to preserve injured or degenerated labrum and articular cartilage of the acetabulum.

**Data:**
The nature and extent of a Full Thickness Acetabular Articular Cartilage delamination Defect (FAACD) has gone unrecognized, and there is essentially nothing in the literature describing neither the true problem nor its treatment. It has been known as a blister or a wave effect when probing the acetabulum in zones 1, 2 and 3. The lesion is associated with pincer impingement, and we describe a method to expose and treat it using hip arthroscopic techniques. Through an extensive capsulotomy, the labro-capsular junction is exposed and separated from the acetabular rim in the area of the defect. Separation of the delaminated articular cartilage as a flap with the intact labrum from the bony acetabulum is accomplished by a blunt elevator. The exposed acetabular face is curedtted and micro-fractured to stimulate a healing response and bonding of the interface. The intact labro-cartilage construct is then re-fixed to the rim with bone anchors. Patients are encouraged to do early weight bearing, and range of motion exercises using directed self procured rehabilitation and training. The indications diagnosis, imaging and the details of the technique as well as early and intermediate results will be presented.

**ePoster #: 306**

*Analysis Of Labral And Articular Chondral Changes In 2458 Arthroscopies*

Newton Wellesley Hospital
Newton, MA, USA

**Joseph C. McCarthy, MD, USA, Presenting Author**

Joann Lee, MS, USA

**Category:** Chondral and Labral Treatment

**Summary:**
The arthroscopic observations reported in this large study support the concept that labral disruption may be a prelude to degenerative joint disease.

**Data:**
Abstract:
This study examines the relationship between articular cartilage changes and labral lesions in patients in various stages of joint disease.

**Materials and Methods:**
Between 1993 and 2010, 2458 consecutive hip arthroscopies were performed by the senior author. Indications for surgery included painful mechanical symptoms reproducible at physical exam, and failure to respond to conservative therapy. The severity of articular cartilage damage was graded according to the Outerbridge classification system.

**Results:**
One thousand nine hundred fifty-seven of the 2458 (80%) arthroscopic patients had anterior labral tears, and an additional 195 had labral fraying. All lesions were located at the articular, not capsular margin of the labrum. Of the 1957 hips with anterior labral tears, 1312 (67%) had associated anterior socket changes. Of those with anterior socket changes, 1067 (81%) had Grade III or IV changes. In addition, of the 1957 with anterior labral tears, 717 (37%) had anterior femoral head changes and 271 (38%) were Grade III or IV. Conclusion: The arthroscopic observations reported in this large study support the concept that labral disruption may be a prelude to degenerative joint disease. These lesions are frequently part of a continuum of joint pathology that begins with delamination of the articular cartilage from the articular margin adjacent to the labrum and then leads to more global labral and articular cartilage degeneration.
**ePoster #: 307**  
*Predicting Labral Repairability Prior To Surgery: Age Under 40 Is Predictive In 151 Cases*

Harvard Medical School  
Boston, MA, USA

**Kyle Alpaugh, MA, USA, Presenting Author**  
Frank McCormick, MD, USA  
Benedict Nwachukwu, B.S., USA  
Martin Gagne, B.S., USA  
Scott Martin, MD, USA

**Category:** Chondral and Labral Treatment

**Summary:**  
When compared with patients over 40 years of age, patients under 40 years are more likely to undergo labral repair rather than labral resection. This is explained as they are more likely to have partial labral tears rather than complex or degenerative tears.

**Data:**  
Introduction:  
Hip arthroscopy is the preferred method for the treatment of acetabular labral tears. Mounting evidence suggests labral repairs produces better post-surgical outcomes than to labral debridement. The decision of whether a labrum is repairable is often definitively made intra-operatively. An a priori better understanding of the characteristics of patients presenting with repairable labrum is valuable to the hip arthroscopist, especially if the surgeon will need to consider labral reconstruction options.

The purpose of the present study was to identify a patient demographic that demonstrates a high potential for labral repair upon presentation. We also sought to determine the age distribution of particular acetabular labral tear types as determined intra-operatively.

We hypothesize that patients under 40 are more likely to undergo acetabular labral repair while patients over 40 are more likely to undergo labral excision. Furthermore, we hypothesized that the acetabular labral tears of patients under 40 would be described as repairable, while the tears of older patients would be reported as “degenerative” and/or “complex.”

**Methods:**  
After IRB approval, we performed a retrospective review of 151 consecutive hip arthroscopies for labral pathology performed between 2006 and 2008 by one orthopaedic surgeon at a major tertiary care center. We reviewed clinic notes to compile data on patient demographics and indications for procedure. Operative notes were reviewed to gather information on labral intervention performed as well as the description of the labrum. We identified our independent variable as age and our dependent variables as labral intervention performed and intra-operative labral condition. In all cases labral intervention performed was either labral repair, labral resection or no intervention. Labral condition was described in terms of degree of tear: complex, degenerative, partial, bucket handle or displaced.

Statistical analysis was performed using SPSS. In evaluating the effect of age on labral intervention, we conducted a cross tabulation and Chi-Square test for age against labral intervention. Similarly, we conducted a cross-tabulation and Chi-Square test of age against intra-operative labral classification.

**Results:**  
Our study had complete data on 151 of 151 hip arthroscopies. 77 (51%) arthroscopies were performed in males; mean age at surgery was 41.2 years (SD ± 11.5). Of the 151 procedures, 25 hips underwent labral repair, 124 hips underwent labral resection and two hips received arthroscopy with no labral intervention. 18 of 69 (26%) hips in the “under 40” category and 7 of 82 (9%) of hips in the “over 40” category were repaired. Thus, patients less than 40 years old were 2.8 times more likely to receive a labral repair when compared to patients age over 40 (OR=3.78 p = 0.02), which closely corresponded to the intra-operative classification during arthroscopy as 1 out of 44 (2%) complex/degenerative tears were repaired compared to 14 of 75 (19%) partial, bucket, handle or displaced (OR=3.70 p=0.027).

**Conclusions:**  
We affirm our hypothesis. When compared with patients over 40 years of age, patients under 40 years are more likely to undergo labral repair rather than
labral resection. This is explained as they are more likely to have partial labral tears rather than complex or degenerative tears. Our findings suggest that younger patients demonstrate a propensity for labral repair; whereas, older patients are more likely to have degenerative tears identified at arthroscopy that is not amenable to repair, thus debridement versus reconstruction should be considered pre-operatively.

**ePoster #: 308**

*Arthroscopic Debridement Versus Repair Of Labral Tears In Patients With Femoroacetabular Impingement*

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**Category:** Chondral and Labral Treatment

**Summary:**
Prospective comparison of labral debridement to labral repair outcomes in the arthroscopic treatment of femoroacetabular impingement revealed equivalent short-term outcomes.

**Data:**
Introduction:
The purpose of this study was to compare the outcomes of labral debridement with those of labral repair in the arthroscopic treatment of femoroacetabular impingement (FAI).

Methods:
We prospectively assessed 83 patients (88 hips) who underwent arthroscopic management of femoroacetabular impingement with associated labral pathology from February 2009 to February 2011. Patients with labral tears suitable for repair (group R), as determined intraoperatively, were compared with patients who underwent labral debridement (group D) with a minimum of 6 months follow-up. Excluding patients with < 6 months follow-up (n = 10), previous surgeries on the operative hip (n = 7), deformity cases (n = 6), revisions (n = 5), and microfracture cases (n = 5), there were 55 hips (repair = 37, debridement = 18) eligible for analysis. Outcomes were measured preoperatively and postoperatively with the modified Harris Hip Score (mHHS), Short Form-12, and Visual Analog Scale for pain. Outcome differences between the groups were assessed using the Wilcoxon Rank Sum Test. In addition, progression analysis of groups R and D outcomes, at each time-point, was performed using Generalized Estimating Equations(GEE) regression methods.

Results:
The mean age was 39.8 years in group R, with a mean follow-up of 13 months (range, 6 months - 2 years). The mean age was 45.5 years in group D, also with a mean follow-up of 13 months (range, 6 months - 2 years). The debridement group was noted to have a larger percentage of hips with advanced arthritis (p = 0.0089). Otherwise, baseline demographics and preoperative functional/pain scores were not significantly different between the two groups. At the most recent follow-up visits, all median outcome scores were significantly improved (p<0.01) in both groups. Comparative analysis of final median scores revealed no differences between the groups at final follow-up. Regression analysis comparing mean values at different time-points showed a slight trend towards better outcomes in the repair hips for all subjective measures. Group R had significantly higher SF-12 MCS scores at 6 weeks (p=0.0154), 3 months (p=0.0130), and 6 months (p=0.0486); however, this difference was eliminated at final follow-up (p=0.2465). Otherwise, no significant differences in mean scores were determined between the groups at any time-point. Good to excellent results were similarly noted in 15 hips (83.3%) in the debridement group and 33 hips (89.1%) in the repair group. Age = 30 was the only factor found to be predictive of a good outcome (p = 0.003). Sub-analysis failed to demonstrate advanced arthritis to be a predictor of poor outcome. However, a non-significant trend towards a higher failure rate was seen in Group D (p=0.056).

Discussion and Conclusion:
This study is the first to compare, prospectively, the results of labral repair and debridement in the arthroscopic treatment of FAI. Preliminary results
indicate that equivalent short-term outcomes can be expected with either repair or debridement, as indicated by intraoperative assessment, when treating labral pathology in association with FAI. Trends toward higher failure rates in patients undergoing labral debridement are likely to become significant with longer follow-up.

ePoster #: 309
Arthroscopic Treatment Of Labral Tears In Acetabular Dysplasia: Role Of The Size Of The Tonnis Angle And Outcomes.

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Category: Chondral and Labral Treatment

Summary:
An increased Tonnis angle correlates with poorer surgical outcomes in patients with acetabular dysplasia receiving arthroscopic treatment for labral tears.

Data:
Introduction:
Labral tears are a common finding in patients with acetabular dysplasia. Currently, the role of arthroscopic treatment and the factors that might influence the outcome of labral treatment are still uncertain. The aim of this study is to assess if the size of the Tonnis angle influences the clinical outcomes in patients with acetabular dysplasia receiving arthroscopic treatment for labral tears.

Materials and Methods:
Retrospective study of 30 patients with acetabular dysplasia, with an associated labral tear treated with hip arthroscopy. Inclusion criteria were centre edge (CE) angle < 25, Tonnis grade 0, lateral sourcil height =2mm. The Tonnis angle was measured. Intraoperative findings were recorded and the type of labral treatment: resection or repair. Patients were assessed using a 100 point Modified Harris Hip Score (MHHS) pre- and post-operatively after an average of 2 years. A linear regression model was used to assess the relation of the difference in MHHS (preop-postop) and the Tonnis angle (explanatory variable). A linear regression model was also fitted within each of the treatment groups separately.

Results:
30 patients; 23 females and 7 males (mean age 37 years, range 23-51) were assessed pre-operatively and at 2 year follow up. The average CE angle was 21 degrees (range 15- 24). The average Tonnis angle was 13.8 degrees (6-25).

11 patients had a labral debridement and 19 patients a labral repair. Our study demonstrates a significant (p=0.0013) relation between the reduction in MHHS score difference (preop-postop) as the Tonnis angle increases.

Conclusions:
This study demonstrates that in patients with dysplasia who received arthroscopic treatment for labral tears, the surgical outcome (MHHS) is depending on the Tonnis angle. Patients with an increased Tonnis angle, independent of the type of treatment, have a poorer outcome and possibly, a different treatment option should be considered.

ePoster #: 310
The Clinical Use Of Autologous Bone Marrow Mesenchymal Stem Cells Concentrate Transplanted On A Platelet-Rich Plasma Clot Plus Microfractures In The Treatment Of Hip Chondral Defects: Surgical Arthroscopical Technique And Preliminary Results

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Category: Chondral and Labral Treatment

Summary:
A surgical arthroscopical technique and our preliminary results are presented step by step for the treatment of hip chondral defects with microfractures and Autologous
Bone Marrow Mesenchymal Stem Cells (ABM-MSC) Concentrate on a Platelet-Rich Plasma (PRP) Clot.

**Data:**

**Introduction:**
Chondral lesions of the hip represent a diagnostic challenge and can be an elusive source of pain. Gadolinium enhanced arthrography MRI is limited in its ability to reliably show the presence and extent of these lesions. More recently, however, delayed gadolinium enhanced MRI of cartilage (dgemric) has shown to be useful to delineate chondral damage within the hip. Treatment of chondral lesions of the hip presents many difficulties due to localization and spherical form of the joint and is most commonly limited to excision (rim trimming and femoral neck osteoplasty), debridement, thermal chondroplasty and microfractures. Rim trimming and femoral neck osteoplasty can lead to excise the chondral lesion if located in the overcoverage area. When full thickness chondral damage extends beyond resection area microfractures are the treatment of choice. The indications for microfracture of the hip are similar to the knee and include focal and contained lesions, tipically less than 2 to 4 cm² in size.

Microfracture is a marrowstimulating procedure that brings undifferentiated stem cells from a subchondral perforation into the chondral defect. A clot formed in the microfractured area provides an environment for both pluripotent marrow cells and mesenchymal stem cells to differentiate into stable fibrocartilaginous tissue. Several studies had shown good midterm results with this technique; however we know that this fibrocartilaginous tissue does not have the required mechanical properties and eventually will fail, leading to advanced chondral damage and osteoarthritis. Animal and clinical studies had demonstrated that the use of a PRP clot or bone marrow mesenchymal stem cells over the microfractured area can lead to a better quality hyaline-like fibrocartilage with better mechanical properties.

**Purpose:**
To describe a novel arthroscopical technique for the treatment of chondral hip lesions with the use of Autologous Bone Marrow Mesenchymal Stem Cells Concentrate (ABM-MSC) transplanted on a Platelet-Rich Plasma (PRP) Clot over the microfractured area.

To show our preliminary results in a prospective series of patients treated with this technique.

**Methods:**
Patients: 11 patients undergoing hip arthroscopy for FAI between December 2010 and May 2011 presenting a focal chondral defect were selected for treatment with microfractures and ABM-MSC concentrate transplanted on a PRP clot. 10 males and one female, 33 years old average (26 to 49) and a full thickness chondral lesion of 0,12 to 3 cm² were treated.

**Surgical Technique:**
After rim trimming and labrum refixation; cartilage assessment is made. If chondral lesion exists, we proceed to harvest autologous bone marrow stem cells, which are centrifuged obtaining 2 to 4 cc of ABM-MSC concentrate (average 14 millions of nucleated cells/cc3). At the same time, 50 cc of peripheral blood is taken and centrifugated twice, in order to obtain 4 cc of PRP (6 to 9x), ready to be activated with autologous thrombin. Treatment of chondral lesion is made as described by Steadman in the knee, with debridement of all remaining unstable cartilage, followed for the removal of the calcified plate. After preparation of the bed, multiple holes in the exposed subchondral bone plate are made, leaving about 3 to 4 mm between each. Once microfracture is complete, traction is release and we focus on the femoral osteoplasty, obtaining free range of motion with no abnormal contact between acetabular rim and femoral neck-head junction. At the end of the procedure, traction is reinstalled and we proceed to the final part of the procedure. After activation of PRP and clot formation, a slotted cannula is inserted via the anterior portal. PRP clot is inserted through the cannula and positioned over the microfractured area. A 21-gauge trocar is then inserted passing through previously located clot and ABM-MSC is instilled under PRP clot. Traction is then released and the procedure is finished.
Rehabilitation protocol:
Passive motion device is maintained for 8 hours. Two crutches with partial weight bearing are indicated for 6 to 8 weeks. Progressive physical activities are allowed.

Preliminary Results:
At the time, 11 patients with chondral lesion of the hip had been treated with microfractures and ABM-MSC concentrate transplanted on a PRP clot. All patients symptoms improved over the follow-up period of 4 months (1 to 8 months). Average Hip Outcome, Vail Hip and Modified Harris Hip scores for all patients showed significant improvement at 3 months. Ogemric of 2 patients at 6 months postoperatively revealed complete defect fill and complete surface congruity with native cartilage.

Conclusions:
Surgical technique of a novel treatment for chondral lesions of the hip is presented. ABM-MSC concentrate transplanted on a PRP Plasma clot may be an effective approach to promote the repair of articular cartilage defects of the hip. Further study is currently underway to identify medium and long-term effects in cartilage repair and outcomes.

ePoster #: 311
Acetabular Labral Tear Type In Relation To Mechanism Of Hip Impingement

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Category: Chondral and Labral Treatment

Summary:
In 444 hips with hip impingement no correlation was found between labral tear type and bony morphology. Other findings suggest that labral tear pattern may be reflective of the degenerative process.

Data:
Background:
It has been postulated that bony morphology of femoral acetabular impingement may cause labral tears. Furthermore, it has been suggested that labral tear patterns may reflect the mechanism of impingement: cam-type impingement may preferentially damage the chondro-labral junction, while pincer-type impingement may cause intrasubstance tearing.

Purpose/hypothesis:
The hypothesis of the current study was that a relationship exists between bony morphology of cam and pincer femoroacetabular impingement (FAI) and acetabular labral pathology (chondro-labral detachment, intrasubstance damage or both). The purpose of the study was to examine this relationship.

Methods:
In the period between the years 2008 to 2011, 444 cases (421 patients) met our inclusion/exclusion criteria for the study. All patients had bony morphology of FAI - measured alpha angle >50° on Dunn view, positive crossover sign on AP-pelvic XR or both. Revision surgeries, history of fracture, previous hip disease or Tonnis arthritic grade >2 were the exclusion criteria of the study. Acetabular labral tear type was determined arthroscopically at the time of the surgical treatment for the FAI.

The cohort was divided into three groups: Group 1 – tears at the base of the labrum which created a chondro-labral detachment; Group 2 – intrasubstance damage, labral fraying, labral cysts or labral ossification; and Group 3 – combination of both.

Results:
A total of 206 cases (46.4%) fitted Group 1, 110 cases (24.7%) fitted group 2 and 128 cases (28.8%) fitted Group 3. There was an insignificant difference in the distribution of the three FAI types between the groups (p=0.21). Insignificant differences were found also for the crossover sign, the size of the ischial prominence, the head-neck offset and the alpha angle (MRI and Dunn view).

Significant differences between the groups were found regarding age (p=0.001), with group 1 the youngest and group 3 the oldest; acute onset of pain (p<0.01), lowest in group 1 and highest in group 3; and Tonnis arthritic
grade (p=0.03), highest rate of Tonnis 0 in group 1 and lowest in group 3. Moreover, labral tear size was the only operative finding significantly different between the groups, with the smallest in group 1 and the highest in group 3 (p<0.0001).

Conclusions:
Correlation between labral pathology type and FAI type and morphology was not found. However, association to age, arthritic changes and labral tear size was found. Consequently, this association and its pattern may indicate a degeneration process rather than a morphological relationship.

**ePoster #: 312**
*Chondrocyte Survival Study In Chondrolabral Lesions In FAI. Can Be Cultured Those Chondrocytes?*

Meds
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**Category:** Chondral and Labral Treatment

**Summary:**
determine the survival and regenerative capacity of chondrocytes from chondral lesions in FAI

**Data:**
Background:
The treatment of chondral lesions in femoro acetabular impingement (FAI), that affect the chondrolabral complex, is controversial.

Aim:
Determine the survival and regenerative capacity of chondrocytes from chondral lesions (flap type) in FAI.

