Current Concepts: Young Adult Hip Disease Management
An Evidence Based Approach

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Medical Director: Hamilton Tiger-Cats Football Club & Forge FC April 2019 Pain Rounds
ETA code ETABXZB
DISCLOSURES

• Speaker’s Bureau
  • Conmed

• Editorial Board
  • Knee Surgery Sports Traumatology and Arthroscopy
  • American Journal of Sports Medicine
  • Canadian Orthopaedic Association Bulletin
  • BMC Musculoskeletal Disorders

• Research:
  • Arthroscopy Association of North America
  • Canadian Institute for Health Research
  • American Orthopaedic Society for Sports Medicine
  • McMaster University
  • Conmed
 Predators goalie Pekka Rinne to have hip surgery
No. 1 netminder to miss at least 4 weeks of action

Surgeons/Therapists aim to provide best available care to patients.

Patients in 2019 are:
- Sophisticated
- Informed
- Have rapid access to information about Condition, Surgeon & Procedure
FUNCTION OF LABRUM

- Functions
  - Suction seal mechanism preventing cartilage consolidation, Ferguson et al 2000, J Biomech.
  - Contributes to joint stability and proprioception, Smith MV et al AJSM 2011

Grant et al 2012, J Child Orthop
LABRUM STRUCTURE
VASCULARITY/INNERVATION

• Supplied by Superior and Inferior Gluteal Arteries form a retinaculum for blood supply

• Innervated by branches of the quadratus femoris and obturator nerve

• Capsular blood supply is dominant

• Kalhor et al. JBJS AM 2009

• Kelly BT et al. Arthros. 2005
HOMEOSTASIS OF THE HIP
LABRAL TEARS

DYSPLASIA

FAI
HIP DYSPLASIA & ARTHROSCOPIC MANAGEMENT

- Clinical Dilemma 24 Female

18 STUDIES – 889 PATIENTS
MEAN F/U 32 MONTHS
12/18 STUDIES LEVEL IV
14.1 % REVISION
9.5 % ARTHROPLASTY
What is the source of this patient’s pain? “The answer was (JBJS 1936):

“The impingement of the femoral neck on the anterior acetabular margin. Such impingement would result in “traumatic arthritis “ with characteristic changes of the joint surfaces as well as of the synovia.”
FAI: CAN IT CAUSE HIP DEGENERATION?

• Harris WH 1966, JBJS
• Observational Study
• Over 90% of “idiopathic osteoarthritis of the hip” showed demonstrable abnormalities.
• Many had mild forms of paediatric hip conditions such as DDH, SCFE, Perthes
“FAI syndrome is a motion-related clinical disorder of the hip with a triad of symptoms, clinical signs and imaging findings. It represents symptomatic premature contact between the proximal femur and the acetabulum.”
IS FAI RELEVANT TO SPORTS MEDICINE?

- Congenital/Genetic
- Acquired/Activity Related
- …Both…

Conclusion: Significant (P < 0.03) Difference in Cam Type FAI in Hockey Players (54 vs. 43 degrees)
SPORTS HIP INJURIES IN YOUTH ICE HOCKEY

19 June 2014
Open Access Journal of Sports Medicine

Trends in reporting of mechanisms and incidence of hip injuries in males playing minor ice hockey in Canada: a cross-sectional study

Olufemi R Ayeni¹
Marcin Kowalczyk¹
Jordan Farag¹
Forough Farrokhryan¹,²
Raymond Chu¹
Asheesh Bedi³
Kevin Willits⁴
Mohit Bhandari¹,²

<table>
<thead>
<tr>
<th>Year</th>
<th>Hip injuries reported per 1,000 registered players (n)</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>2005</td>
<td>0.003</td>
<td>(0.003–0.004)</td>
</tr>
<tr>
<td>2006</td>
<td>0.030</td>
<td>(0.029–0.031)</td>
</tr>
<tr>
<td>2007</td>
<td>0.100</td>
<td>(0.099–0.101)</td>
</tr>
<tr>
<td>2008</td>
<td>0.068</td>
<td>(0.063–0.065)</td>
</tr>
<tr>
<td>2009</td>
<td>0.063</td>
<td>(0.062–0.064)</td>
</tr>
<tr>
<td>2010</td>
<td>0.129</td>
<td>(0.128–0.131)</td>
</tr>
</tbody>
</table>
Physical activity during adolescence and the development of cam morphology: a cross-sectional cohort study of 210 individuals

Antony Palmer,¹ Scott Fernquest,¹ Mo Gimpel,² Richard Birchall,¹ Andrew Judge,¹,³ John Broomfield,¹ Julia Newton,¹ Mark Wotherspoon,² Andrew Carr,¹ Sion Glyn-Jones¹
HIP IMPINGEMENT & SPORTS