Material & Methods:
We incluue 15 samples of 9 patients with FAI who underwent a hip arthroscopy surgery. Eight Samples (Group I) were obtained of flap-cartilage from zone 2 and 3 of completed chondrolabral complex lesions with unstable flap. Seven samples (Group II) were obtained from healthy cartilage of femoral neck as a control group. The samples were sent to pathology unit to determine survival and culture of chondrocytes

Results:
The survival rate of all samples was 100%. There were no differences between both groups in growth curve of chondrocytes. Both group shows no differences of speed duplication rate of chondrocytes.

Conclusion:
There is complete survival and regenerative capacity of chondrocytes from chondral lesions flap type in FAI, in vitro.

**ePoster #: 313**
*Prognostic Outcome Factors Following Hip Arthroscopy: Minimum 10 Year Follow-Up*

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**Category:** Chondral and Labral Treatment

**Summary:**
There is a significant association between the grade of articular wear seen at time of arthroscopy and eventual progression to hip arthroplasty.

**Data:**
Arthroscopy of the hip has evolved over the past two decades to more effectively diagnose and treat several pathologies of the hip joint. However, there is a paucity of information relating intra-operative findings during hip arthroscopy and long term outcome.

Methods:
We reviewed a consecutive series of 345 hip arthroscopies performed by a single surgeon between April 1989 and November 1997 (minimum 10 year follow-up) with labral tear. Pain with mechanical symptoms and/or positive arthro-MRI scan was the primary indication for surgery. Patients were stratified according to condition of the anterior superior
acetabular cartilage according to the Outerbridge Classification. Patient survey questionnaires were filled out at minimum 10 year follow-up, including a Case Mix Indicator, UCLA Activity Score, EQ-5D, Harris Hip Score, and Non-Arthritic Hip Score. Endpoint for follow-up included those patients who went on to arthroplasty.

Results:
A statistically significant higher percentage of patients with Grade III and IV acetabular wear (32% ) went on to arthroplasty after hip arthroscopy vs 12% with normal or Grade I or II wear. The average age of patients without chondral lesions was 32.5 years and the average age with Grade III or IV changes was 44 years. These outcomes correlate with Joint Survey Questionnaire data and will be presented in detail.

Conclusion:
There is a significant association between the grade of articular wear seen at time of arthroscopy and eventual progression to hip arthroplasty. These outcomes substantiate the importance of earlier clinical and radiographic diagnosis and treatment before advanced articular wear is present. To our knowledge this is the longest follow-up from this procedure using validated outcome measures.

Data:
A cause of hip pain in symptomatic hip dysplasia without advanced osteoarthritis is still not clearly verified. We performed concomitant hip arthroscopy during periacetabular rotational osteotomy (PARO) in intension to verify the features of accompanied labral lesions and clarify the correlation of labral lesions with early hip pain. We also expected to determine whether a concomitant management for the injured labrum during PARO can result in more favorable clinical results.

We investigated 52 hips in 49 patients with symptomatic hip dysplasia without advanced degenerative osteoarthritis (Tönnis grade 0 in 18 hips, I in 33 hips and II in 1 hip). Arthroscopic examination has been performed during PARO to evaluate intraarticular pathologies. Labral lesions were described as the Lage’s description. Three kinds of procedures were performed for the labral lesions, observation (group A, 29 hips), debridement (B, 10 hips), and repair (C, 7 hips). Clinically, Harris hip score (HHS), and presence of impingement sign were evaluated. Radiologically, center-edge angle (CEA) in anteroposterior and false profile view, and change of Tönnis osteoarthritis grade were evaluated. We followed up these patients for a mean period of 4.5 years (range 36-90 months). The statistical evaluation to define the factors associated with degree of pain, osteoarthritis change after PARO, and prognosis following the management for labral lesions.

Labral lesions (tear and fibrillation) were found in 46 hips (88.6 %), and most of them were found at anterosuperior and superior area (20/46 hips, 43.5%). Chondral lesions were found in 28 hips (53.8%). They were found at only acetabular side in 9 hips, at femoral side only in 4 hips and at both side in 15 hips. The type of labral lesions were labral fibrillations in 10 hips, simple tears in 16 hips, and degenerative tears in 20 hips. A degree of pain has statistic correlation to the presence of degenerative labral tear (p=0.022), not chondral lesions (p=0.407). Simple tears, especially peripheral longitudinal tears were frequently observed in patients with Tönnis grade 0(12/14 hips), and degenerative tears in patients with Gr I (17/31 hips). There were no clinical difference at last follow up among the group A, B and C.

ePoster #: 314
The Labral Lesions Of Dysplastic Hip And Usefulness Of Concomitant Management For Labral Lesions During Periacetabular Rotational Osteotomy

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Category: Chondral and Labral Treatment

Summary:
The Labral Lesions of Dysplastic Hip and Usefulness of Concomitant Management for Labral Lesions during Periacetabular Rotational Osteotomy
Impingement signs were also improved in all groups. Relief of groin pain and disappearance of impingement sign after PARO showed no statistical correlation with any factors such as age, sex, degree of postoperative CEA, and even whether the labral lesions were treated or not. Osteoarthritis according to the Tönnis grades were improved in 12 hips, progressed in 2 hips and not changed in 38 hips. Two cases with deterioration in degenerative osteoarthritis were found in the group with labral debridement (group B). One of them showed inadequate surgical correction of acetabular coverage and both of them were involved by focal advanced cartilage degeneration (Noguchi grade 3). The improvement of osteoarthritis was only statistically correlated with preoperative status of osteoarthritis (p=0.005).

The labral lesions in most of symptomatic hip dysplasia are caused by abnormal stress concentration to acetabulum rather than impingement and they seem to be the main cause of initial or early hip pain in symptomatic patients without advanced osteoarthritis. If the abnormal concentration of joint stress is ameliorated by PARO and followed by adequate joint stress redistribution and joint stability, we can expect to improve the hip pain even when the labral lesions retained without any management. The existence of labral lesions seems to affect the initiation of hip pain but does not seem to affect the clinical course of hip joint after PARO up to midterm follow up.

Results on iliotibial band release and endoscopic trocantheric bursectomy in patients with lateral hip pain in a 14 months (range 9-29) follow up.

Data:
Objective:
The objective of this prospective descriptive study is to demonstrate the results of endoscopic iliotibial band release, along with trocantheric bursectomy, in patients with lateral hip pain.

Materials and Methods:
Eight patients were included in this study, seven women and one man between the ages of 15 and 69 years, six had diagnosed trochanteric bursitis and two had coxa saltans. All patients were evaluated with radiographs, sonography and nuclear magnetic resonance imaging (MRI) of the hip. The average duration of symptoms was 14.4 months. All patients underwent an endoscopic iliotibial band release along with trocantheric bursectomy during the timeframe from November 2008 until August 2010.

The results were measured using the Modified Harris Hip Score (HHSm) prior to surgery and in post-operative follow-up visits on the 3rd, 6th months, and at the end of the study. A satisfaction survey was applied during the last follow-up visit. The average duration of follow-up was 14.4 months (range from nine to 29 months). The results were analyzed using a nonparametric test for docima sign with Stata 11.1

Results:
There was a statistically significant difference between the preop score and the follow-up scores in the HHSm and in each of the items evaluated: pain, function and daily activities.

The average HHSm score increased from 56% preoperative to a final of 94% (p value = 0.0039).

The average score for “pain” on the HHSm increased from 18 points preoperatively to 41 at the last follow-up visit (p value=0.0039).

ePoster #: 401
Endoscopic Treatment Of Extraarticular Hip Pathology.
Results Of Iliotibial Band Release And Endoscopic Bursectomy.

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Category: Extra Articular Hip Endoscopy

Summary:
The average score for “function” on the HHSm increased from 22 points preoperatively to 32 at the last follow-up visit (p value=0.0039).

The average score for “daily activities” on the HHSm increased from 11 points preoperatively to 13 at the last follow-up visit (p value=0.0313).

Seven patients reported their results as good or excellent, and one patient as normal.

There were no complications nor recurrence reported in this group of patients.

Conclusions:
Endoscopic iliotibial band release and trochanteric bursectomy allows an improvement in the clinical symptoms, demonstrated by a significant increase in the modified Harris Hip Score. The improvement is due to an increase in all aspects evaluated by the modified HHS test: pain, function, and daily activities.

The aspect that demonstrated the greatest improvement was pain, which was observed at the earliest follow-up and was maintained throughout the duration of the follow up.

**Data:**

**Introduction:**
FAI has been recognized as a common cause of hip pain in young adults and is also proposed to be a cause of osteoarthritis. Arthroscopic treatment of FAI has arisen as the Gold Standard. As the number of procedures increases, it is important to evaluate the outcomes of current interventions. Vail Hip Score (VHS) is a validated questionnaire, presented at ISHA meetings, developed by Philippon, Briggs et al that combines the questions from Modified Harris Hip Score (MHHS), Non-arthritic Hip Score (NAHS) and Hip Outcome Score (HOS) that have shown best validity and responsiveness in patients with FAI, including floor and ceiling effects under 15%.

**Purpose:**
The purpose of this study was to cross-culturally adapt the VHS into Spanish and to validate it for its use in patients with symptomatic FAI.

**Methods:**
The VHS contains 10 items that evaluate pain, function and activities. Question 1 and 2 are about pain in Visual Analogue Scale (VAS). Question 3 and 4 (pain and limp) were taken from MHHS. Questions 5 and 6 were adapted from NAHS. Questions 7 and 8 were extracted from HOS (daily subscale). Questions 9 and 10 were reproduced from NAHS and HOS. In brief, scores can range from 0 to 100, with higher scores representing normal functioning hip. VHS gives great importance to pain, representing half of the total potential score (50 points). Function and activities have 25 potential points each.

The English version of the questionnaire was translated into Spanish and adapted to the Chilean cultural environment. Before the main study, the final version was tested in 10 consecutive subjects with symptomatic FAI.

The validation study involved 113 patients with symptomatic FAI from one center, between November 2010 and May 2011. These subjects also answered SF-12, HOS-D, HOS-S and MHHS. Reliability was tested with intraclass correlation coefficient (ICC). Cronbach alpha was determined to establish internal consistency (>0.75). Convergent and divergent validity were measured for

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**ePoster #: 501**

**The Spanish Vail Hip Score: Validation And Reliability In Patients With Femoroacetabular Impingement.**

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Karen K. Briggs, MPH, USA
Marc Philippon, MD, USA

**Category:** General Hip Arthroscopy

**Summary:**
A prospective assessment of the Spanish translated Vail Hip Score (VHS) in patients with Femoroacetabular Impingement (FAI) undergoing hip arthroscopy.
testing construct validity (Spearman correlation). In addition, construct validity was tested against a subjective function question according how normal was actual activity level. Floor and ceiling effects were calculated according to minimal detectable change (MDC=SEMx) and standard error of measurement (SEM). Finally, feasibility was calculated according to missed items.

Results:
Excellent VHS reliability was confirmed by ICC values >0.9. Mean score was 53.73 + 15.7. The SEM was + 1.48. According to the formula this gave MDC of +3.976.

Internal consistency was confirmed by Cronbach a value of 0.84. Construct validity was proven by the convergent and divergent validity obtained with the correlation of VHS with MHHS, HOS-D and HOS-S (r>0.5) and with SF-12 mental disabilities (r<0.3) respectively. We found a positive correlation (r>0.5) between total VHS score and the subjective function question. There were no floor or ceiling effects > 15% for the VHS (MDC = 3.976). Floor effect occurred in 0.9% of the cases and ceiling effect in none.

Feasibility of VHS was high, 82% of the patients filled out the form completely, 15.3% had 1 missed item and 2% had missed 2 or 3 items. In all but one case the total score could be calculated.

Conclusion:
The Spanish VHS is a reliable and valid tool for the assessment of pain, function and activities in patients with FAI undergoing hip arthroscopy, showing excellent internal consistency and construct validity.

**Summary:**
Unusually, we experienced 3rd degree burn along the anterior portal and beaver blade broken during the capsulotomy. Complications related hip arthroscopy is uncommon but needs experiences and learning curves.

**Data:**
Introduction:
In many cases hip arthroscopy techniques has made it possible to avoid open surgical techniques for FAI (Femoroacetabular impingement). Early reports suggest favorable results using hip arthroscopic surgery. The frequency of complications reported for hip arthroscopy for all indicated cases is generally less than 1.5%, suggesting that hip arthroscopy is a safe procedure. We report atypical case of complications, like iatrogenic 3rd degree burn, beaver blade fracture and Vulcan tip broken including other cases.

Methods:
We performed hip arthroscopic surgery on 223 hips (221 patients), we excluded the cases which were related with acetabular fracture reduction, unknown pain after total hip arthroplasty, snapping hip and trochanteric bursitis. Of the 221 patients, 121 were male and 100 were female. The average age was 44 years (range, 17-70 years). The average follow-up period was 17 months (range, 3-40 months). Surgical indications for hip arthroscopy were FAI in 174 and FAI associated with synovial chondromatosis in one. All patients were undergone a hip arthroscopy in supine position with 2 or 3 portals (anterolateral, anterior and midanterior portals), with doing the central compartment first and peripheral compartment review later. During the arthroscopic procedure, we commonly did capsulotomy.

Results:
We identified traction nerve injury in 5 hips in which pudendal nerve neuropraxia was observed in three and lateral femoral cutaneous nerve neuropraxia in two hips, which was resolved spontaneously within three months. Instrument breakages were in 4 hips. These were experienced during the arthroscopic procedure, but one coagulator tip broken was found incidentally under the C-arm fluoroscopy during resection of the bony bump of the cam lesion. All of broken instruments were removed successfully, grasper and blade were removed by other
grasper and one small coagulator tip was removed using a curved curette. During the refixation of the labrum, anchor was pulled out in 1 hip. We experienced unusual complication of 3rd degree burn along the anterior portal in 1 patient. This was suspected by use of a bipolar radiofrequency for long durations during mixed type FAI. We saw the blister formation along the line of fluid extravasation from the anterior portal during operation. This burn wound needed skin grafting and would take a 2 months complete resolution. We suggested anterolateral to be working portal and saline infused through it, but anterior portal is working portal and excessively warmed from anterior portal. We presumed that this burn injury was caused by the sudden stop of the fluid input or during the change of the fluid bag. Labral perforation and femoral head scuffing were also observed in 7 hips. This iatrogenic damage occurred in early learning period. The average operation time was 120 minutes (range, 90-240 minutes). All complication rates were 0.94%, but we did not experience other major complications such as fluid extravasations to the peritoneal cavity, DVT, femoral head subluxation and permanent nerve palsy.

Conclusion:
There were no major complications in hip arthroscopy noted in this series. Most common complications were femoral head scuffing during the insertion of the metal cannula in early learning period, and traction related neuropraxia could be prevented by releasing of traction occasionally without having residual symptoms. Unusually, we experienced 3rd degree burn along the anterior portal and beaver blade broken during the capsulotomy. Complications related hip arthroscopy is uncommon but needs experiences and learning curves.

ePoster #: 503
Hypothermia In Hip Arthroscopy

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Category: General Hip Arthroscopy

Summary:
Incidence and the factors which contribute to the development of hypothermia during hip arthroscopy procedure.

Data:
Objective:
To determine the incidence and the factors which contribute to the development of hypothermia during hip arthroscopy procedure.

Methods:
An analytical observational study was carried out in a cohort of 73 consecutive patients, all of whom underwent hip arthroscopy for the treatment of femoroacetabular impingement and were operated on by the same surgeon. The patients’ core temperature (esophageal) was measured throughout the surgery. Relevant information was collected on the patients’ age, gender, body mass index, blood pressure) and on the procedure (volume and temperature of the saline solution, pressure of the fluid pump, surgery time and room temperature) The corresponding statistical analysis was performed with STATA 10.0, using a repeated measures GEE model.

Results:
Patients’ average age: 33 (14 – 57), gender distribution: 39 females and 34 males. The average BMI was 23.9 (18.7 – 30.42) The average systolic blood pressure was 97.5 mmHg, while the average diastolic blood pressure was 52.2 mmHg. The incidence of hypothermia below 35°C was 2.7%, and below 36°C this percentage soared
to 52%. The multivariate statistical analysis of the results showed a direct relationship between surgery time and hypothermia for surgeries over 120 minutes (p<0.001). There was an inverse relationship between esophageal temperature and surgery time (p<0.001), with a drop in body temperature of 0.19°C/hr. There was also a direct relationship between esophageal temperature and saline solution temperature (p<0.001), body mass index (p<0.01) and diastolic blood pressure (p<0.03).

Conclusion:
The incidence of hypothermia in patients who underwent hip arthroscopy for the treatment of femoroacetabular impingement below 35°C is 2.7%, and below 36°C it is 52%. Factors which stimulate the development of hypothermia during the hip arthroscopy surgery are: prolonged surgery time, low body mass index, low diastolic blood pressure during the procedure and low temperature of the arthroscopic irrigation fluid.

Key words: Hip, Femoroacetabular impingement, Arthroscopy, Hypothermia
Level of evidence: Level II, analytical observational study

Data:
Introduction:
Modified Harris Hip Score (MHHS) is the most frequently instrument used to evaluate FAI despite the fact that was designed to evaluate osteoarthritis. Hip Outcome Score (HOS) is a self reported English language questionnaire that was recently developed to assess outcome in patients undergoing hip arthroscopy. Vail Hip Score (VHS) is a validated questionnaire developed by Philippon, Briggs et al that combines the questions from MHHS, Non-arthritic Hip Score and HOS that have shown the best validity and responsiveness in patients with FAI.

Floor and ceiling effects are an important part of the quality criteria used to measure health status questionnaires. Floor and ceiling are considered to be present if more than 15% of subjects achieved the lowest or highest possible score, respectively. If present, it is likely that extreme items are missing in the lower or upper end of the scale, indicating limited content validity. Patients with the lowest or highest possible score cannot be distinguished from each other, thus reliability is reduced and responsiveness is limited because changes cannot be measured in time.

Purpose:
To determine which is the best tool to evaluate FAI in symptomatic patients according to their floor and ceiling effects.

Methods:
Spanish versions of VHS, HOS (HOS-D and HOS-S) and MHHS, previously validated, were applied to 50 patients between February and May 2011. For each item (10 in VHS, 17 in HOS-D, 9 in HOS-S and 8 in MHHS) the floor and ceiling effects were calculated as the proportion of patients with worst and best values for the instrument. In addition, total scores were tested for floor and ceiling effects. The worst value was defined as the actual worst possible score (0 point) plus the minimal detectable change (MDC); the best value was defined as the actual best possible score (100 points) minus the MDC. Minimal detectable change was calculated as the Standard error measurement (SEM) x . We expected the proportion of floor and ceiling effects to be lower than 15% for all items and scores.

ePoster #: 504
Floor And Ceiling Effects Of Spanish Hip Outcome Score (Hos), Modified Harris Hip Score (Mhhs) And Vail Hip Score (Vhs) In Patients Undergoing Hip Arthroscopy Due To Femoroacetabular Impingement (FaI).

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Category: General Hip Arthroscopy

Summary:
A prospective assessment of Spanish translated HOS, MHHS and VHS in patients with Femoroacetabular Impingement (FAI) undergoing hip arthroscopy testing their floor and ceiling effects for each item and total score.
Results:
VHS: Of the 10 items tested, 4 had a ceiling effect > 15% (Items 4, 7, 8 and 9), related to limp, twisting, squatting and heavy work). There were no floor effects. SEM and MDC obtained were 1.48 and 3.976, respectively, meaning that for total scores the minimum was 3.976 and the maximum was 96.024. According to these measures, we found a floor value of 0.9% and a ceiling value of 0%.

MHHS: Of the 8 items tested, 7 had a ceiling effect > 15% (Items 2, 3, 4, 5, 6, 7 and 8), related to limp, support, distance walked, stairs, difficulty to put shoes or socks, sitting and public transportation. There were no floor effects. SEM and MDC obtained were 2.834 and 7.6149, respectively, meaning that for total scores the minimum was 7.6149 and the maximum was 92.38 points. According to these measures, we found a floor value of 0% and a ceiling effect of 17.5%.

HOS-D: Of the 17 scored items tested (items 3 and 11 not scored), 16 had a ceiling effect > 15% (Items 1 to 18). The last item, related to recreational activities, was the only one that had a floor and ceiling score <15%. There were no floor effects. SEM and MDC obtained were 3.11 and 8.36, respectively, meaning that for total scores the minimum was 8.36 and the maximum was 91.64 points. According to these measures, we found a floor value of 0% and a ceiling effect of 21.6%.

HOS-S: Of the 9 items tested, 6 had a ceiling effect > 15% (Items 2, 3, 4, 5, 7 and 8), related to jumping, swinging objects, landing, starting and stopping quickly, low impact activities and the ability to perform activities with normal technique. Of the 9 items, 8 had a floor effect > 15%. The item related to low impact activities was the only one that had a floor score <15%. SEM and MDC obtained were 4.75 and 12.76, respectively, meaning that for total scores the minimum was 12.76 and the maximum was 87.24 points. According to these measures, we found a floor effect of 18.9% and a ceiling value of 8%.

Conclusion:
According to our results the best tool to evaluate FAI in patients undergoing hip arthroscopy is VHS with no floor or ceiling effect in total scores, despite the fact that 4 of the 10 scored items showed some ceiling effect. With slight modification of this 4 items this questionnaire will probably become the most reliable clinical measuring tool for FAI.

**ePoster #: 505**

*Arthroscopic Treatment Of Femoroacetabular Impingement (FAI): Midterm Results (3 To 6 Years Follow-Up).*

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**Category:** General Hip Arthroscopy

**Summary:**
Arthroscopic treatment for FAI is a relatively recent technique, with promising results, but with scarce mid or long term follow-ups.

**Data:**
Objective:
The objective of this paper is to present midterm results (3 to 6 years) in patients treated arthroscopically for FAI.

Patients and Methods:
235 patients (270 hips) with diagnosed FAI, clinically and radiologically, between January 2005 and July 2008 were treated arthroscopically. Debridement, labral desinsertion and reinsertion, acetabuloplasty, femoral head-neck osteoplasty and treatment for osteochondral lesions were performed. All patients had a preoperative positive lidocaine test. Clinical evaluation was done with the impingement test, modified Harris Hip Scale and subjective satisfaction scale.
Results:
61.3% female, 38.7% male. Mean age 39 years old (15-75). Average follow-up 50 months (36-78). 96% of the hips presented a labral lesion, 8% round ligament lesions and 2.6% had intra-articular free bodies. 85.6% were combined FAI, 8.6% Pincer and 5.8% Cam. 24 full-thickness chondral lesions Outerbridge 4 were registered (83% acetabular and 17% femoral); 16 were subject to microfractures, the rest were resected in the acetabuloplasty or osteoplasty. Postoperative Harris Hip Score had a significant improvement (p<0.05) in relation to the preoperative score. In 96% of the cases the postoperative impingement test was negative. According to subjective satisfaction scale, we obtained an average of 9 over 10 points. 5 patients had neurological complications all of which had spontaneous resolution, 2 had technical complications (1 intra-articular anchor and 1 instrumental breakage), 4 required arthroscopical reintervention after 6 months due to chronic postoperative tendonitis and 11 had required a total hip arthroplasty (2 pending surgery).

Conclusions:
Arthroscopic treatment of FAI shows excellent results at a midterm follow-up with low complication and reintervention rate. Evidence and long term follow-up studies are still required to clarify if this treatment modifies the natural course of this pathology and if pain relief remains in time.

ePoster #: 506
Telephone Administration Of The International Hip Outcome Tool
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Category: General Hip Arthroscopy

Summary:
The IHOT-12 can be administered by telephone, achieving acceptable agreement with scores achieved by paper-based administration.

Data:
Introduction:
The short form of the International Hip Outcome Tool (IHOT-12) is a valid, reliable and responsive instrument designed for use in routine clinical practice. It is formatted as 12 questions in four domains. The response to each question is a point between 0 and 100 on a visual analogue scale. This may be administered on a paper form or through a computer interface. In this study, we explored the possibility of administering IHOT-12 over the telephone. This route of administration would facilitate the use of IHOT-12 by surgeons who routinely collect data over the telephone, and in circumstances where patients do not have access to computers or do not respond to postal requests. The aim of the study was to measure the agreement between IHOT-12 administered on paper or over the telephone.

Methods:
30 patients who attended a young adult hip clinic were invited to participate in this study. 28 agreed. These patients completed a paper version of IHOT-12, and responded to a telephone version of the IHOT-12 on consecutive days. The order of paper and telephone administrations was randomly allocated. Agreement between the two administration methods was assessed using the intra-class correlation statistic.

Results:
The mean IHOT-12 score (paper version) in the study group was 47.1 (95% CI: 41.2-53.0). The intra-class correlation was 0.86, suggesting strong agreement between the two methods of administration.

Conclusion:
This study suggests that IHOT-12 can reliably be administered over the telephone. Further studies will be necessary to determine whether it is reliable in larger groups of patients, in specific subgroups of patients, and whether a telephone administration demonstrates the same sensitivity to clinical change as a paper or computer administration. However this study supports the idea that surgeons who prefer to use telephone follow-up in their practice will be able to make use of the short version of the International Hip Outcome Tool.
Comparison Of Early Outcomes Of Hip Arthroscopy In Adolescent Versus Adult Patients: A Prospective Cohort Study

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Category: General Hip Arthroscopy

Summary:
Hip arthroscopy for mixed diagnoses resulted in good early outcomes with low complication rates in this prospective cohort study comparing adolescent versus adult patients.

Data:
Introduction:
Hip arthroscopy has increased in popularity as a treatment for specific hip disorders in adolescent and adult patients. The current literature indicates that hip arthroscopy is safe in both groups with good early outcomes. There are currently no studies that directly compare the outcomes of the procedure in these two age groups.

Methods:
The study design was a prospective cohort study of 52 hip arthroscopies in 50 patients (26 hips in 24 adolescents – average age 14.2 years and 26 hips in 26 adults – average age 33.5 years) at a tertiary referral hospital between 2009 and 2010. Patient demographics, indications for surgery, Modified Harris Hip Scores (MHHS) and complications were recorded. Indications for surgery in the adolescent group included femoroacetabular impingement (FAI) (8), isolated labral tears (12), isolated chondral lesions (2), chondrolysis (3) and osteonecrosis (1). In the adult group, indications were FAI (17) and isolated labral tear (9).

Results:
The preoperative MHHS improved from a mean of 58.5 to 91.0 (p<0.01) in the adolescent group and from 64.3 to 87.4 (p<0.01) in the adult group at a minimum of 1 year. There was no statistical significance in outcome between the two groups. There were 2 cases of transient lateral femoral cutaneous nerve palsy (1 adolescent and 1 adult) that resolved spontaneously. There were 2 transient pudendal nerve palsies that resolved spontaneously in the adolescent group. The mean traction time was 54.0 minutes in the adolescent group versus 55.5 minutes in the adult group. No cases of proximal femoral physeal growth disturbance or osteonecrosis were seen.

Conclusion:
Hip arthroscopy leads to early good outcomes with low complication rates in both adolescent and adult patients. The incidence of pudendal nerve palsy in the adolescent group needs to be further investigated.

correlation Of Acetabular Lesion And Periacetabular Cyst

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Category: General Hip Arthroscopy

Summary:
Paralbral cyst is thought to be related to intraarticular lesion of ALT, and degenerative tear was the common type of ALT. Presence of paralbral cyst could be a evidence of ALT and help the selection of hip arthroscopy patient.

Data:
Purpose:
To study the correlation of MRI findings and hip lesion found on arthroscopy in patients with paralbral cyst.

Material and Methods:
Among cases that underwent arthroscopic treatment of the hip from January 1996 to March 2010, 17 cases that accompanied paralbral cyst (Rt: 13, Lt: 4) found on MRI were retrospectively analyzed. Cases consisted of 8 male and 9 female, mean age was 37.8(21-62) years old, and
mean follow up period was 43.6 months (12-178). Preoperative physical examination and trauma history were checked. Presence of femoroacetabular impingement (FAI) was checked by radiological evaluation of 3D MDCT, by using Tönnis classification, osteoarthritis was evaluated, and by measuring the lateral central-edge (CE) angle, presence of acetabular deformity was checked. The presence and location of acetabular labral tear (ALT), and size of cyst was checked on MRI. For the 2 cases that cyst extended to the extraarticular space and compressed the sciatic nerve, using posterior extraarticular approach, cyst decompression was done and intraarticular lesion was not checked. For the other 15 cases, cyst location and intraarticular lesion was checked, and the correlation between which were checked. Visual analogue scale (VAS), modified Harris hip score before and after surgery was compared, and the remnant cyst was checked using MRA.

Results:
5 cases had a history of trauma, mean lateral CE angle was 35.2 (19.1-48) degrees, and 1 case accompanied acetabular dysplasia. Radiologically, 9 cases (52.9%) had FAI (4 cam type, 5 pincer type). There were 2 cases of 0 degree, 13 cases of 1 degree, and 4 cases of 2 degree according to Tönnis classification, and correlation between degenerative change and paralabral cyst was negative (P>0.05). On MRI, the cyst was located anterosuperiorly for 5 cases, anteriorly for 1 case, anteroinferiorly for 4 cases, posteriosuperior for 2 cases, and posteroinferior for 4 cases, and the mean size was 25.1x12.5x13.8mm3. Of the 15 cases with confirmed intraarticular lesion, all cases (10 cases of degenerative rupture (66.7%), 5 cases of incomplete tear) had ALT. The location of the cyst checked on MRI and the ALT found on arthroscopy coincided in 14 out of 15 cases (93.3%). On the follow up MRA, cyst was removed for 15 cases that underwent arthroscopy assisted decompression, however, paralabral cyst was partially remnant. Mean VAS improved from 7.7(7-9) preoperatively to 1.5(0-3) postoperatively, and mean modified Harris hip score improved from 58.8(45-70) preoperatively to 90.7(80-100) postoperatively, which were all statistically significant (P<0.001)

Results:
Paralabral cyst is thought to be related to intraarticular lesion of ALT, and degenerative tear was the common type of ALT. Presence of paralabral cyst could be a evidence of ALT and help the selection of hip arthroscopy patient.

**ePoster #: 509**

*Hip Arthroscopy In Professional Tennis Players: Pathologies and Return to Play*

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**Category:** General Hip Arthroscopy

**Summary:**
Arthroscopic treatment of various hip pathologies is a safe and effective way for professional tennis players to return to play.

**Data:**
Purpose:
Tennis is a game of repetitive movements. The purpose of this study was to define hip pathologies seen in professional tennis players and determine if professional tennis players would return to play following hip arthroscopy.

Methods:
Nine professional tennis players underwent a total of 12 hip arthroscopies (6 males, 3 females). Average age of athletes was 25 (range: 18-31) years of age at time of surgery. All players sought treatment after being unable to play tennis. Players were included in the study if they were professional tennis players and underwent arthroscopy for intra-articular hip pathology.

Results:
The average alpha angle was 72 degrees (range 65 to 83) and the average center edge angle was 37 (range 33 to 42). All players were diagnosed with femoroacetabular impingement (FAI) preoperatively. At arthroscopy, all
players underwent labral repair and treatment for FAI (2 isolated pincer, 10 combined). The average size of the labral tear was 25 mm (range 5 to 40 mm) and an average of 3 (range 2 to 5) suture anchors were used to repair the tear. One player required microfracture of a chondral lesion on the femoral head. Ten players had tears of the ligamentum teres which was treated with debridement. One player underwent an iliopectineal release. All nine players return to play professional level tennis.

In conclusion, this study demonstrated that professional tennis players who underwent hip arthroscopy for FAI were able to return to play. It was also found that labral tears are a commonly found injury in elite tennis players. Arthroscopic treatment of various hip pathologies is a safe and effective way for professional tennis players to return to play.

Level of Evidence: Level IV, therapeutic cases series.

ePoster #: 510
Fluid Extravasation During Hip Arthroscopy.

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Category: General Hip Arthroscopy

Summary:
During hip arthroscopy, a mean of over one litre of irrigation fluid may be lost to the peri-articular tissues.

Data:
Purpose:
This study aims to quantify the amount of fluid that may be lost into the soft tissues during hip arthroscopic surgery.

Methods:
We measured the volumes of irrigation fluid infused, operating time, fluid pressures and volumes of fluid recovered in 36 therapeutic hip arthroscopies. We excluded those where fluid was lost to the floor, leaving 28 patients. The majority were undergoing surgery for the treatment of femoroacetabular impingement. In 5 patients an intra-articular contrast medium was instilled, in order to establish the likely location of any extravasated fluid.

Results:
The mean operating time was 68 minutes (31 to 120), and the mean infusion pressure was 46 mm Hg (30 to 70). The mean volume of infused fluid was 9677 ml (95% confidence interval (CI) 7715 to 11638) and the mean volume of fluid recovered was 8544 ml (95% CI 6715 to 10373). The mean fluid extravasation loss into the peri-articular tissues was 1132 ml (95% CI 808 ml to 1456 ml). There was a significant correlation between the volume of extravasated fluid and both the length of operation and the volume of infused fluid used. We had no adverse events in our series.

Conclusions:
We conclude that although hip arthroscopic surgery is a generally safe technique, the surgical team should be aware that more than a litre of irrigation fluid may be extravasated into the soft tissues during the procedure. In order to reduce any problems related to this we attempt to keep operating times low, and maintain intra-operative fluid pressures at = 50 mm Hg if possible.

ePoster #: 511
Hip Arthroscopy In Patients With Developmental Dysplasia Of The Hip Joint

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Category: General Hip Arthroscopy

Summary:
Data:  
Purpose:  
The purpose of this study was to describe the arthroscopic findings and the short-term follow-up results after hip arthroscopy in patients with developmental dysplasia of the hip joint.

Type of Study: Retrospective series of 27 patients out of a larger series of 139 hip arthroscopies from 2008 till July 2010.

Methods:  
27 hip arthroscopies were performed (one bilateral) in 26 consecutive patients (6 male, 20 female; average age, 35 years) with Developmental Dysplasia of the Hip. 8 of these patients had hip arthroscopy performed prior to a Peri-Acetabular Osteotomy and 19 had previously been operated for developmental dysplasia with a PAO. Mean time after PAO was 58 months (3-108). They all presented with mechanical hip symptoms and groin related pain.

Results:  
A labral tear was found in all cases with varying degrees of cartilage damage in the acetabulum or on the femoral head. The labral tear was debrided and the labrum was reattached to the acetabular rim in all cases, cartilage lesions were repaired, and microfracturing of the exposed subchondral bone was performed in three patients with grade IV changes suitable for microfracturing. All patients had a small rimtrimming prior to labral reattachment.

All but three patients had resection of the head neck junction for CAM-like deformities (Alpha-angle mean 87). The pre-PAO CE-angles were 17 (2-24) and in the PAO post group the CE-angle was 35 (27-45). At surgery the labral width was measured and most patients had a large hypertrophic labrum, mean width 8 mm (3-12 mm). 10 (37%) patients had a prominent ischial spine on a standing pelvic X-ray indicating retroversion of the acetabulum and they also had a “cross-over” sign of the supero-lateral portion of the acetabular rim. The joint space width was measured on a standing pelvic x-ray and mean JSW at the upper sourcil was 4,2 mm (2,4–5,6 mm). Out of the 26 patients, 8 patients had previous surgery because of Calves-Legg Perthes or slipped femoral head either with osteotomy of the femoral neck or pinning.

The patients have all been seen for postoperative follow-up and mean follow-up is 21 months (7-36).

Out of the 26 patients (27 procedures) six patients went on to total hip replacement within the follow-up period. The mean post operative HOS score was 76,9 (51-100). Preoperative mHSS-score was 49 (21-81) and postoperative mHSS-score in the patients not receiving THR 71 (49-87).

Conclusions:  
In the Dysplastic patient hip arthroscopy is a valuable tool in restoring hip function, in patients without severe deformities of the femoral head or joint space loss < 3-4 mm.

Level of Evidence: Level IV.

Key Words: Hip arthroscopy—Hip dysplasia—PAO osteotomy. Hip Arthroscopy in the Dysplastic Hip

ePoster #: 512  
Design And Validation Of A Short Version Of The International Hip Outcome Tool (iHOT-12) For Use In Routine Clinical Practice

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Category: General Hip Arthroscopy

Summary:  
We present a 12 item version of the International Hip Outcome Tool and demonstrate excellent validity, reliability and responsiveness.
Data:
Purpose:
The purpose of this study was to develop and validate a shorter version of the International Hip Outcome Tool (IHOT) that could be easily used in routine clinical practice to measure health related quality of life, and changes after treatment, in young active patients with hip disorders.

Methods:
A development data set (104 patients) was explored with forward selection linear regression analysis to choose a reduced item set for the new scale. This was tested in a validation data set (1833 patients) and responsiveness sub set (80 patients) to measure agreement between the shorter and longer versions and to test the sensitivity of the shorter scale to change after treatment.

Result:
Twelve items were chosen for a short version of the International Hip Outcome Tool (IHOT-12). IHOT-12 demonstrated excellent agreement with the long version, IHOT-33; captured 95.9% (95% CI: 95.0-96.8%) of the variation of IHOT-33, and showed equivalent sensitivity to change with a standardised effect size of 0.98 (0.67 to 1.28).

Conclusions:
A short version of the International Hip Outcome Tool (IHOT-12) has been developed. It has very similar characteristics to the original 33-item questionnaire, losing very little information despite being only a third the length. It is valid, reliable and responsive to change. We suggest that it be used for initial assessment and post-operative follow-up in routine clinical practice.

ePoster #: 513
Prevalence, grading and localization of chondral Lesions in the hip

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Category: General Hip Arthroscopy

Summary:
This morphologic study on hip arthroscopy for impingement and other pathologies shows that chondral lesions are localized mainly in the antero-superior area of the acetabulum and that usually acetabular lesions are more severe and more common than femoral lesions

Data:
Background:
Chondral lesions are a common finding in hip arthroscopy, nevertheless their incidence and localization in the joint are still under discussion.

Methods:
A prospective randomized study on 312 consecutive hip arthroscopies was performed to evaluate prevalence, grading and localization of chondral lesions in the hip joint.

The Outerbridge classification was used (from grade 0 to IV). The authors gave to the delamination, which is not included into the classification and adjunctive grade V. The localization of the chondral defects on the acetabulum was determined according to a clock-like disposition dividing the acetabulum in 5 zones from posterior to anterior (A, B, C, D, E), with a sub-division of each zone in central (1) and peripheral (0). The femoral head was divided in 4 zones: central (A), anterior (B), superior (C) and posterior (D).

The diagnosis before the 312 arthroscopic treatments was 62.4% femoro-acetabular impingement (FAI), 11.4% arthritis, 20.2% chondral lesion and 6% other.
Results:
A chondral lesion was found on the acetabulum in the 93% of the cases and on the femoral head in the 41.5%. The grade of these chondral lesions in the acetabulum was: 0 (normal) 7.0%, I 0.9%, II 8%, III 16.8%, IV 38.9, V 28.4, while on the femoral head it was: 0 in 58.5, I 0%, II 4.5%, II 23.1%, IV 13.9%, V 0%, respectively. The localization of the chondral lesion was A0 7.1%, B0 30.9%, C0 76.9%, D0 80.5%, E0 7.1% and A1 2.6%, B1 15.9%, C1 47.8%, D1 36.3%, E1 2.6%, respectively. On the contrary, the distribution of the chondral defects in the femoral head in the different areas was: A 34.4%, B 19.5%, C 37.2%, D 11.5%.