Athletic groin pain: a systematic review of surgical diagnoses, investigations and treatment

Darran de SA,1 Per Høkch,2,3 Mark Phillips,4 Sebastian Heaven,1 Nicole Simunovic,4 Marc J Phillips,5 Olufemi R Ayeni6

Table 1 Top five surgical causes of groin pain in athletes

<table>
<thead>
<tr>
<th>Cause</th>
<th>Patients (n)</th>
<th>Reported mean age (range)</th>
<th>Male (%)</th>
<th>Pathology breakdown</th>
<th>Patients (n)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Femoroacetabular impingement*</td>
<td>3110</td>
<td>27.31 (15-45)</td>
<td>89.19%</td>
<td>Cam</td>
<td>111</td>
</tr>
<tr>
<td></td>
<td>2317</td>
<td>26.23 (15-45)</td>
<td>92.00%</td>
<td>Pincer</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>1600</td>
<td>27.56 (15-45)</td>
<td>96.17%</td>
<td>Isolated hip</td>
<td>403</td>
</tr>
<tr>
<td></td>
<td>1322</td>
<td>27.18 (15-45)</td>
<td>96.25%</td>
<td>Isolated femoral</td>
<td>133</td>
</tr>
<tr>
<td></td>
<td>1170</td>
<td>27.35 (15-45)</td>
<td>94.59%</td>
<td>Isolated acetabulum</td>
<td>178</td>
</tr>
<tr>
<td></td>
<td>473</td>
<td>26.56 (15-45)</td>
<td>96.61%</td>
<td>Isolated ligament</td>
<td>122</td>
</tr>
<tr>
<td></td>
<td>491</td>
<td>27.35 (15-45)</td>
<td>92.00%</td>
<td>Isolated tear</td>
<td>39</td>
</tr>
<tr>
<td></td>
<td>461</td>
<td>27.35 (15-45)</td>
<td>93.58%</td>
<td>Other pathology/none</td>
<td>96</td>
</tr>
</tbody>
</table>

*Pathology breakdown does not equate total number of patients due to bilateral procedures in individual patients.

Table 2 Top three sports causing top five surgical causes of groin pain in athletes

<table>
<thead>
<tr>
<th>Injury</th>
<th>Top 3 sports</th>
<th>Patients (n)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Femoroacetabular impingement*</td>
<td>Ice hockey</td>
<td>67</td>
</tr>
<tr>
<td></td>
<td>Soccer</td>
<td>87</td>
</tr>
<tr>
<td></td>
<td>Baseball</td>
<td>24</td>
</tr>
<tr>
<td>Athletic pubalgia</td>
<td>Soccer</td>
<td>368</td>
</tr>
<tr>
<td></td>
<td>Ice hockey</td>
<td>69</td>
</tr>
<tr>
<td></td>
<td>Football</td>
<td>23</td>
</tr>
<tr>
<td>Adductor-related pathology</td>
<td>Soccer</td>
<td>288</td>
</tr>
<tr>
<td></td>
<td>Ice hockey</td>
<td>52</td>
</tr>
<tr>
<td></td>
<td>Football</td>
<td>17</td>
</tr>
<tr>
<td>Isolated-related pathology</td>
<td>Soccer</td>
<td>13</td>
</tr>
<tr>
<td></td>
<td>Ice hockey</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>Rowing</td>
<td>18</td>
</tr>
<tr>
<td></td>
<td>Judo</td>
<td>12</td>
</tr>
</tbody>
</table>

*Femoroacetabular impingement: AUS, Australia.
RISE IN HIP ARTHROSCOPY


- “A 365% increase in the rate of hip arthroscopy was observed in the examined cohort of patients between 2004 and 2009”


“600% increase in hip arthroscopy during the 5-year period under study from approximately 83 in 2006 to 636 in 2010 by part II Orthopaedic Board Examinees.”
FAI & OA: IS THERE A LINK?