Discussion:
This is a morphological study after hip arthroscopy in a consecutive series of painful hips. The incidence of chondral lesion is more common on the acetabular side (93%), than on the femoral side (41.5%). And the localization involves mainly the superior area of the femoral head and the antero-superior area of the acetabulum. Also, acetabular lesions are usually associated with a more severe degree of cartilage damage than the femoral lesions. According to our findings, the delamination is typical for the acetabulum (28%) while it is quite uncommon on the femoral head.

Conclusions:
Acetabular antero-superior chondral lesions are the morphologic features of painful hips after FAI and arthritis. A specific treatment should be planned when preparing a hip arthroscopy for these pathologies.

Summary:
The purpose of this study was to document the incidence of intra-articular pathology found arthroscopically before PAO was performed.

Data:
Objective:
Periacetabular osteotomy (PAO) has a proven track record in the treatment of acetabular dysplasia. However, poor results are associated with coexistent intra-articular pathology. The purpose of this study was to document the incidence of intra-articular pathology found arthroscopically before PAO was performed.

Methods:
Between October 2010 and May 2011, seven patients with acetabular dysplasia underwent PAO with a concomitant hip arthroscopy at our institution. All patients had mild dysplasia with a center edge angle <20 degrees (range, 9 to 18 degrees). Intra-operative findings including the labrum, chondral surface, ligamentum teres, and psoas tendon were recorded.

Results:
The mean age of the patients at the time of surgery was 24 years old (range, 12 to 33 years). All patients had arthroscopic evidence of intra-articular pathology which required surgical intervention. An anterosuperior labral tear was found in all patients, 5 of which required labral repairs, the other two underwent selective debridement. Two patients had a full-grade ligamentum teres tear, and the remaining 5 had partial thickness tears; all were debrided. Six patients had chondral injury; 5 had a chondroplasty, and 1 had microfracture as well. Two patients had evidence of internal snapping, and had a functional psoas tendon lengthening. Two patients with femoral cam-type lesions had a concomitant arthroscopic femoral osteoplasty.

Conclusion:
Intra-articular pathology in the presence of acetabular dysplasia was found in all seven patients. Therefore, we recommend performing a concomitant hip arthroscopy before the PAO surgery to address that pathology in an effort to decrease the failure rate.

ePoster #: 515

*Hip Arthroscopy Findings In The Setting Of Acetabular Dysplasia*

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Category: General Hip Arthroscopy
ePoster #: 517  
_Tears of the Ligamentum Teres: Prevalence in Hip Arthroscopy Using Two Classification Systems_

Hinsdale Orthopaedic Associates  
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Dorea Elizabeth Martin, BA,BS, USA  
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Category: General Hip Arthroscopy

Summary:  
This study presents the prevalence of ligamentum teres tears on 558 hip arthroscopy cases. Two classification systems were used the Gray and Villar and a new descriptive classification. Prevalence of 51% ligamentum tears was found in the cohort. Magnetic resonance was found to be inaccurate for the diagnosis of ligamentum tears.

Data:  
Introduction:  
While several studies have suggested that tears of the ligamentum teres may generate hip pain, and may be successfully treated arthroscopically, the prevalence of such tears has not been established. The purpose of this study was to report the prevalence of ligamentum tears in a population of patients who underwent hip arthroscopy, using both the Gray and Villar classification and new descriptive classification.

Methods:  
After excluding revision surgeries, a total of 558 surgeries (502 patients) were included during the study period between February 2008 and January 2011. Data were prospectively collected regarding patients’ demographics, mechanism of injury, range of motion, magnetic resonance arthrogram (MRA) results, and intra-operative findings. All patients completed the modified Harris hip score (mHHS), non-arthritic hip score (NAHS), hip outcome score sport specific subscale (HOS SSS) and activities of daily living (HOS ADL), and visual analog pain score (VAS), preoperatively. Ligamentum tears were classified according to Gray and Villar’s classification(1), and were also categorized using a descriptive grading system as: 0) no tear; I) low-grade tear involving <50% of ligament; II) high-grade tear involving >50% of ligament; or III) 100% tear.

Results:  
A total of 284 (51%) LT tears were found in the cohort. By the descriptive classification, 122 (22%) patients had grade I tears, 134 (24%) had grade II tears, and 28 (5%) had grade III tears. According to the Gray and Villar classification, 21 patients had a full rupture, 238 had a partial tear, and 25 had a degenerative tear. The average age of patients with ligamentum tears was higher (42.31 years) than patients without tears (36.17 years) (p<0.00001). Preoperatively, patients with tears had lower NAHS, HOS SSS, and ADL scores (p<0.05 for all 3 scores), but had larger range of motion in flexion and internal rotation (p= 0.02 and 0.06, respectively). Labral tear size significantly increased with increasing descriptive grade of ligamentum tear (p < 0.05). Hips with grade 4 acetabular chondral lesions were 3.6 times more likely to have a high-grade partial thickness ligamentum tear than patients without chondral lesions. Pre-operative MRA had a very low sensitivity of 1.8% for detecting tears of the ligamentum. No correlation was found between ligamentum tears and gender, BMI, flexion, abduction, pain level, or pre-operative duration of symptoms.

Conclusions:  
To our knowledge, this study is the largest report of prevalence of ligamentum tears to date. The incidence was defined using the Gray and Villar classification, as well as a new descriptive grading system which categorizes the ligamentum according to the amount of tearing. A higher prevalence of tears was found than in previous studies, most likely due to our inclusion of low-grade partial thickness tears using the descriptive grading system. Despite the high prevalence of ligamentum teres tears shown in this series, further research is needed to define their clinical relevance and recommended treatment.
ePoster #: 518
Arthroscopic Iliopsoas Tendon Release In The Treatment Of Internal Snapping Hip

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Category: General Hip Arthroscopy

Summary:
This study examined the outcomes and effectiveness of arthroscopic iliopsoas tendon lengthening as a solution to internal hip snapping. Surgical lengthening of the iliopsoas tendon in patients showing pre-operative internal hip snapping resulted in limited recurrence of the snapping post-operatively, as well as an overall good to excellent clinical improvement.

Data:
Introduction:
Internal hip snapping produced by the iliopsoas tendon moving over the iliopsoineal eminence or over the femoral head can cause significant pain in the hip joint. The purpose of this study was to examine the outcomes and effectiveness of arthroscopic iliopsoas tendon lengthening as a solution to painful internal hip snapping.

Methods:
Data was prospectively collected between 2009-2011 on all patients undergoing arthroscopic iliopsoas lengthening for a diagnosis of painful internal snapping hip. The exclusion criteria were revision surgeries and previous hip conditions such as LCPD, SCE or AVN. The surgical approach used to lengthen the iliopsoas tendon involved releasing the tendinous portion at the joint level, while leaving the anterior muscular portion intact. Surgical outcome was measured according to the improvement in four hip specific scores (modified Harris Hip Score, Non-Arthritic Hip Score, and the two Hip Outcome Score subscales: the Sport Specific and the Activities of Daily Living), visual analog pain score (VAS), and satisfaction with surgery on a scale of 0 - 10.

Results:
A total of 28 cases met our inclusion/exclusion criteria. At the time of surgery, patient’s age ranged from 14 to 51, with an average age of 25. At an average follow-up of 15.4 months, 20 of the 28 cases resulted in a complete resolution of hip snapping. On average, patients showed an improvement of more than 19 points in all four hip specific scores. The pain level reduced by over 3 points on average. All patients but 6 reported to have ‘good’ to ‘excellent’ (7 to 10 out of 10) level of satisfaction. One report of iliopsoas weakness was noted two weeks after the tendon lengthening and was found to be resolved at the 3 month follow-up visit.

Conclusions:
Arthroscopic lengthening of the iliopsoas tendon at the level of the joint in patients showing painful pre-operative internal hip snapping resulted in limited recurrence of the snapping post-operatively, no cases of unresolved weakness in flexion, as well as an overall good to excellent satisfaction and clinical improvement.

ePoster #: 519
Back Pain Prior To Hip Arthroscopy For Femoroacetabular Impingement Predicts Inferior Results

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Category: General Hip Arthroscopy

Summary:
FAI patients with and without a history of back pain improve significantly after arthroscopic treatment. Although those with back pain have equivalent relative improvement, their absolute clinical results and satisfaction are inferior compared to patients without back pain. Hence, the patients’ and surgeon’s expectations for FAI surgery should be adjusted accordingly when back pain is present.
**Data:**

Objectives:
The hip and the spine are intimately related anatomically and functionally, and their respective disorders may present with overlapping symptomatology. A problem in one area could potentially cause or aggravate problems in the other. The hypothesis of this study was that hip surgery for femoro-acetabular impingement (FAI) would have inferior results in patients with a history of low back pain.

Methods:
Between February 2008 and April 2010, data was prospectively collected for all patients undergoing arthroscopic surgery for FAI. Exclusion criteria were previous surgery on the same hip other than diagnostic hip arthroscopy, Tonnis arthritic grade 2 or 3, and previous hip condition such as AVN, LCPD, or DDH. Any history of back pain was recorded and the type of pain and duration were noted. A total of 116 hips (112 patients) met the inclusion/exclusion criteria. Ninety-one patients had no history of back pain, while 25 had a positive history of back pain. Radiographic and intraoperative findings and procedures were recorded. All patients were assessed pre- and post-operatively using the modified Harris Hip Score (mHHS), the Non-Arthritic Hip Score (NAHS), and the visual analog pain scale (VAS). Post-operatively, patients were asked for their satisfaction from the surgery on a scale from 0 to 10.

Results:
There was no difference in the radiographic findings pre- and post-operatively, or the intra-operative findings and procedures between the two groups. Pre-operative clinical scores (mHHS and NASH) trended lower for the back pain group; pain level (VAS) was similar between the groups. At mean follow-up of 15 months (11 to 30 months), all scores were significantly improved, and there was no difference in relative improvement between patients with or without back pain. However, the absolute clinical scores (mHHS and NASH) were lower for the back pain group (p=0.05 and 0.06, respectively); the pain level (VAS) trended lower as well (p=0.07). Moreover, patients with back pain were significantly less satisfied with the result of the surgery (p=0.02).

Conclusions:
FAI patients with and without a history of back pain improve significantly after arthroscopic treatment. Although those with back pain have equivalent relative improvement, their absolute clinical results and satisfaction are inferior compared to patients without back pain. Hence, the patients’ and surgeon’s expectations for FAI surgery should be adjusted accordingly when back pain is present.

**ePoster #: 520**

**Intra-Articular Corticosteroids For Pain Management After Hip Arthroscopy.**

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**Category:** General Hip Arthroscopy

**Summary:**
Intra-articular corticosteroid injection (IACI) is a very popular procedure in orthopedics. The main beneficial effect is pain relief. It’s use after hip arthroscopy is an option as a coadjuvant in pain management.

**Data:**
Introduction:
Intra-articular corticosteroid injection (IACI) is a very popular procedure in orthopedics. The main beneficial effect is pain relief. It’s use after hip arthroscopy is an option as a coadjuvant in pain management.

Objective:
To determine if IACI after hip arthroscopy reduces pain in comparison to traditional pain management.

Material & Method:
All of our patients underwent general anesthesia without using corticosteroids in this process. We randomized two groups. After performed the surgical procedure we injected one of the groups with 40 mg of
Depomedrol®. Both groups received the same general pain management protocol, with 300 mg of ketoprofen and 4 gr of dipyrrone in a 24 hrs infusion. We use an intravenous morphine infusion to determine the number of IV bolus required by the patient. VAS was obtained every 4 hrs to every patient during 24 hrs. Harris hip score (HHS) was performed preop, at 1 week after surgery and 1 month after surgery.

Results:
A total of 40 patients were included, conforming two groups of 20 patients each. Mean age was 40.07 years. 34 patients suffered mixed impingement, 5-cam impingement and 1 pincer impingement. There were no statistical differences between both groups in terms of VAS and HHS. There was no extra requirement of morphine infusion (p= 0.8).

Discussion:
The data obtained from this study doesn’t support the use of intra-articular corticosteroids as a coadjuvant in hip arthroscopy. It may be effective as a pain killer in degenerative pathology, but it doesn’t seem to improve the pain management after hip arthroscopy. A larger group of patients is needed to analyze separately the three impingements types.

**ePoster #: 521**

**Outcomes Of Endoscopic Gluteus Medius Repair**

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Benjamin G. Domb, MD, USA

**Category:** General Hip Arthroscopy

**Summary:**
This study reports good to excellent satisfaction and clinical results of 11 endoscopic repairs of partial and full thickness tears of the gluteus medius with an average follow-up of 7 months.

**Data:**
Introduction:
Gluteus medius tears may be present in as many as 25% of late middle-aged women, 10% of middle-aged men, and can either be partial or full thickness tears. Outcomes of endoscopic repair of gluteus medius tears have scarcely been reported. The purpose of this study was to report the early outcomes of endoscopic repair of partial and full thickness tears of the gluteus medius.

Methods:
Between February 2009 and April 2011, data was prospectively collected for all patients undergoing endoscopic gluteus medius repairs. Only patients with evidence of gluteus medius tears on magnetic resonance, lateral hip pain and weakness of the gluteus medius were treated surgically. Patients were assessed pre- and post-operatively using four hip specific questionnaires (the modified Harris Hip Score, the Non-Arthritic Hip Score, the two Hip Outcome Score subscales: the Sport Specific and the Activities of Daily Living). Post-operatively, patients were asked for their satisfaction from the surgery on a scale from 0 to 10. Patients who did not complete the pre- and post-operative hip questionnaires were excluded from the study.

Results:
Of the 17 patients who underwent endoscopic repair of a torn gluteus medius during our study, 11 met the inclusion/exclusion criteria. Our cohort included 10 females and 1 male, with an average age of 58 years old (range, 44 to 74 years). Endoscopically, 2 cases were found to be partial-thickness tears, 3 were high-grade partial-thickness tears, and 6 were full-thickness tears. At an average follow-up of 7 months, 10 of the 11 patients showed post-operative improvement in all four hip specific scores, with an average improvement of more than 22.5 points for all scores. Satisfaction with the surgery results was reported to be ‘good’ to ‘excellent’ (7 to 10 out of 10) in 8 of 11 patients.

Conclusions:
This study suggests that endoscopic surgical repair can be an effective treatment of gluteus medius tears in the short term. A longer-term follow up study would help in finding out if this approach is effective long-term.
**ePoster #: 522**  
*Tumors About The Hip Joint Misdiagnosed As Sport Injuries*  
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Martin Buttaro, MD, ARGENTINA  
Francisco Piccaluga, MD, ARGENTINA  
Category: General Hip Arthroscopy  
Summary:  
Although rare, hip tumors can be found mimicking the symptoms of FAI or labral tears. Delay in diagnosis can adversely affect prognosis in these patients.  
Data:  
Hip pain in young adults is most frequently related to femoroacetabular impingement (FAI) and labral tears. Tumors involving the hip joint are rare. However, both joint-related tumors and sports-related injuries can affect young, active patients, and their symptoms often overlap. The purpose of present study is to analyze a series of patients referred to our institution for hip arthroscopy with a diagnosis of sports-related injuries, which were eventually diagnosed as hip joint tumors.  

Between May 2007 and May 2011 ten patients with hip tumors or pseudotumors were referred to our institution with a misdiagnosis of a sports-injury lesion. After carefully evaluating the clinical history, the physical examination and the radiologic images, suspicion of a tumor was raised. Scintigraphy and biopsy confirmed the results when needed. There were eight men and two women with a mean age of 37 years old (range 23 to 52 years old). Time delay before diagnoses was an average of 20 months (range 3 to 48 months).  

Hip pain was the main symptom of all the patients. FAI was the original diagnosis in 7 patients. Hip arthroscopy had been performed (at other institutions) in 4 of these 7 patients and they complained of persistent pain after procedure. An acetabular labral tear was the original diagnosis in 3 patients. The definitive diagnoses achieved were: 3 femoral neck osteoid osteomas, 1 acetabular osteoid osteoma, 1 femoral neck osteoblastoma, 1 groin haemangioma, 2 synovial chondromatosis in early stages when intrarticular loose bodies have not calcified, 1 acetabular metastasis from bladder adenocarcinoma and 1 acetabular plasmocytoma.  

These findings suggest the importance of the careful evaluation of every young adult patient complaining of hip pain. Although rare, hip tumors can be found mimicking the symptoms the everyday sports-related injury. The delay in diagnosis can adversely affect prognosis in these patients.  

**ePoster #: 601**  
*Femoroacetabular Impingement Secondary To Pubic Symphysis Dysfunction*  
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Category: Impingement  
Summary:  
This study reports two cases of femoroacetabular impingement secondary to pubic symphysis dysfunction. The first patient had a pubic diastasis, while the second patient had a fused pubic symphysis. Both patients had symptomatic FAI with labral tears and chondral damage. We hypothesize that pubic symphysis abnormalities can contribute to FAI due to altered pelvic anatomy.  
Data:  
Introduction:  
Femoroacetabular impingement (FAI) is commonly present in conjunction with osteitis pubis, sports hernia, sacroiliac joint dysfunction and other pelvic pathologies. It is unclear, however, if these commonly associated disorders are interrelated in some manor. It would seem intuitive that extra-articular disorders of sufficient magnitude could influence intra-articular joint kinematics. To this end, disorders of the sacroiliac joint or pubic symphysis could contribute to femoroacetabular pathology if acetabular version or joint kinematics are altered. The purpose of this study is to report two cases where pubic symphysis disorders may have contributed to femoroacetabular impingement.
Case 1:
A 37-year-old male recreational athlete was referred to our institution after one year of right hip pain and no history of precipitating injury. He had a history of an “abdominal wall hernia repair” during his childhood and the absence of one kidney. Physical examination revealed decreased motion of both hips and a positive anterior impingement sign of the right hip. An AP pelvis radiograph demonstrated diastasis of the pubic symphysis, signs of early osteoarthritis, and a crossover sign of the right acetabulum. An MRI revealed evidence of labral tearing and chondral damage consistent with mixed-type femoroacetabular impingement. After informed consent was obtained, the patient underwent hip arthroscopy to relieve the femoroacetabular conflict, repair the torn labrum, and treat chondral damage.

Case 2:
A 34-year-old male professional wrestler was referred to our institution after 3-years of bilateral hip pain and stiffness. He reported an insidious onset of discomfort and that he was involved in a severe motor vehicle accident that required multiple pelvic surgical procedures nearly 20 years prior. Medical records documenting these surgical procedures were not available to the patient. Physical examination revealed decreased motion of both hips and the anterior impingement sign was positive bilaterally. Radiographically he demonstrated a fused pubic symphysis and small bilateral rim fractures. The MRI revealed labral and chondral damage consistent with femoroacetabular impingement. After informed consent was obtained, bilateral staged hip arthroscopy was performed to decompress the bony impingement and stabilize the damaged acetabular labrum and cartilage.

Discussion:
The bony ring of the acetabulum helps to position the acetabulum relative to the coronal plane of the pelvis. To this end, pubic symphysis diastasis of sufficient magnitude would result in external rotation of the hemipelvis and consequently, acetabular retroversion. This would be evident radiographically as a crossover sign similar to that traditionally described for increased anterior coverage of the femoral head. Therefore, external rotation of the hemipelvis could contribute to anterior over-coverage and predispose the patient to femoroacetabular conflict.

By contrast, fusion of the pubic symphysis eliminates all motion that would typically be dissipated by the normal fibrocartilagenous pubic symphysis. The decreased mobility of the pelvis would conceivably transmit forces to the hip or sacroiliac joint. This could magnify chondrolabral damage in patients already predisposed to femoroacetabular impingement.

Although the reported cases represent extreme examples of pubic symphysis pathology, less severe deformity may result in some degree of hip dysfunction. Considerable biomechanical and clinical research is necessary to elucidate the influence of extra-articular disease on intra-articular hip pathology.

ePoster #: 602

Mixed Cam/Pincer Impingement And Relative Head Neck Shortening After In Situ Fixation Of Slipped Ecf - Example Of Treatment

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Category: Impingement

Summary:
We report of a case were mixed cam/pincer impingement in combination with relative head neck shortening was treated via surgical luxation with offset correction, acetabular rim trimming and trochanter distalization

Data:
We present the case of a 19 year old girl who came to visit our department due to groin pain while sitting and lifting heavy weights 10 years after in situ fixation of a slipped epiphysseolysis capitis femoris of her left hip. First occurence of pain was reported by the patient about 2-3 years prior to admittance. No limitation of walking distance. Pain relievers occasionally.
During clinical examination she complained about pressure pain at the greater trochanter and in the groin. Maximal flexion in combination with internal rotation and adduction resulted in reproducible groin pain. ROM was close to normal with Internal/External Rotation right 20/0/80°, left 10/0/80°, Abduction/Adduction both sides 30/0/30, Flex/Extension both sides 110/0/0°. Trendelenburg Test was positiv (Grade 2) for the left hip. Leg shortening of 0,5cm on the left side. No sensomotory deficits.

Pelvic X-ray showed on the acetabular side a CE angle of 30° with positive cross over sign due to acetabular retroversion (Ganz). On the femoral side we measured a relative head neck shortening (Morscher). Axial view showed an alpha angle of 90° and Offset of 0 mm (Nötzli).

Arthro MRT showed labral tear grade 2-3 (Czerny) and chondral lesion grade 2-3 at the cartilage labrum margin on the acetabular side (Outerbridge).

We treated the patient by surgical luxation with detachment of the ventral labrum, trimming of the ventral acetabular rim and refixation of the labrum with 4 anchors. In addition we performed correction of the head neck junction and relative head neck lengthening via distalization of the trochanter. Intraoperative impingement tests were video recorded.

In the 6 month postoperative control the patient was pain free even during maximal flexion, internal rotation and adduction. No difference in ROM between right and left hip. Trendelenburg sign on the operated side was improved from grade 2 to 1.

Post operative pelvic X-ray showed no cross over sign. On axial view off-set was corrected to 6mm and alpha angle was corrected to 55°. Head neck length was physiologic.

In conclusion we present this case because to our mind the combination of different hip pathologies can only be adressed via surgical luxation and not by hip arthroscopy alone.

ePoster #: 603
Femoroacetabular Impingement from Post-Traumatic AIIS Avulsion Fracture Malunion in the Adolescent Athlete

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Category: Impingement

Summary:
This is the first case report of an AIIS avulsion fracture in an adolescent athlete with delayed-onset symptoms from secondary femoroacetabular impingement successfully treated with arthroscopic spinoplasty.

Data:
Secondary FAI from anterior inferior iliac spine (AIIS) traction hypertrophy in an adult patient treated with open resection has been recently reported, however we present the first case to our knowledge of an adolescent athlete with a post-traumatic AIIS avulsion fracture who developed delayed-onset symptomatic secondary pincer FAI from a malunion. We performed arthroscopic hip surgery with resection of the AIIS malunion. Femoral osteoplasty for associated cam impingement was also performed in this patient with open capital physis. At 10 months post-surgery, the patient is asymptomatic and has returned to his previous level of athletics despite some non-restrictive heterotopic ossification. Pincer FAI from AIIS malunion should be considered in the patient with refractory symptomatic AIIS avulsion, arthroscopic “spinoplasty” may permit its minimally invasive management, and more aggressive guidelines for acute surgical management may be appropriate in this youthful patient population.
**ePoster #: 604**

*Computer-assisted preoperative simulation on Femoro-acetabular impingement using three-dimensional computer–assisted design techniques*

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**Category:** Impingement

**Summary:**
Arthroscopy in Femoro-acetabular impingement (FAI) patients is difficult because of less visibility compared to other joint arthroscopy. For easily correction of bony impingement, we will report Computer-assisted operation planning and simulation of FAI operations using 3D CAD techniques.

**Data:**
**Purpose:**
FAI has recently known as one of the factors developing to major osteoarthritis of the hip. Patients who do not respond to conservative treatment can be good candidates of arthroscopic treatment. The purpose of this paper is to show the benefit of our preoperative planning using 3D-CAD techniques.

**Methods:**
Helical multislice computed tomography scanning with 2mm slice increment including the pelvis and whole femur was performed. DICOM (Digital Imaging and Communication in Medicine) images were performed by use of Mimics software package. Addition to clinical diagnosis of painful hip position for example Ganz sign, Log roll test and so force, bony extrusion as cause impingement should be determined. For easy observing for the extrusion during hip arthroscopy, it was planning how many angle of hip flexion and external or internal rotation should be better for correction of bony extrusion with 3D pelvis and femur models simulation.

**Results:**
Preoperative planning with 3D bone models, it was easily to guess the vision of bony extrusion of CAM and Pincer during hip arthroscopy.

**Discussion:**
Surgical dislocation or Arthroscopic operation should be accepted for FAI operation. Recently hip arthroscopic operation will be preferred to FAI operation because of fewer invasion. But it has difficulty of less visibility compared to another joint arthroscopy, and it is hard to recognize position of bony extrusion in spite of using fluoroscopy. Pre operative planning with 3D CAD models will prefer to make reliable simulation for hip arthroscopy and bring to safety correction of bony extrusion.

**Conclusion**
We will be concluding that it was useful preoperative planning with 3D CAD models for hip arthroscopy with FAI.

**ePoster #: 605**

*Prevalence of Leg Length Discrepancy in Femoroacetabular Impingement*

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**Category:** Impingement

**Summary:**
The role of leg length discrepancy (LLD) as a predisposing factor for associated musculoskeletal disorders has been recognized. We evaluated the prevalence of LLD in femoroacetabular impingement and its clinical relevance.
**Data:**
The role of leg length discrepancy (LLD) as a predisposing factor for associated musculoskeletal disorders has been recognized. It has been proposed that a longer leg might be a predisposing factor to hip OA.

Aim of this study was to evaluate the prevalence of LLD in FAI and its clinical relevance.

We evaluated the prevalence of LLD in a sample of patients with a scheduled hip arthroscopy for FAI.

We retrospectively reviewed the clinical records of 70 patients who underwent hip arthroscopy for FAI. The mean age of patients was 42.9 years (range, 25 to 69). There were 41 men and 29 women.

Diagnosis of FAI was done with provocative test and with standardized anteroposterior, cross table and Dunn view.

LLD was evaluated preoperatively using a clinical standardized method.

LLD was found in 27 (39%) patients. 17 patients had a moderate LLD (1 cm) and 10 had a slight LLD (0.5). In patients with LLD, the affected hip leg on was both longer or shorter than the controlateral leg.

The LLD prevalence in patients suffering from FAI is high and should be more accurately studied.

**Summary:**
In conclusion, we advise caution in evaluating patients with a painful hip with restricted internal rotation before suggesting osteochondroplasty of the proximal femur as a definitive treatment to cure hip symptoms and delay degenerative disease.

**Data:**
The following study was undertaken to answer the following questions:
1. Is the Cam deformity of the femur seen in femoro-acetabular impingement a distinct morphologic entity or part of a continuum of different morphologic conditions?
2. How frequently do subtle deformities of the proximal femur occur without degenerative disease?
3. Are there differences in the frequency and severity of these deformities in men and women?

**Materials and Methods:**
Sixty-six embalmed femora were randomly selected. Thirty-six of these specimens were derived from male body donors of average age, 73 years (range: 43-90 years), while 30 were derived from females of average age 79 years (range: 49-98 years). High resolution contiguous CT slices were obtained then reconstructed into three-dimensional solid body computer models for assessment then segmented into principal anatomic components. The proportions of femora in each group were calculated. Descriptive and comparative statistics were then preformed on the various groupings between genders.

**Results:**
Within the overall collection of 66 femora, only 20 (30%) were classified as "normal" according to the morphologic criteria. The most common abnormality was a posterior slip of the femoral head. Fifteen femora (23%) were found to have a deformity consistent with Cam-FAI with an average alpha angle of 49.1 degrees in the normal cases.

Almost half of the female femora were considered "normal", whereas only 17% of male specimens met the same criteria (p=0.0145). Similarly, almost half of male femora had a posterior slip according to the 2mm limit vs. 30% of the female cases. There was no difference between genders in terms of the prevalence of
retroverted and excessively anteverted cases (male: 8%; females: 7%).

Discussion:
The distribution of values of posterior slip, alpha angle and femoral anteversion are continuous and typically univariate, so the decision of what is “normal” and “abnormal” is one of judgment influenced by convention. For this reason, the use of a threshold value of a morphologic parameter to determine the need for surgical intervention appears to serve the desire for regimentation rather than the obligation to treat each patient as a unique individual.

**ePoster #: 607**
**Radiographic Predictors Of Femoroacetabular Impingement**

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**Category:** Impingement

**Summary:**
In a radiographic analysis of 200 hips in 100 patients with unilateral FAI, we found that there is a poor correlation between pain and radiographic findings of FAI with a unique gender characteristic, as men exhibit more signs of cam characteristics and females show more signs of pincer.

**Data:**
Background:
The primary diagnosis of femoroacetabular impingement is based on clinical symptoms, physical exam findings and radiographic abnormalities. The study objective was to determine the radiographic findings that correlate with and are predictive of hip pain in femoroacetabular impingement (FAI).

Material and Methods:
One hundred prospective patients with unilateral FAI symptoms based on clinical and radiographic findings were included in this study. All patients filled out a WOMAC pain questionnaire. Two independent blinded surgeons assessed antero-posterior and lateral radiographs for 33 radiographic parameters of FAI. Correlations between pain scores and radiographic findings were calculated. A matched radiographic analysis was performed comparing symptomatic versus asymptomatic hips. Radiograph findings were also compared between males and females.

**Results:**
Weak positive correlations were identified between increasing pain scores with radiographic findings of posterior wall dysplasia, presence of a shallow socket and a more lateral acetabular fossa relative to the iliischial line. A symptomatic hip had a lower neck shaft angle, greater distance from iliinoischial line to acetabular fossa and larger distance from cross over sign to superolateral point of the acetabulum when compared to the asymptomatic hip in the same patient.

Symptomatic hips in males had more joint space narrowing, femoral osteophytes, higher alpha angles and larger, more incongruent femoral heads compared to females. Females had more medial acetabular fossa relative to the iliischial line and smaller femoral head extrusion index.

**Conclusion:**
Similar to other musculoskeletal conditions, radiographic findings of FAI are poor predictors of hip pain.

**ePoster #: 608**
**Arthroscopic Treatment For Patients With Limited Motion Of Hip Joint**

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**Category:** Impingement
Summary:
Radiologic bony deformity, accompanied labral degenerative tear and synovitis are the common causes of limited hip joint motion. By arthroscopic osteoplasty, acetabular removal, and synovectomy, hip joint range of motion improved afterwards.

Data:
Purpose:
To analyze the treatment results and arthroscopic findings of the patients whose chief complaint is limited motion of hip joint.

Material and Methods:
Among the cases that showed limited motion of hip joint from May 2009 to March 2010, 13 cases (right: 5 cases, left: 8 cases) that underwent arthroscopic treatment for suspected femoroacetabular impingement (FAI) by physical examination were retrospectively analyzed. There were 11 male and 2 female, and the mean age was 33.5 years old (17-69). Mean follow up period was 15.8 months (12-22 months). Physical examination and hip range of motion were preoperatively measured and presence of HLA B27 was evaluated and checked by blood test. Osteoarthritis was evaluated using Tönnis classification by measuring the lateral center-edge (CE) angle and femoral head-neck offset on simple radiography. Acetabular anteversion was measured and the alpha angle change before and after surgery was checked using 3D MDCT. For the 2 cases that traction of hip wasn’t achieved, osteoplasty was done on the peripheral compartment, and for the other 11 cases, intraarticular lesion was checked and synovectomy, partial labrectomy, osteoplasty, and removal of loose bodies was carried out. On the final follow up, visual analogue scale (VAS), modified Harris hip score, and hip range of motion before and after surgery was compared.

Results:
The group consisted of 11 cases of cam type FAI (7 hip ankylosis due to ankylosing spondylitis, 1 case of diffuse idiopathic skeletal hyperostosis, 1 case of LCP disease sequelae, and 1 case of sequelae of SCFE, and 1 case of FAI without underline disease), 1 mixed type FAI was a sequelae of hypochondroplasia, and 1 pincer type FAI that showed hypertrophy of anterior capsule. HLA B27 was positive in 6 cases of ankylosing spondylitis. On radiological study, mean lateral CE angle was 44.4 degrees (33.2-61.5 degrees), mean femoral head-neck offset was 2.3 mm (-4.2~11.1 mm), and mean acetabular anteversion was 5.4 degrees (-4.4~18 degrees), and there were 7 cases of grade 1 and 6 cases of grade 2. In all cases, on arthroscopy, diffuse synovitis and acetabular joint cartilage injury was found, and 9 out of 11 cases with intraarticular lesion accompanied acetabular rupture and degenerative rupture anterosuperiorly, and the other 2 cases accompanied acetabular deformation. Mean alpha angle significantly improved from 69.4 degree (52.8-89.7) to 36.7 degree (22.1-55.2). Mean VAS improved from 7.5 (7-9) preoperatively to 1.8 (1-3) postoperatively, and mean modified Harris hip score from 49.3 (35-60) preoperatively to 90.1 (85-95) postoperatively. Of the mean range of motion, flexion significantly improved from 95.2 degree (60-120) preoperatively to 127.7 degree (110-140) postoperatively, internal rotation significantly improved from 4.6 degree (-5-25) preoperatively to 25.4 degree (15-30) postoperatively (p<0.001), however, improvements of extension, external rotation, adduction, and abduction were not statistically significant.

Conclusion:
Radiologic bony deformity, accompanied labral degenerative tear and synovitis are the common causes of limited hip joint motion. By arthroscopic osteoplasty, partial labrectomy and synovectomy, hip joint range of motion improved afterwards.
Index: hip joint, limited hip joint motion, arthroscopic treatment

ePoster #: 609
Femoroacetabular Impingement and Osteoid Osteoma: a Strange and Misleading Association

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**Category:** Impingement

**Summary:**
We have found a strange association between hip intraarticular osteoid osteoma and femoroacetabular impingement in four young patients. We critically evaluated this strange association and we speculated on a hypothetical etiopathological pathway.

**Data:**
We have found a strange association between hip intraarticular osteoid osteoma (OO) and femoroacetabular impingement (FAI) in four young patients. Aim of this study is to critically evaluate this strange association and to speculate on a hypothetical etiopathological pathway.

Four patients with a confounding hip pain and radiological signs of FAI revealed a diagnosis of intraarticular osteoid osteoma. There were three males and one female with a mean age of 35 years (age range 28 to 45 years).

History, physical evaluation, X-ray, arthro-MRI, CT, bone scan and hystological findings were recorder and related to treatment results.

Clinically all patient major concern was diffuse groin and tight pain. Usual daily activities and weight bearing worsen the symptoms. Pain was described as worse at night in three patients. Physical examination revealed minimally reduced hip range of motion in all planes except for one patient, with end–range pain at FADIR and FABER test.

Conventional radiology revealed FAI signs in all 4 patients. Arthro-MRI were positive for mild to severe degenerative signs. Bone scan and computered tomography (CT) allowed a preoperative diagnosis of intraarticular OO in all patients, then confirmed hystologically in three. In two patients the lesions were located in the neck while in the other two at the acetabular side.

All patients but one underwent CT-guided thermoablation. One patient underwent hip arthroscopy for femoral osteoplasty and acetabular chondral microfractures.

Intraarticular OO, associated with FAI radiological pattern, exhibiting a confusing clinical presentation, represents, in the FAI age, a new diagnostic challenge. The association found in these four patients may open a new speculation on hip intraarticular OO etiopathogenesis as repetitive microtrauma may be, in some instance, the cause of an osteoid osteoma reaction inside the cortical bone.

ePoster #: 610

**Prevalence Of Radiographic Bony Abnormalities Predisposing For Femoroacetabular Impingement In Asymptomatic Patients**

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**Category:** Impingement

**Summary:**
A group of 95 hips in 95 asyntomatic patients without history of hip pain where studied with standarized x-rays to analize the prevalence of radiografic abnormalities predisposing for femoroacetabular impingement.

**Data:**
Introduction:
The femoroacetabular impingement (FAI) corresponds to structural bone abnormalities associated with pain and functional limitation of the hip. This condition generally occurs in young patients without obvious joint degeneration, which have an altered hip morphoanatomy. The diagnosis is made by clinical and image study. The normal radiographic parameters have been published in the international literature.

**Objective:**
The purpose of this study is to investigate the prevalence of radiographics bone abnormalities predisposing for FAI by radiographic measurements in asymptomatic patients.
Methods:
Standart conventional radiographic imaging for FAI, an antero-posterior pelvic view and an axial cross-table view of the proximal femur, where taken in 95 hips of 95 asymptomatic patients.

The patients, that had no history of hip pathology or pain, where recluted in one hospital between May 2009 and December 2010. The mean age was 42.8 years (range 17-55), 49 females and 46 males.

Radiographic parameters for PFA were measured. These consisted in the lateral center edge angle, acetabular index, femoral head extrusion index, presence of coxa profunda or protrusio acetabuli, alpha angle, the anterior femoral-neck offset and offset ratio.

Results:
For pincer type FAI predisposing radiographic parameters, 46 patients (48%) had no radiographic abnormalities, 32 patients (34%) had one and 17 patients (18%) had two altered radiographic parameters.

For cam type FAI predisposing radiographic parameters, 46 patients (48%) had no radiographic abnormalities, 24 patients (25%) had one and 25 patients (27%) had two or more altered radiographic parameters.

Patients with predisposing parameters of cam and pincer type FAI were 13 (18.3%).

Conclusions:
This study demonstrates a significant prevalence of radiographic abnormalities predisposing FAI in asymptomatic patients in the population studied.

ePoster #: 611
A Novel Approach To Assess Dynamic Function In The Non-Arthritic Hip
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Category: Impingement
Summary:
This novel approach to dynamic function of the hip represents a possible mechanism for evaluation of preoperative and postoperative function in patients with femoroacetabular impingement.

Data:
Introduction:
There has been a recent interest in the non-arthritic hip and its associated complex pathologies. Passive range-of-motion and static specialty tests are the corner stone of diagnosis and assessment of treatment. There has been little information on the use of dynamic functional measurements to assess non-arthritic hip function. The primary aim of this study was to measure and identify objective and reliable functional parameters as a novel approach to assess dynamic hip function.

Methods:
A cross-sectional study was conducted on eight healthy non-arthritic male subjects. Functional kinematic and kinetic data were acquired with dynamic 3D motion analysis during stair ascent and descent, as well as a sit-to-stand maneuver. Surface electromyographic (EMG) activity was measured for hip and trunk musculature. The adjusted coefficient of multiple correlation (CMC) was calculated for angle, moment and EMG measures per subject, and then averaged across subjects.