Does Femoroacetabular Impingement Contribute to the Development of Hip Osteoarthritis? A Systematic Review

Marcin Kowalczyk, MD, Marco Young, MD, Nicole Sinunovic, MSc, and Olufemi R. Aiyeni, MD, MSc, FRCSC

Abstract: Femoroacetabular impingement (FAI) has been linked to specific patterns of cartilage damage. The goal of this systematic review is to answer the following questions: (1) Does FAI contribute to the development and progression of hip osteoarthritis (OA)? (2) If FAI does contribute to the development and progression of hip OA, does CAM-type or pincer-type impingement play a greater role? A search of the electronic databases, MEDLINE and EMBASE, was performed to identify relevant studies performed between January 1, 2000 and January 1, 2015 that link the pathophysiology of OA to FAI. Methodological quality of included studies was assessed by 2 reviewers using the Methodological Index for Non-Randomized Studies criteria. An intraclass correlation coefficient with 95% confidence intervals was used to determine the reliability of the reviewers’ evaluations. Certain morphologic features of CAM-type FAI, particularly elevated alpha angle, do seem to predispose select patients to radiographic progression of hip OA. In comparison with pincer-type impingement, the association between CAM-type impingement and hip OA is better understood. Long-term surgical outcome studies will further delineate the role of FAI in the development and progression of hip OA.

![Image of hip bones with labels: Normal, Cam, Pincer, Mixed]
Can we stop the development of Hip Osteoarthritis (OA)?
DIAGNOSTIC STEPS
Clinical Presentation of Patients with Symptomatic Anterior Hip Impingement

John C. Clohisy MD, Evan R. Knaus DO,
Devyani M. Hunt MD, John M. Lesher MD,
Marcie Harris-Hayes PT, Heidi Prather DO

Abstract  Femoroacetabular impingement (FAI) is considered a cause of labrochondral disease and secondary osteoarthritis. Nevertheless, the clinical syndrome associated with FAI is not fully characterized. We determined the clinical history, functional status, activity status, and physical examination findings that characterize FAI. We prospectively evaluated 51 patients (52 hips) with symptomatic FAI. Evaluation of the clinical history, physical exam, and previous treatments was performed. Patients...
DIFFERENTIAL DIAGNOSIS OF HIP PAIN

- Musculoskeletal
  - Tendinopathy/Tendonitis

- Genitourinary
  - Epididymitis

- Gynaecological
  - Ovarian Cyst/PID

- Neurologic
  - L1-L2-L3

- Abdominal
  - Appendicitis/Hernia
HIP SPECIFIC EXAM

• Standing
  • Gait, Alignment

• Seated
  • Modified straight leg raise, Neurovascular, Strength

• Supine
  • ROM,
  • Provocative testing: Log roll, FADIR, FABER, Resisted sit up/adduction

• Lateral Decubitus
  • Palpation, Abductor strength/contractures

• Prone
  • Hip Contractures, Version, Lumbar spine palpation
FAI: IMAGING MODALITIES

- X rays
- MRI (arthrogram)
- Computed Tomography Scan
- Ultrasound
- Diagnostic Injection
Pre-operative intra-articular hip injection as a predictor of short-term outcome following arthroscopic management of femoroacetabular impingement

Olufemi R. Ayeni · Forough Farrokhyar · Sarah Crouch · Kevin Chan · Sheila Sprague · Mohit Bhandari

Received: 9 September 2013 / Accepted: 25 January 2014 / Published online: 5 February 2014
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Conclusion  In this study, the data suggests that a positive response from an intra-articular hip injection is not a strong predictor of short-term functional outcomes following arthroscopic management of FAI. However, a negative response from an intra-articular hip injection may predict a higher likelihood of having a negative result from surgery.

Level of evidence  Level II.

- PROSPECTIVE COHORT OF 52 PATIENTS
- PAIN DIARY DOCUMENTING PAIN RELIEF FOR 2 WEEKS AFTER IA HIP INJECTION
- HIP OUTCOME SCORES MEASURED AT 6 MONTHS
UTILITY OF HIP INJECTION

• History (GROIN PAIN)
• Physical Exam (FADIR)
• Imaging (FAI/TEAR)
• Diagnostic Injection (RELIEF)

CASE EXAMPLE

• HISTORY
  • 28 y.o. professional ice hockey player
  • No significant medical comorbidities
  • 6 months of worsening R hip pain
  • Limited hip flexion and rotation
  • No relief with rest (2 months), physical therapy and anti inflammatory medication

• PHYSICAL EXAMINATION
  • Full range of motion/strength
  • Positive & Painful FADIR TEST
  • Negative testing for sports hernias
Moderate sensitivity and moderate specificity

Not entirely diagnostic but can be helpful
CASE EXAMPLE: IMAGING

• XRAY Frog Lateral

• MRI (Axial)
HIP JOINT ACCESS

- General/Spinal Anesthetic
  - Full Muscle Paralysis
- Supine or Lateral Positioning
  - With all extremities well padded
- Well Padded Peroneal Post
  - Protection of Pudendal Nerve
SURGICAL EQUIPMENT

- Instruments needed:
- Spinal needle
- 11 blade
- 20 cc syringe
- Kelly clamps
- Scope trochars
- Slotted cannulas
- Guidewire
- Switching stick
- Banana blade
FAI/LABRAL REPAIR: SURGICAL STEPS
SURGICAL ACCESS (PORTALS)
HIP ARTHROSCOPIC (FAI) SURGERY