Results:
Mean sit-to-stand angle, moment, and EMG CMCs were 0.82, 0.83, and 0.63 respectively. Mean stair ascent angle, moment, and EMG CMCs were 0.83, 0.89, and 0.74, respectively. Mean stair descent angle and EMG
CMCs were 0.79, 0.83, and 0.70 respectively. Hip-specific angle and moment CMCs for sit-to-stand, stair ascent, and descent were: 0.91 and 0.90; 0.91 and 0.91; 0.83 and 0.81.

Discussion:
Overall the kinematic, kinetic and EMG repeatability was very good; these measures are sufficiently reliable to objectively assess dynamic function in healthy subjects. Given the importance of these activities of daily living and their requisite stresses, neuromuscular compensation strategies may be involved that are not present with static measures. This novel protocol has been shown to be a reliable way mean to assess dynamic hip function in the non-arthritic hip. The resultant data may lead to improved diagnostic and therapeutic regimens and also serve as a baseline data set to assess complex pathologies.

**ePoster #: 612**
*Femoroacetabular Impingement And Femoral Neck Stress Fractures: Is There An Association?*

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**Category:** Impingement

**Summary:**
The prevalence of FAI in patients with femoral neck stress fractures is 100%. Main morphological alteration associated is pincer-type FAI. We should determine whether FAI plays a role in the pathogenesis of femoral neck stress fracture.

**Data:**
Objective:
To determine the prevalence of femoroacetabular impingement (FAI) in patients with femoral neck stress fractures.

Methods:
A multicenter descriptive study was performed; we reevaluated hip imagining files (radiographs, CT and MRI of the hip) in 9 patients (10 hips) with the diagnosis of femoral neck stress fracture, between the years 2000 and 2010 in 3 hospitals. The images were independently assessed by 2 radiologists and 4 orthopedic surgeons from different institutions. Then these patients were clinically evaluated looking for FAI clinical signs.

Results:
FAI was detected in all patients who had a femoral neck stress fracture. Seven hips had imaging signs of pincer FAI and the other 3 hips with mixed FAI. All the patients evaluated (7) had a positive physical exam for FAI and 6 of 7 patients had a previous history of groin pain.

Conclusions:
The prevalence of FAI in patients with femoral neck stress fractures is 100%. Main morphological alteration associated is pincer-type FAI. We should determine whether FAI plays a role in the pathogenesis of femoral neck stress fracture.

Keywords: femoral neck fracture, stress bone fracture, femoroacetabular impingement, pincer impingement type.

**ePoster #: 613**
*Concavity Of The Proximal Femur In Mammals And It's Correlation With Fai*

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**Category:** Impingement
**Summary:**
Morphological features of the human hip which may induce osteoarthritis represent normal anatomy in mammals

**Data:**
Recent innovations in joint preserving surgery of the hip indicate morphological features of the hip may induce osteoarthritis. However, these morphological features, especially reduced concavity of the femur head, represent normal anatomy in some mammals. We studied hip morphology in mammals and tried to correlate form and function.

In the collection of the Dutch museum of Natural History, femora of horse, cow, kangaroo, dog, chimpanzee, orangutan, seal and beaver were photographed in standardized AP and lateral positions. A total of 76 femora were studied. The following parameters of the proximal femur were measured: concavity (α, β, γ, δ angles and offset) neck-shaft–angle, and the modified anatomical proximal femoral angle (MPFA).

In mammals two types of hip can be recognized. Coxa Recta is a hip made for running as well as jumping and is seen in mammals like horse, cow and kangaroo. It has less concavity at the dorso-superior head-neck transition. Coxa Rotunda is hip made for climbing as well as swimming and is seen in mammals like chimpanzee, seal and beaver. The cut-off value between these two types is a β- angle of 45 degrees.

The different types of hip morphology, coxa recta and coxa rotunda, each have their characteristic anatomy, corresponding to function. The two types correlate with human hip morphology where males tend have a coxa recta, and females a coxa rotunda, or coxa profunda. Each type has a characteristic mechanism that can induce osteoarthritis through femoro-acetabular impingement.

ePoster #: 615
**Low Prevalence Of Femoroacetabular Impingement Findings On MRI In Asymptomatic Women**

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**Category:** Impingement

**Summary:**
Retrospective review of pelvic MRIs of asymptomatic women reveals low prevalence radiologic findings consistent with FAI.

**Data:**
Introduction:
While interest in hip arthroscopy for the treatment of femoroacetabular impingement is increasing, there is currently little information on its prevalence. The purpose of this study was to document the prevalence of FAI associated MRI findings in asymptomatic females.

Methods:
Pre-existing pelvic MRIs of asymptomatic women between the ages of 14 and 60 were evaluated for the following MRI signs of FAI: os acetabuli, joint effusion, paralabral cysts, and herniation pits in the femoral neck. Two fellowship-trained musculoskeletal radiologists and one orthopaedic surgeon evaluated the MRIs. Patients who had prior pelvic surgery, or an MRI obtained for hip pain were excluded.

Results:
MRIs of a total of 132 hip joints were reviewed. Joint effusions were present in between 13% and 51% of pelvic MRIs; os acetabuli were seen in .7% to 18%; paralabral cysts between 0% and 2.3%; herniation pits of femoral neck in between .7% and 1.5%; Phi contingency coefficients calculated for correlation between each of the three MRI interpreters were .057, .01. and .099; indicating a lack of consistency between all three interpreters. A negative finding by one observer was confirmed by the second 86% of the time, however a positive finding was confirmed only 6% of the time.
Conclusion:
The prevalence of FAI associated MRI findings in asymptomatic women was low. Furthermore, the presence of these findings on MRI also varies with the interpreter. Although a high degree of interobserver consistency exists with regards to negative findings, a positive finding by one radiologist was rarely predictive of a positive finding by another.

Methods:
We investigated 162 patients who underwent arthroscopic management of Cam-lesion among the 203 patients. We measured the alpha angle in the pelvis AP, frog-leg AP, and Axial oblique view pre and post-operatively. We also measured the width of the circle of the femoral head (a) and most lower part of the head and neck junction (b) in same circle and assess the ratio b/a. We also evaluated the clinically modified Harris hip score (HHS) and we made a satisfaction grade 5 points (5 as excellent, 4 as moderate satisfaction, 3 as preoperative points, 2 as not improved or slightly aggravated symptoms, and 1 as joint space narrowing or taken a total hip arthroplasty). This was easily measured by the physicians, who were not involved in the operation.

Results:
Preoperative alpha-angle in Pelvis AP, Frog-leg AP and Axial lateral view were 66.95(STD=9.87), 59.49(STD=11.22), 62.71(STD=12.43) on average respectively, and postoperatively 58.8(STD=8.52), 51.1(STD=8.08), 55.7(STD=12.6) on average respectively. These were statistically significant results (p=<0.001). Head–neck ratio was 0.641(STD=0.082) preoperatively and 0.638(STD=0.23). This ratio also showed statistical significance (p=0.002). Additionally, we measured head-neck shaft angle pre and postoperatively, and the results were 134.9(STD=4.95) and 135.73(STD=4.64) on average (p=0.58). HHS was improved by an average of 12.9 points and satisfaction grade also improved by 1.6 points.

Conclusion:
The average alpha angle was improved in all three views (63.05-55.2). A Head-neck ratio in axilalateral radiograph as a new radiologic parameter of FAI showed significant deference between preoperative and postoperative images. Arthroscopic management of patients with Cam-lesion results in satisfactory improvement in outcomes at a minimum 1 year follow-up.

ePoster #: 616
Radiological Evaluation And Clinical Outcomes Of Cam-Type Femoroacetabular Impingement After Hip Arthroscopy

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Category: Impingement

Summary:
The average alpha angle was improved in all three views (63.05-55.2). A Head-neck ratio in axilalateral radiograph as a new radiologic parameter of FAI showed significant deference between preoperative and postoperative images. Arthroscopic management of patients with Cam-lesion results in satisfactory improvement in outcomes at a minimum 1 year follow-up.

Data:
Introduction:
Femoroacetabular impingement (FAI) is an increasingly recognized disorder. FAI is the result of abnormal contact between the femoral head and acetabulum. Cam impingement is the abnormalities of the femoral head-neck contour. However, there were no reports around to pre and postoperative alpha angle change in anteroposterior (AP), frog-leg AP, or cross table lateral view. There were few reports on how the amount of the resection of the bump could be measured. The primary purpose of this paper is to measure the pre and post operative alpha angle in three views, and measure the head-neck ration in axial view to assess both the clinical results and radiological relationships.
Magnetic Resonance Arthrography Of The Hip: The Correlation Of Consultant Experience And The Quality And Accuracy Of Reporting Compared To Arthroscopic Findings

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Category: Impingement

Summary:
The accuracy and quality of MR Arthrography reporting may vary depending on consultant experience. A retrospective study was conducted examining the relationship between the experience of consultant reporting and the correlation with arthroscopic findings (n=119). As the experience of the consultants increases, the accuracy and quality of MRA reporting of hip pathology significantly improves.

Data:
Introduction:
Magnetic Resonance Arthrography (MRA) is being increasingly utilised to investigate the presence of intra-articular pathology of the hip in patients with a clinical diagnosis of femoro-acetabular impingement (FAI). The experience of consultant radiologists providing the reports may vary greatly as may the accuracy and quality of the findings. A well-executed, good quality MRA will provide excellent information; accurate reporting can support surgeons in confirming a clinical diagnosis and identifying the extent of the pathology; poor quality or inaccurate reporting may confuse diagnosis and result in conflict of opinion.

Method:
All patients who underwent arthroscopic hip surgery for FAI and whose MRA investigation was prospectively reported on by the main author, a senior musculoskeletal consultant radiologist (working in an independent international jurisdiction) and one of three local consultant radiologists, between July 2009 and May 2011 were considered for the study. A total of 119 patients were suitable. Arthroscopic findings were separated into three groups of pathology each group containing pathological features of increasing subtlety, complexity and diagnostic difficulty (level 1 to level 3). Consultants (1 to 5) were considered in order of experience (consultant 1 being most experienced and consultant 5 being the least experienced). The level of agreement of the reports from each consultant was then assessed with the arthroscopic findings in each of the three groups, for all patients in the study. Three levels of agreement were assessed: Level 1: Hip pathology was considered present or absent (normal); Level 2: Considered the presence or absence of labral pathology, pincer deformity, CAM deformity and chondral damage; Level 3: Quality of labrum (blunting, poor volume/absent), type of labral pathology (tear, partial separation or complete separation, intralabral cyst/calcification/osseus body), size of (CAM and Pincer) impingement lesion, presence of os acetabuli, rim fracture, type of chondral pathology (degeneration, fibrillation, wave sign, delamination, thinning), femoral or acetabular subchondral cysts. Agreement outcomes were analysed in 2x2 tables for each of the three levels of agreement; statistical analysis was performed using a Chi-squared test, Kappa statistic and Fishers exact test.

Results:
Level one – there was a statistically significant level of agreement (p<0.05) between all consultants and arthroscopic findings; the level of agreement was highly significant (p<0.01) for four out of five consultants. Level two – features described well with consistently high level of agreement with arthroscopic findings were the presence of a labral tear, detachment, chondral thinning and CAM deformity; the level of agreement was highly significant (p<0.01) for consultants 1,2 and 3; consultants 4 and 5 failed to reach an agreement level of statistical significance in these areas. Pincer deformity was universally poorly reported and agreement only reached statistical significance with consultant 1. Level three – the presence of sub chondral cysts both in the acetabulum and femoral head/neck, the presence of os acetabuli, chondral thinning, and intralabral lesions were well reported (p<0.01) by consultant 1,2 and 3. For consultants 4 and 5, the majority of pathological features at level three were poorly reported and agreement with arthroscopic findings rarely reached statistical significance.
Conclusion: This study demonstrates the difference in the level of understanding and the accuracy of interpretation of MR arthograms of the hip. The two consultants with most experience demonstrated a high level of agreement with arthroscopic findings at all three diagnostic levels of difficulty; consultant three also demonstrated a consistently good appreciation of the pathology mainly at levels one and two; consultants four and five demonstrated poor agreement with arthroscopic findings at level two and three but agreement was significant at level one. As the experience of the consultants increases, the accuracy and quality of MRA reporting of hip pathology significantly improves.

Study Design: Descriptive Epidemiology Study

Methods: We retrospectively reviewed the AP pelvis and frog leg lateral radiographs of 95 elite male and female soccer players to determine the prevalence of hip abnormalities. Multiple radiographic parameters were used to assess the presence of cam and pincer type morphologies of femoral acetabular impingement (FAI). Measurements were conducted by a blinded, sports medicine fellowship trained orthopaedic surgeon with experience in treating hip pathology.

Results: A total of 72% (54/75) male and 50% (10/20) female players demonstrated some evidence of radiographic hip abnormality. Cam lesions were present in 68%(51/75) of males [76.3% (39/51) bilateral involvement] and 50% (10/20) of females [90% (9/10) bilateral involvement]. Pincer lesions were present in 26.7% (20/75) of males and 10% (2/20) of females. A crossover sign was identified in 20% (20/75) of males and 5% (1/20) of females. The average male alpha angles overall was 65.6°. Cam positive hips averaged 70.7°. The average female alpha angle overall was 52.9° with cam positive hips averaging 60.8°.

Conclusion: The prevalence of radiographic hip abnormalities in elite soccer athletes is considerable, particularly in young male athletes. The establishment of the prevalence of these findings represents the first step in identifying the relationship between radiographic abnormalities and injuries of the hip and groin in athletes.

ePoster #: 618

The Prevalence Of Radiographic Hip Abnormalities In Elite Soccer Players

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Category: Impingement

Summary: The prevalence of radiographic hip abnormalities in elite soccer athletes is considerable, particularly in young males.

Data:
Background: Hip injuries, both intra- and extra-articular, are becoming a more commonly recognized, diagnosed and treated injury in athletes of all levels. Our goal is to establish a previously undefined value in any athletic population – the prevalence of radiographic hip abnormalities in elite soccer athletes.

Purpose: This study is designed to provide a foundation for the future body of literature regarding hip pathology and “at risk” hips in athletes of all ages and levels of participation.
Arthroscopic Treatment Of Femoroacetabular Impingement In Young Taekwondo Players

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Category: Impingement

Summary:
Arthroscopic treatment in symptomatic Taekwondo players is a safe and effective method to improve the postoperative frequency and function of Taekwondo. The returning to Taekwondo play may be directly associated with clinical improvement and patients’ will.

Data:
Purpose:
To evaluate the clinical results and radiological and arthroscopic findings of arthroscopic treatment for femoroacetabular impingement(FAI) in young Taekwondo players, the returning rate and recurrence rate of FAI.

Materials and Methods:
We retrospectively analyzed 20 cases(16 males, 4 females) of Taekwondo players who were arthroscopically treated for FAI from September 2003 to July 2008. The mean age was 21.6 years old(17-32) and the duration of mean follow up was 23.8 months(18-71). We underwent plain radiographs, 3 dimensional computed tomography and sometimes magnetic resonance arthrography for radiological evaluation, and evaluated labral injury, injury of cartilage and associated lesions on arthroscopy. Preoperative and postoperative Visual analogue scale(VAS), modified Harris hip score(MHHS), Sports frequency score(SFS), and non-arthritic hip score(NAHS) were each compared. We investigated returning rate at postoperative day(POD) 1 year and also, continuous rate and recurrence rate at POD 2 year.

Results:
There were 10 Cam types, 1 Pincer type, and 9 mixed types. Mean alpha angle was improved from 65.8 degrees to 43.2 degrees postoperatively. Acetabular labral tear was accompanied in all cases, and anterolateral and anterior tear, in order, was related to anterior impingement and degenerative tear was the most common type. Regarding to injury of acetabular cartilage, anterosuperior, posteroinferior, and anterior were frequent in order, and regarding to injury of femoral cartilage, anterosuperior portion was mostly present. The range of motion on the final follow-up showed improvement in all ranges except abduction, and VAS, MHHS and SFS showed statistically significant improvement, however, NAHS was improved though not significant. The returning rate at POD 1 year was 85%(17/20). The recurrence rate at POD 2 year was 15%(3/20; 1 case who stopped Taekwondo and 2 cases who had returned), and 2 cases who returned additionally abandoned Taekwondo which lead to 75%(15/20) continuous rate.

Conclusion:
Screening test of FAI in young Taekwondo players is necessary, and if there is evidence of which, selection of Taekwondo play should be carefully done. Arthroscopic treatment in symptomatic Taekwondo players is a safe and effective method to improve the postoperative frequency and function of Taekwondo. The returning to Taekwondo play may be directly associated with clinical improvement and patients’ will.

Efficacy Of Ultrasound Guide To Perform Hip Arthro-MRI

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Category: Impingement
Summary: In our study we utilized the ultrasound (US) guide to perform hip arthro-MRI in patients with FAI, to avoid radiation exposure using fluoroscopic or CT: in all cases we correctly positioned the contrast medium in intra-articular location, without significant extravasations and therefore we believe that US guide could become the gold standard for hip injections of MRI contrast medium.

Data: Purpose / Introduction: Our purpose was to verify the efficacy and feasibility of ultrasound (US) guide to perform hip arthro-MRI in order to avoid radiation exposure using fluoroscopic or CT guide. In recent years femoroacetabular impingement (FAI) was defined and rapidly aroused orthopedists and radiologists’ interest. The diagnosis of this pathological entity lies on clinical findings, x-ray images, but, above all, on arthro-MRI examination. Normally the intra-articular (IA) introduction of paramagnetic contrast-medium is made by means of fluoroscopic or CT guide. The technique is quite complex, time-consuming and leads to both patients and operator radiation exposure. In our Institution we performed in the last ten years about 15.000 ultrasound-guided IA hip injections of hyaluronans, anesthetic or steroids for osteoarthritis therapy. We used a similar US-guided technique to perform arthro-MRI in patients with FAI.

Material and Methods: We performed in the last two years (Sept. 2009- May 2011) 90 arthro-MRI in 90 patients (51 men and 39 women) with clinical and x-ray diagnostic suspect of FAI. All patients were examined with the standard US technique used for the hip. The patients lied supine with the hip in slight internal rotation (15 to 20°). We scanned hip joint by means of an anterior parasagittal approach, lateral to the femoral vessels. Color-Doppler permitted us to recognize the femoral vessels. The probe was centered on the femoral epiphysis and oriented with the long axis of the femoral neck, including also the acetabulum, the femoral head and the hyperechoic joint capsule in its entirety. The joint capsule, with its concave contour, lies between the hyperechoic iliopsoas and the femur. It has been easily recognized in all procedures. We used two different medium level ultrasound machines, a convex multi-frequency (2.5-5 MHz) probe with attached a bioptic-device to guide bioptic needles (20/21G of 3.5/4.3 in.). The injection technique was the same used for osteoarthritis IA therapy, with an antero-superior approach for needle introduction toward femoral head. We needed two radiologists, one providing the ultrasound guide and the other injecting gadolinium. The ultrasound real-time monitoring allows us to recognize both the needle progression and the tip under hyperechoic capsule, making us sure to inject gadolinium in IA position. We made sure of a correct IA progression of paramagnetic contrast medium in various ways. First, we noticed a low resistance to injection. Then, as gadolinium (Gd-DTPA, 2mmol/L) appears hypo-anechoic, we experienced a progressive distension of the articular capsule, as the effusion-like pattern. Third, we also utilized power-Doppler imaging to recognize IA flow signals generated by fluid movements. No local or IA anesthetic was administered to any patient before, during or after the injections. We ended injection when patients referred articular discomfort.

Results: In all cases we correctly positioned contrast medium in intra-articular location, without significant extravasations. The technique lasted about ten minutes, considerably less than fluoroscopic or CT guide, without both radiation exposure and added radio-opaque contrast medium. The technique was well-tolerated.

Discussion / Conclusion: Hip IA injection performed “blindly” has a significant failure rate. Leopold et al. injected human cadavers and found that neither the anterior (failure rate of 40%) nor the lateral (failure rate of 20%) injection approach, using technique based on anatomic landmarks, were reliable for a safe clinical or diagnostic use. Fluoroscopy, the most used guidance, has important disadvantages. First of all, the need of radiation and iodinated contrast to assess the proper IA position of the needle, then the absence of direct visualization of the joint capsule and vascular structures, third, the relative high costs. In the last years, the IA hip injection under US guidance gained acceptance and scientific validation, making this technique safer, simple and relatively cheap. The clinical results give evidence that US has at least equivalent
efficacy of fluoroscopy in guiding IA therapy. This conviction originates also from our ten-year experience that developed on about 15,000 IA hip injections. We used US guidance for viscosupplementation, steroid and anesthetic treatment and joint effusion aspiration. US provide a simple and reliable method of real-time visualization of needle location during IA injection and require less manipulation of the needle respect to fluoroscopy. US, unlike fluoroscopy, allow detection of joint effusion and peri-articular fluid collection, such as bursitis. In our study US guidance showed its efficacy also to perform hip arthro-MRI, where we needed more quantities of injected fluid (10-20 ml) respect that of IA therapy. Gadolinium appears as hypoechoic, then more fluids are injected and greater will be the distension of the hip joint capsule anterior to the femoral osseous profile with an "effusion-like" pattern. We thought that ultrasound guide could become the gold standard for hip injections of MRI contrast medium, avoiding unnecessary radiation exposure to patients and operators.

ePoster #: 621
**Femoral Head Articular Cartilage Mapping In Normal Specimens: A Cadaveric Study**

University Hospitals Case Medical Center
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**Ethan S. Lea, MD, MS, USA, Presenting Author**
Michael Abdulian, MD, USA
Shane Nho, MD, USA
Michael Jonathan Salata, MD, USA

**Category:** Impingement

**Summary:**
Cadaveric hip joints were dissected to quantify the articular cartilage exposed distal to the acetabular labrum throughout normal hip range of motion in order to guide the extent of osteochondroplasty that may be performed safely along the femoral neck in cases of Cam-type femoral acetabular impingement.

**Data:**
**Purpose:**
The use of hip arthroscopy in the treatment of femoral acetabular impingement (FAI) has greatly changed the orthopedic surgeon’s ability to restore normal osteochondral congruency about the hip. Cam-type FAI can be successfully treated with arthroscopic techniques. To date, however, review of the literature demonstrates little published description of the normal amount of exposed articular cartilage covering the femoral head in relation to the labrum. This measurement is an important guide directing how proximally the osteochondroplasty can be extended. The purpose of this study is to quantify the articular cartilage exposed distal to the acetabular labrum in order to guide the extent of osteochondroplasty that may be performed safely along the femoral neck.

**Methods:**
Ten cadaveric femoral heads were marked at five distinct points: 1.) the most superior/lateral aspect, 2.) the AIIS, 3.) the psoas U, 4.) most inferior/medial aspect, and 5.) a point halfway between the AIIS and the psoas U. Lines were extended from these five points down the femoral head and neck, parallel with the femoral neck. Measurements were taken along these five lines between the free edge of the labrum and the edge of the articular cartilage of the femoral head. These measurements were taken 1.) in neutral abduction/adduction and internal/external rotation at full extension, 2.) 45° of flexion, and 3.) 90° of flexion. Measurements were also taken in 45° of internal rotation and 45° of external rotation at full extension and 45° of flexion.

**Results:**
The specimens demonstrated 5+2mm of exposed articular cartilage in full extension when measured from the most superior/lateral femoral head, 16+4mm from the AIIS, 19+3mm from the midpoint, 20+3mm from the psoas U, and 7+2mm from the most inferior/medial aspect of the femoral head. In 45° of flexion, these measurements decreased to 1+4mm from the superior/lateral femoral head, 2+3mm from the AIIS, 3+3mm from the midpoint, 5+3mm from the psoas U, and 7+4mm from the inferior/medial aspect of the femoral head.

**Conclusions:**
This data offers the first published guidelines regarding the amount of femoral head articular cartilage that must
be preserved in order to maintain normal articular cartilage distal to the labrum when performing femoral neck osteochondroplasty. The measurements at 45° of flexion are less than the 1 cm of articular cartilage that is often recommended and suggests that a more aggressive osteochondroplasty may be performed. Measurements taken from the psoas U and AIIS are easily identified in the intra-operative setting and demonstrate reproducible results. This data may also be utilized to decrease the need for intraoperative

**ePoster #: 622**

*Psoas Impingement Causing Labrum Tear: A Series From Three Tertiary Hip Arthroscopy Centers*

Orthopedic Associates- Multi-Center
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**David King, MD, USA, Presenting Author**

Yi-Meng Yen, MD, Ph.D, USA
Brett Casio, MD, USA

**Category:** Impingement

**Summary:**
A series of young, athletic patients treated for labrum pathology associated with the psoas tendon rather than a significant bony abnormality.

**Data:**
Background:
The term hip impingement is usually associated with psoas impingement after arthroplasty or femoroacetabular impingement (FAI). A recently, less commonly described mechanism of impingement and labrum pathology is the psoas tendon applying pressure to the acetabular labrum more medial to the typical FAI labrum lesion. Much is still unkown about the anatomy, pathology, and treatment of this entity.

**Purpose:**
This paper describes the successful arthroscopic treatment of a series of patients with a recently recognized but unnamed cause of hip pain in the young athletic population without significant bony pathology or coxa saltans. Awareness of this entity is important to allow appropriate treatment of the labrum and psoas tendon.

**Methods:**
Seven hundred hip arthroscopies by three surgeons at different centers were retrospectively reviewed. Athletes with labrum tears from the 2 to 3 o'clock position were evaluated for inclusion in the study. Patients with osteoarthritis, crossover sign, coxa profunda, CAM lesion, acute trauma, or coxa saltans were excluded. All authors were the primary surgeons and are fellowship trained hip arthroscopists working in tertiary hip arthroscopy centers. Pre and post-operative Harris Hip scores were obtained. Patients underwent diagnostic and therapeuic hip arthroscopy. The psoas tendon was released in all patients at the level of the capsule via a transcapsular approach. Labrum repairs were performed when deemed beneficial by the operative surgeon.

**Results:**
Twenty-two patients (26 hips, 4 bilateral) were identified with a labrum tear apparently caused by psoas impingement and had no other significant hip abnormalities. All but one were female. Average age was 19 (12 – 25 years). Labral repair was performed in all but 2 patients. Average anchors used were 1.2 per hip. Pre and post-operative Harris hip scores were obtained with a minimum follow-up of 6 months for 16 patients. Average Harris hip score improved from 70 preop to 94 postop. There were no significant complications identified.

**Conclusion:**
We describe a recently recognized but yet unnamed entity encountered in the treatment of athletes with hip pain consisting of labrum pathology associated with the psoas tendon rather than bony abnormality. Arthroscopic treatment including a psoas tendon release and a more medial labrum repair can provide relief with no significant complications in the short term.
**ePoster #: 623**
*Return To Sporting Activities After Arthroscopic Management Of Femoroacetabular Impingement*

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Christos Paliobeis, MD, UNITED KINGDOM
Richard N. Villar, BSc (Hons), MA, MS, FRCS, UNITED KINGDOM

**Category:** Impingement

**Summary:**
In a large prospective series of athletes this study has demonstrated the positive impact of arthroscopic surgery for FAI. The trend suggests that athletes involved in competitive sports may show greater benefit than those involved in recreational sports.

**Data:**
**Background:**
The benefit of hip arthroscopy for the treatment of femoroacetabular impingement (FAI) in athletes and its role in early return to sporting activities needs further investigation.

**Purpose:**
The aim of this study is to determine the impact of hip arthroscopy on the return to sports in this population.

**Study design: Cohort study**

**Methods:**
We prospectively collected data on 200 athletes, the largest series reported, who underwent hip arthroscopy for FAI. Patients were asked to complete questionnaires for the modified Harris hip score (MHHS), non-arthritic hip score (NAHS), patient satisfaction on a visual analogue scale (VAS) and a specially formulated sports module. This was collected immediately before surgery, and at six weeks, six months and one year after the procedure.

**Results:**
We have found that 72% of the athletes return to their preferred sports within six months of surgery and this increased to 82% at one year. This was better for athletes involved in competitive sports as compared with those in recreational sporting activities both at six months (78% versus 65%; p=0.06) and at one year (88% versus 73%; p=0.14). There was a statistically significant improvement in the training time (hours per week) from a mean of 7.8 hours before surgery to 15.7 hours (p<0.001) six months after surgery and 20.3 hours (p<0.001) one year after surgery. A significant improvement in the time spent in competitive activities (hours per week) was also noted from a mean of 2.5 hours before surgery to 5.2 hours (p=0.02) six months after surgery and 7.9 hours (p<0.001) one year after surgery. A statistically significant (p<0.001) improvement was seen in the MHHS and NAHS at six months and one year follow up.

**Conclusion:**
In a large prospective series of athletes this study has demonstrated the positive impact of arthroscopic surgery for FAI. The trend suggests that athletes involved in competitive sports may show greater benefit than those involved in recreational sports.

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**ePoster #: 624**
*Hip Gait, Biomechanics And Strength Abnormalities In Femoroacetabular Impingement*

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**Michael Kenneth Gilbart, MD, FRCS(C), CANADA, Presenting Author**
Adrian De Vincenzo, BSc., CANADA
Michael Anthony Hunt, PhD, CANADA

**Category:** Impingement

**Summary:**
A biomechanical assessment, including electromyography and strength measurements of patients with FAI in comparison to controls revealed abnormalities in hip range of motion as well as decreased strength.

**Data:**
**Introduction:**
The purpose of this study was to determine the hip joint biomechanics and strength differences between individuals with and without femoroacetabular abnormalities.
impingement (FAI) as well as during functional activities including: gait, lunging, stair climbing.

Materials and Methods:
This was a cross-sectional observation study examining gait and strength measurement in individuals with hip impingement and comparing them to a cohort of age- and sex-matched healthy individuals. There were 10 patients in each group.

Measurements of hip joint range of motion and joint load were made during walking, stair climbing, and lunging. Patients underwent a 3-dimensional motion analysis. Kinematic (joint angles) and kinetic (joint forces, joint moments) data was collected synchronously using high-speed digital cameras and floor-mounted force platforms. The peak values of hip adduction and abduction as well as flexion and extension hip joint moments were calculated to estimate internal joint loading. The maximum isometric muscle strength of the following hip muscle groups was measured: extensors, flexors, abductors, adductors, and internal/external rotators. The strength data were reported in Nm/kg to reflect their absolute strength converted to a torque (to account for differences in limb length) normalized to body mass (kg). Wireless electromyography was used to measure activation patterns including total muscle activation and peak amplitudes of the hip musculature during each movement trial. The hip joint function was also assessed using the timed stair climb (time required to ascend a flight of 10 stairs) and the five-times sit-to-stand test (time required to complete five consecutive sit-to-stand movements).

Between-group comparisons were performed for each variable using paired t-tests (using age- and sex-matched pairs).

Results:
The internal rotation was 34.00 +/- 12.166 degrees in the control group vs. 21.14 +/- 6.914 degrees for the patient group. The ER strength was 0.71 +/- 0.22 Nm/kg in the impingement group versus 0.87 +/- 0.25 Nm/kg in the control group. The IR strength was 0.67 +/- 0.26 Nm/kg in the impingement group versus 1.00 +/- 0.37 Nm/kg in the control group. The stair climb was 2.62 +/- 0.62 in the impingement group versus 1.87 +/- 0.07 in the control group.

Conclusions:
This represents a complete biomechanical assessment, including electromyography and strength measurements of patients with FAI in comparison to controls. Patients with hip impingement exhibited a decreased range of motion in the hip, as well as a trend towards a decrease in flexion, internal and external rotation strength compared to the control group. Patients in the impingement group appeared to exhibit increased hip joint loading during walking and other functional activities compared to the control group.

**ePoster #: 701**

*Intraarticular nodular fasciitis of the hip – a new rare indication for hip arthroscopy*

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Jože Pižem, PhD, SLOVENIA

Category: Other

Summary:
The first case report of intraarticular nodular fasciitis of the hip is reported, successfully treated by arthroscopy.

Data:
Introduction:
Nodular fasciitis is a benign myofibroblastic proliferation with predilection for the subcutaneous tissues of the upper extremities, trunk, head and neck of young adults. Intraarticular localization is extremely rare and believed to be provoked by traumatic event. Seldom cases have been published with pathology proven in the knee, ankle, hand, shoulder and temporomandibular joint.

Case Report:
25 years old female patient with 9 moths of spontaneous right groin pain during hip movements, worsened after longer bicycling, was treated in our institution. MRI of
the hip joint demonstrated signs of synovitis with synovial chondromatosis like loose bodies in the peripheral compartment. During hip arthroscopy a conglomerate of multiple white-grayish loose bodies well localized sub-synovially in the anterior part of the peripheral compartment was removed from the joint and sent for patho-histological analysis together with samples of inflamed synovium. All tissue samples showed typical histologic features of nodular fasciitis. The groin pain subsided 2 months after the operation and the patient remained symptomless at the time of the last visit, 10 month after the procedure.

Conclusion:
According to our knowledge this is the first report of intraarticular nodular fasciitis of the hip, a possible differential diagnosis for synovial chondromatosis or other synovial diseases and a new but probably extremely rare indication for hip arthroscopy.

**Methods:**
The frequency of hip arthroscopy cases over a ten year period was determined from the ABOS database (1999-2009). Fellowship data and geographic region of practice from the years 2003-2009 was also available on the candidates.

A survey was devised to determine the type of hip arthroscopy training that is currently offered at a fellowship level. The survey was sent out to all fellowship directors that were listed in the American Orthopaedic Society for Sports Medicine (AOSSM) and American Association of Hip and Knee Surgeons (AAHKS) directory.

**Results:**
There was a significant increase in the number of hip arthroscopy procedures performed by ABOS candidates from 1999 (0.02 cases per candidate) to 2009 (0.36 cases per candidate) (p<0.0001).

From 2003-2009, a significantly greater percentage of sports fellowship trained ABOS candidates (10.4%) performed hip arthroscopy versus those without sports fellowship training (2.9%; p<0.0001). During this same time period, candidates in the Northeast and Northwest performed the most hip arthroscopy cases as a percentage of total cases (p<0.0001). Of the sports and adult reconstruction fellowships that have hip arthroscopy as a component of their training, most have added it within the past three years. Fellows performed less than twenty hip arthroscopy cases per year in the majority of training programs.

Most directors (89.2%) agreed that hip arthroscopy should be a component of a sports fellowship, while 59.6% agreed that it should be a component of an adult reconstruction fellowship. Of those directors who did not have hip arthroscopy as part of their fellowship, the majority (60.9%) of directors were not trying to actively incorporate it.

**Conclusions:**
The number of hip arthroscopy procedures performed by those who are taking Part II of the ABOS examination has risen over the past decade. This increase may be the...
result of several factors, including an increase in the number of programs offering training in hip arthroscopy.

**ePoster #: 703**

*Hip Pathology Presenting As Testicular Pain*

Asia Medical Specialists
Hong Kong, HONG KONG

**Jason Brockwell, MD, HONG KONG, Presenting Author**

**Category:** Other

**Summary:**
Two patients with unilateral testicular pain improved significantly with either hip arthroscopy or local anaesthetic injection into the same side hip joint.

**Data:**
A 38-year-old had about 3 months of right testicular pain.

Aged 24, he had had a hernia repair for a painless lump on the same side.

He was treated with antibiotics for presumed epididymo-orchitis, despite no symptoms of infection, but did not improve.

He went on to develop right groin pain, and hip examination was painful. On Valsalva manoeuvre he had a small varicocele. He had no herniae.

X-ray of the hip showed a pistol grip deformity of the proximal femur with normal joint space.

Injection of local anaesthetic into the hip joint relieved the groin pain, but not the testicular pain.

Concurrently, he was treated with antibiotics for amoebic dysentery, and fully recovered.

Later hip arthroscopy showed articular cartilage damage from cam impingement, treated with debridement and femoroplasty, and his groin and testicular pain improved significantly.

A 53-year-old presented with low back and gluteal pain, which later spread to the right groin and then to a sharp pain in the right testicle on movement of the lumbar spine and hips, including sitting and twisting. Hip examination was normal. He had painless inguinal cough impulses, but no true herniae.

X-ray of the hip revealed a pistol-grip deformity and small osteophytes on the femur, and reasonably well-preserved joint space, consistent with femoro-acetabular impingement and/or early osteoarthritis. Lumbar spine X-ray was essentially normal.

Ultrasound revealed bilateral small varicoceles, but no inguinal herniae.

Injection of the hip significantly improved his testicular pain.

**Discussion:**
Testicular pain can be a diagnostic challenge. The general surgery and urology community is generally not familiar with the diagnosis of subtle hip pathology, and hip pathology may not be considered in the differential of testicular pain.

Urological work-up consists of a search for testicular and extra-testicular sources of the pain. Ultrasound of the scrotal contents is routine, but pelvic X-ray is not.

If the pain is thought to be testicular, and is unresponsive to drugs, local anaesthetic block of the spermatic cord is performed. If the block is successful, denervation of the spermatic cord, conventionally by surgery, more recently by pulsed radiofrequency, is offered, usually with good success.

**Conclusion:**
Subtle hip pathology presenting primarily with testicular pain has not previously been described. Hip pathology should be considered in the differential diagnosis of testicular pain. Local anaesthetic hip joint injection was positive in one of the two cases described, hip arthroscopy was effective in the other.
We conclude that a significant proportion of patients undergoing diagnostic hip injection are unclear about the main purpose of their procedure. As shown, patient understanding can be significantly improved with the introduction of an information booklet. This may improve the accuracy of patients’ expectations following such procedures.

**ePoster #: 705**

*Outcomes Following Hip Arthroscopy In Patients With Type Three Ehlers-Danlos Syndrome*

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**Mackenzie M. Herzog, BA, USA, Presenting Author**
John E. Mcdonald Jr, MD, USA
Marc J. Philippon, MD, USA

**Category:** Other

**Summary:**
Patients with Type III Ehlers-Danlos syndrome show improvement in stability while maintaining or improving function following arthroscopic hip surgery to address hip pathology. Seventy percent of hips required multiple surgeries to reach their current level of function.

**Data:**
Introduction:
Ehlers-Danlos syndrome (EDS) encompasses a heterogeneous group of collagen disorders that affect the body’s connective tissue. Type III EDS is characterized by hypermobility of the large and small joints. There is a paucity of research regarding treatment for the orthopaedic manifestations of the disorder. Hip arthroscopy has become increasingly popular among orthopaedic surgeons to treat intra-articular hip pathology, including femoroacetabular impingement, labral pathology, synovitis, chondral pathology, and laxity. No research has been done to show outcomes following hip arthroscopy in the EDS population.

Hypothesis:
Patients with Type III EDS will have improved stability and function following arthroscopic hip surgery to address hip laxity.
Methods:
Six patients were identified with a geneticist diagnosis of Type III EDS. All patients underwent hip arthroscopy performed by a single surgeon between 2000 and 2009. Two patients underwent unilateral hip surgery and 4 patients underwent bilateral hip surgeries. Data were obtained prior to surgical treatment and following treatment. All subjective data were prospectively collected and retrospectively reviewed. Data points included modified Harris hip score (MHHS), subjective percent stability, function in activities of daily living (ADLs), function in sports related activities, number of months of stability improvement following surgery, and satisfaction with the outcome. This was an IRB-approved study.

Results:
Five patients were available for follow-up at an average of 52 months following their initial visit. One patient was lost to follow-up. All 10 hips in this study underwent an arthroscopic capsular plication and procedures to address labral pathology. Seven of the 10 hips underwent revision hip arthroscopy by the same surgeon. One patient underwent a revision hip arthroscopy by another physician. Of the hips that underwent revision hip arthroscopy, an average of 3 surgeries were performed per hip. Percent subjective stability increased from an average of 26% (range: 5%-50%) prior to surgical treatment to 71% (range: 25%-90%) at latest follow-up. The average MHHS increased from 43 (range: 31-64) to 65 (range: 45-85). Function in ADLs increased from an average of 60 (range: 25-95) to an average of 79 (range: 35-100), and function in sports related activities increased from an average of 22 (range: 0-60) to an average of 34 (range: 0-85) on a scale from 0-100. Patients reported an average satisfaction of 7 (range: 3-10) on a scale from 1-10. Patients also reported an average of 30 months of improvement of hip stability (range: 0-94 months). No patients reported a decrease in MHHS, percent stability or function in ADLs following surgical treatment. One person, who underwent bilateral surgery, reported a decrease from 5 to 0 in function in sports related activities.

Conclusion:
Patients with Type III EDS show improvement in stability while maintaining or improving function following arthroscopic hip surgery to address hip pathology. Seventy percent of hips required multiple surgeries to reach their current level of function.

ePoster #: 706
Criteria for ISHA membership – Participant feedback from Cancun

ISHA 2010
Cancun, MEXICO
Richard Eddy Field, PhD, FRCS, UNITED KINGDOM, Presenting Author

Category: Other

Summary:
ISHA has grown rapidly and a snapshot of delegate opinions on society membership was obtained at the end of the 2010 meeting in Cancun. Multiple membership categories are strongly supported. Proven competence in hip arthroscopy is less easily defined but linkage of ISHA membership to reimbursement and surgeon recognition is supported.

Data:
International specialist medical societies should provide their members access to pooled knowledge, expertise and advice that will allow them to review and improve their clinical practice. To the outsider, membership of specialist medical societies also infers specialist interest and expertise in the designated area of practice. If membership of a specialist society is restricted to established experts, those with greatest potential to learn will be excluded. If membership is open to all-comers, inexperienced practitioners may acquire inappropriate credibility. Membership of ISHA has grown rapidly over the past three years and a snapshot of the views of delegates, on the subject of ISHA membership, was obtained at the end of the 2010 meeting in Cancun.

A minimum of 72 and a maximum of 81 responses were obtained to six questions on ISHA membership. 65% of respondents felt that ISHA membership should be open to anyone interested in hip arthroscopy. 39% felt that
membership should be restricted to proven, competent hip arthroscopists.

Multiple categories of membership were generally supported with 94% supporting a full membership category for established and recognized hip arthroscopists. A probationary membership status, for hip arthroscopists gaining recognition of competence, was less popular with 74% support. Training membership for surgical trainees, Affiliate membership for allied medical professions and Associate membership for industry employees all achieved high levels of approval with 84%, 87% and 84% support, respectively.

When attendees were asked to consider ISHA membership being linked to a demonstration of clinical competency, 67% supported the idea that members should have undertaken a qualifying number of procedures. Of those who favored this approach, the average of the number of procedures required was 59. The idea that membership should be linked to a level of ongoing practice was slightly less popular with 64% support for an average 31 procedures, over the preceding twelve months and 61% support for an average of 59 procedures, over the preceding two years.

Consideration for linking ISHA membership to more diverse demonstration of involvement in hip arthroscopy proved more controversial. While 83% of respondents supported the idea that members should have attended at least one ISHA conference, only 68% supported the requirement of having attended a cadaveric training course. Other qualifying criteria met with considerably less support: The requirement that members should have completed a formal hip arthroscopy fellowship only secured 32% support, delivering a podium or poster presentation on hip arthroscopy at an international meeting gained 43% support, but publication on hip arthroscopy in a peer reviewed journal was lowest at 22% support and being observed undertaking hip arthroscopy by an ISHA scrutineer only secured 38% support.

When attendees were asked whether ISHA membership should be used by reimbursement organizations, insurance companies and healthcare commissioners as a criteria for funding hip arthroscopy, 55% responded in the affirmative and 84% supported the publication of their names and countries on the ISHA website for review by patients, surgeons and reimbursement organizations.

Respondents strongly supported multiple categories of society membership and generally supported the requirement for attendance of the ISHA conference. Support for completion specialized training was mixed. The potential benefit of ISHA membership being equated to clinical competence was recognized and supported by the majority of respondents.

ePoster #: 707  
Twist Test Has High Predictive Value To Diagnose Hip Labral Tear Compared To Arthroscopy

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Farshad Adib, MD, USA  
Skye Donovan, PT, PhD, USA

Category: Other

Summary:  
The "Twist Test" is a new diagnostic test for labral pathology performed in standing. This test has a high PPV and is quick and easy to perform.

Data:  
Introduction:  
Most tests for labral pathology are currently done in the supine position. We have developed the “twist test”, which is done with the patient standing and can evaluate the patient in functional, weight bearing position. The purpose of this study is to compare its reliability to arthroscopy and MR arthrogram.

Methods:  
Between June 2009 and August 2010, 371 patients had the twist test performed. Of these, 247 had an MR arthrogram (MRA) of the affected hip. A labral tear, degeneration, fraying and paralabral cyst were considered as a positive MRA. 110 of the total 371
patients underwent arthroscopic surgery. Post-operative surgical notes were examined and presence of labral tear were noted and compared to Twist test. The twist test is done with the patient facing the examiner, toes pointing forward. The patient bends their knees to 30 degrees and performs a windshield wiper like action with maximal excursion to the left and right. If the patient tolerates this, then the patient first gets on the unaffected leg, again with the knee bent at 30 degrees, and “does the twist” one-legged, with the examiner holding their hands gently for balance. The test is then repeated on the affected hip. A positive test is groin pain on the affected hip, apprehension with performing the test on the affected hip, or gross range of motion deficits on the affected hip compared with the unaffected side(>%50)

Results:
Among 160 patients with positive twist test, 154 patients had positive MRA and 6 had negative MRA. Among 87 patients with negative twist test, 72 had positive MRA and 15 had negative MRA. In comparison with MRA, the sensitivity and specificity of twist test for labral injury were 68.14% and 71.5% respectively. Positive predictive value (PPV, precision) of twist test for diagnosis of labral lesion was 96.25% and the accuracy was 68.4%. We then determined the sensitivity of the Twist test compared with arthroscopy results. Of the 110 patients underwent surgical intervention, 100% exhibited labral tears. Of those 110 patients with surgically confirmed labral tears, 80 of them exhibited a positive Twist test, resulting in a sensitivity of 72.7%.

Conclusions:
Accurate diagnosis of a labral tear is necessary for treatment planning. This study shows that Twist Test can support clinical decision making when considering labral pathology as a differential diagnosis because of its high PPV (96.25%), so this test can be beneficial for ruling out labral pathology. An added benefit is that this test is quick to perform, so it could be incorporated into a general sports physical screening examination.
Conclusion:
MRI scans can reliably predict alpha angle as a measure of CAM type FAI. They provide useful information about cartilage and labral pathology. The higher average alpha angles noted on CT scans may suggest greater accuracy and this may particularly be useful in the presence of severe pathology or for post procedure evaluation.

**ePoster #: 711**
**Magnetic Resonance Imaging After Lidocaine Injection For Detecting Labral Tears Using Double-Oblique Plane**

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Category: Other

Summary:

Our method using the double-oblique plane showed similar ability of detecting acetabular labral tears in comparison to radial MRI. In addition, the lidocaine test with the lidocaine contrast agent may contribute in reducing patient complaints and help in detecting labral tears.

Data:

Objectives:

One of the most popular methods to detect labral tears is magnetic resonance (MR) arthrography using gadolinium with the sequence of T1-weighted and radial images. The purpose of this study is to diagnose acetabular labral tears using our new protocol of MR imaging, compared with radial imaging, with a sequence of T2-weighted images after injection of 0.5% lidocaine in the hip joint.

Materials and methods:

From January to December 2010, retrospective analysis was performed on 22 hips in 22 patients who were administered 15–20 ml of 0.5% lidocaine injection in the hip joint for performing the lidocaine test. Mean age at examination was 34 years (age range: 14–66 years; 10 males and 13 females). We used lidocaine not only for the lidocaine test (a pain reducing test to confirm the origin of pain from the intra-articular region) but also as a contrast agent with the T2-weighted image sequence.

Our method for detecting labral tears included three sets of coronal images: the coronal plane, 45° anterior inclination with respect to the coronal plane, and 45° posterior inclination with respect to the coronal plane. We compared radial images with these three sets of images.

Results:

In radial image sequences, 11 labral tears were detected. These 11 tears were also detected by our method using the double-oblique plane.

Conclusion:

Radial MRI of the hip has proven to be the diagnostic procedure to decide whether to operate on a patient. Our method using the double-oblique plane showed similar ability of detecting acetabular labral tears in comparison to radial MRI. In addition, the lidocaine test with the lidocaine contrast agent may contribute in reducing patient complaints and help in detecting labral tears.

**ePoster #: 801**
**The Rehabilitation In Post Arthroscopy For Femoroacetabular Impingement. Series Of 62 Cases.**

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Category: Post Operative Management

Summary:

The Femoroacetabular impingement (FAI) has recently been proposed as a mechanism that causes an abnormal contact stress on the hip joint, 62 patients postoperatively FAI were rehabilitated in our department and the physical therapy can improve muscle strength, pain and function in patients undergoing arthroscopy for FAI and allows the return to sport in these patients.
Data:
Introduction:
The Femoroacetabular impingement (FAI) has recently been proposed as a mechanism that causes an abnormal contact stress on the hip joint. In most cases, a bone deformity or misaligned orientation of the femoral head or acetabulum, can cause the FAI.
The development of surgical procedures to treat these disorders have been described, however only a few references of the rehabilitation after surgery of the IFA are found in the literature.

Among all existing protocols, the main objectives are: restoration of range of motion, pain relief, increase muscle strength and improve function. For athletes to rehabilitation should still focus on agility and power for a safe return for the competitions.

The aim of this study is to evaluate the postoperative rehabilitation program used in our service.

Methods:
From January 2006 to March 2011, were rehabilitated 62 patients postoperatively FAI. All subjects underwent the same surgical repair of labral and osteoplasty.

The average patient age was 38 (11.8), 36 males (58%) and 26 women (42%). The follow up average was 18 months with a standard deviation of 1 year.

The mean time of that the patients were undergone to the rehabilitation program was 16 weeks. All of the patients started the rehabilitation program on the second day after the surgery. The program was based on exercises to improve the internal and external rotation of hip, cycle ergometer exercise for two hour a day, strength training and return to sports.

At the beginning, all patients were instructed to don't flex their hips above 90 degrees, don’t put their hips beyond the midline and keep the external rotation with hip in neutral position. The average time of partial weight bearing (limited 20 to 50% according to medical criteria) was 6 weeks, and the main objective is improve range of motion and strength through open kinetic chain exercises. When the full weight bearing is allowed, the program emphasis become to be the gain strength in closed kinetic chain exercises with progression until functional exercises. All patients were underwent the clinical evaluation and periodic reevaluations assessed by Harris Modified protocol and strength evaluation using the hand dynamometer (Lafayette Manual Muscle Test System). We used the Wilcoxon test for paired samples with p-value equal to 0,05.

Results:
Eighteen subjects (11.2%) said they had more than one sport and the sports who were more cited by patients were: running, weightlifting and soccer. The average return to sports was 20 weeks. When comparing preoperative muscle strength of lower limb muscle groups of the side of the symptomatic hip with no symptomatic side showed no significant difference (p<0.05). Regarding the Modified Harris averages were 69 pre-operative and postoperative points of 98 points (p = 0.0017).

In relation to muscle strength, remarkable improvements in the assessment by strength test for the groups: hip extensor (p = 0.0391), adductors (0.0039), abductors (p = 0.0488), internal rotators (p = 0.0108) and external rotators (p = 0.0045). There were no differences for the hip extensor group (p = 0.2311), knee extensors group (p = 0.2321) and hamstrings (p = 0.3211).

Discussion:
Rehabilitation must comply with the repaired tissue in order to allow adequate healing. However, prolonged immobilization is not recommended because of the numerous problems that can happen, like: adhesion formation including fibrous cartilage degeneration, loss of ligament strength and muscular atrophy. Moreover, then physical-therapist must control and reduce edema, start the exercises for improve range of motion more earlier as possible, beware the limitation of weight bearing, stimulate the muscle activity and neuromotor control, make gradual strengthening of the lower limbs and proprioceptive training, promote cardiovascular fitness as well as the specific training for return to sport.
Conclusion:
We can conclude that physical therapy can improve muscle strength, pain and function in patients undergoing arthroscopy for Femoroacetabular impingement, and allows the return to sport in these patients.

**ePoster #: 802**

**Age Or Arthritis: What’s Causing The Pain Following Hip Arthroscopy?**

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**Category:** Post Operative Management

**Summary:**
We found that age over 40 years, and not osteoarthritic status, is a better predictor of residual pain after hip arthroscopy in the first 6 months and longer for labral pathology; Moreover, in patients over 40 years old, pain after hip arthroscopy is common.

**Data:**
Introduction:
Hip arthroscopy is an established treatment for hip pain secondary to labral pathology. However, the management and treatment of hip pain is often quite difficult and patients can continue to experience hip pain after arthroscopic intervention. Osteoarthritis is an identified cause of continued pain after hip arthroscopy for labral pathology; as such hip arthroscopy is most often reserved for patients without a significant osteoarthritis burden. Furthermore, patient age is a recognized determinant of successful outcome after hip arthroscopy.

The purpose of the present study was to determine whether age and the presence of osteoarthritis are independent predictors of continued pain after hip arthroscopy for labral pathology. We hypothesize that patients with hip osteoarthritis, irrespective of their age, are more likely to experience continued pain after arthroscopic intervention for labral pathology. We also hypothesized that patients over 40 years of age are no more likely to experience residual pain after hip arthroscopy compared to younger patients.

**Methods:**
After IRB approval, we performed a retrospective review of 151 consecutive hip arthroscopies for labral pathology performed between 2006 and 2008 by one orthopaedic surgeon at a major tertiary care center. We reviewed pre-operative clinic notes to compile data on patient demographics and indications for procedure, operative notes for the presences of osteoarthritis graded by the outerbridge classification and type labral intervention, and post-operative clinic notes to gather information on post-operative pain. Patients were considered to have residual post-operative pain if there was documented complaint of continued hip pain at the last follow-up visit. We also reviewed operative notes to gather information on labral intervention performed as well as degree of osteoarthritis. For statistical analyses we defined an Outerbridge score less than 2 as “non-arthritic” and a score greater than 2 as “arthritic”.

Statistical analysis was performed using SPSS. To calculate the association of osteoarthritic status on post-operative pain we conducted a cross tabulation and Chi-Square test for arthritic vs non-arthritic status against post-operative pain vs no post-operative pain. Similarly we conducted a cross-tabulation and Chi-Square test of age over and under 40 against post-operative pain status.

**Results:**
143 of 151 patients had at least 3 post-operative clinic visits with a minimum post-operative clinic follow-up of six months and complete data (94%). 77 (51%) arthroscopies were performed in males; mean age at surgery was 41.2 years (SD + 11.5). Based on our age stratification, 69 hips were in the “under 40” category and 82 hips were in the “over 40” category. Of the 147 hips, 35 hips met the grading for significant hip osteoarthritis (24%). 27 of these patients were over age 40 (77%). There was no significant correlation between osteoarthritic status and residual post-operative pain.
(p=0.457). 13 of 64 (20%) patients under 40 reported post-operative hip pain as compared to 33 of 79 (42%) patients over 40. Age over 40 was a significant predictor of residual hip pain after arthroscopy (OR 2.8 p = 0.006).

Conclusions:
We reject our null hypothesis. We found that age over 40 years, and not osteoarthritic status, is a better predictor of residual pain after hip arthroscopy in the first 6 months and longer for labral pathology. Moreover, in patients over 40 years old, pain after hip arthroscopy is common. Their relative risk for pain is twice as likely as those under 40. Patients, as well as surgeons, would benefit from an awareness of the extended recovery period in older patients.

Methods:
A retrospective review was performed of 61 patients who were over the age of 50 years who had a hip arthroscopy between November 2004 and December 2008. There were 7 patients lost to follow up and one patient who declined to take part in the study, leaving a total of 53 patients. However, any surgical interventions that occurred following the hip arthroscopy was recorded in all cases. The mean follow up was 3.3 years (range 6 to 76 months). Tonnis grade was assessed using pre and post-operative radiographs and clinical outcome was assessed using the modified Harris Hip Score.

Results:
Seventeen patients (28%) of the 61 patients required a THA. The mean time interval from hip arthroscopy to THA was 17 months. There was no significant difference in the mean age between those patients who required a THA and those who did not, within the study period. The mean pre-operative Tonnis score in the group of patients who did not require a THA was 0.7 compared to 1.4 in the group who did require a THA. This was statistically significant. Of those patients who required a THA, 5 (29%) had evidence of femoroacetabular impingement (FAI), of these 2 had a femoroplasty, 1 had a combined femoroplasty and acetabuloplasty, 1 had an open femoroplasty and 1 had nothing done as the hip was considered to degenerate and unlikely to benefit from debridement of the CAM. Of those patients who did not have a THR, 8 (22%) had evidence of FAI. Three had a small CAM but did not have symptoms of impingement and so where not debrided, 2 had a femoroplasty, 2 had an acetabuloplasty and 1 had a femoroplasty. The majority of the patients who went on to have a THR had evidence of osteoarthritis at the time of their arthroscopy (14 (78%) out of 17 patients). The primary procedure during arthroscopy for all the patients who subsequently required a THR was chondroplasty as well as labral debridement. The primary procedure in the majority of the patients who did not have a THR was for a labral tear with 34 (94%) out of 36 patients having a partial labrectomy. There was a significant improvement in the Harris Hip score at mean follow up of 3.3 years from 57.7 pre-operatively to 82.8 post-operatively in patients who did not require a THA.

ePoster #: 803

Hip Arthroscopy In The Older Patient

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Category: Post Operative Management

Summary:
Age is not a contraindication to hip arthroscopy although significant OA will result in early failure. Patients with isolated labral tears can be successfully treated with arthroscopic debridement.

Data:
Introduction:
To date there has been considerable emphasis in the literature in addressing intra-articular hip pathology with hip arthroscopy in the younger patient. The aim of these interventions is to preserve the hip joint, with hip replacement reserved for the older patient. This study reviewed a cohort of older patients with and without osteoarthritis who had a hip arthroscopy. The primary aim was to assess the incidence of total hip arthroplasty (THA) in this group and to identify any factors that may predispose to a THA.
Discussion and Conclusion:
In this review of patients over the age of 50 years with a mean follow up of 3.3 years, 28% required a THA. The most significant predictive factor for having a total hip arthroplasty was the degree of osteoarthritis at the time of the hip arthroscopy. Age was not a significant factor in this study. There was a similar proportion of FAI patients in each group. The surgical debridement of a pincer or CAM did not appear to affect the eventual outcome. However, all the patients who had evidence of FAI and osteoarthritis required a THA within the study period. Additionally, we have shown that labral tears in the absence of osteoarthritis can be successfully treated with arthroscopic debridement in the older patient.

Keywords:
hip, arthroscopy, osteoarthritis, arthroplasty