Assessment
CASE EXAMPLES:
SELECTIVE LABRAL DEBRIDEMENT

Labral Assessment

Assessment
HIP LABRAL REPAIR VERSUS DEBRIDEMENT
LABRAL REPAIR VERSUS DEBRIDEMENT

- 6 studies (490 patients)
- Modified Harris Hip Score – Clinically important difference in favor of labral repair (7.4 points)
- **Statistically significant** improvements in repair over debridement

Surgical management of labral tears during femoroacetabular impingement surgery: a systematic review

O. R. Ayeni · J. Adamich · F. Farrokhyar · N. Simunovic · S. Crouch · M. J. Philippon · M. Bhandari

DOI 10.1007/s00167-014-2889-8
DOES LABRAL REPAIR TECHNIQUE MATTER?

Loop Stitch Repair

Labral Repair

F = Sawyer et al, AJSM 2015 NO SIGNIFICANT DIFFERENCE
CASE EXAMPLE

• 36 FEMALE TEACHER

• 2 previous hip arthroscopies
  • #1 FAI and labral repair
  • #2 ADHESION RESECTION AND LABRAL DEBRIDEMENT

• Constant activity dependent hip and groin pain

• Has failed all non surgical modalities
  • Physio/injections/nsaids/massage

• X-ray/CT: No residual FAI

• MRI: Cartilage thinning and Labral intra-substance degeneration/fragmentation
CASE EXAMPLE
LABRAL RECONSTRUCTION

Diagnostic Scope
ARTHROSCOPIC LABRAL RECONSTRUCTION

The hip labrum reconstruction: indications and outcomes—a systematic review

Oluwemiti R. Ayeni · Husain Alradwan · Darren de Sa · Marc J. Philippin

73.4% survivorship in short term

**Indications:** young active patient with irreparable or non salvageable labrum and minimal OA
Labral Debridement -> Labral Repair -> Labral Reconstruction

BEWARE OF MORPHOLOGY (X-RAY)
OUTCOMES
FAI OUTCOME REPORTING: SPORTS

Return to Sport as an outcome measure is variable...92% returned and 88% to same pre injury level
FAI OUTCOME REPORTING: SPORTS

 Athletes experience a high rate of return to sport following hip arthroscopy

Muzammil Memon¹, Jeffrey Kay¹, Philip Hache², Nicole Simunovic³, Joshua D. Harris⁴, John O'Donnell⁵, Olufemi R. Ayeni¹,⁶

• 38 studies, 1773 patients
• Pooled rate of return 93% & return to same level 82%
• Best outcomes in athletes, pediatrics and shorter duration of symptoms
FAI OUTCOME REPORTING: PEDIATRIC POPULATION

Mean Age: 16.2
84-100% satisfaction arthroscopy
79% satisfaction open
3% revision (combined open/scope)
Complications following hip arthroscopy: a systematic review and meta-analysis

M. Kowalczuk · M. Bhandari · F. Farrokhyar · I. Wong · M. Chahal · S. Neely · R. Gandhi · O. R. Ayeni

Abstract
Purpose: The use of hip arthroscopy to address injuries and conditions about the hip is becoming more widespread. There are several narrative reviews regarding complications of hip arthroscopy but a systematic review is currently lacking. The primary goal of this study is to determine the complication rate associated with hip arthroscopy in the literature.
Methods: A search of the EMBASE and Ovid Medline databases was performed to identify articles published between 1 January 2000 and 25 November 2011 that reported a complication rate after hip arthroscopy. Appropriate inclusion and exclusion criteria were applied to identify articles, and a meta-analysis was performed to determine an overall complication rate. Complications were divided into major and minor.
Results: A total of 66 papers (n = 6,962 hip arthroscopies) were identified and deemed appropriate for analysis. The overall complication rate was found to be 4.0% (95% CI 3.6% to 4.4%). Of the 97 complications identified in the

Conclusions: Hip arthroscopy appears to be safe. The majority of complications are minor in nature. Prospective trials looking at the complications of hip arthroscopy would aid in identifying prognostic factors.
Level of evidence: Systematic review and meta-analysis Level III.

Keywords: Hip · Arthroscopy · Complications · Adverse events · Systematic review

Introduction
The arthroscopic appearance of the intra-articular stenosis of the hip was first described by Burman in 1931 [13]. His observations, hip arthroscopy has advanced tremendously. The appeal of this technology lies in its ability to provide minimally invasive access to the hip joint, allowing for easier and safer procedures.

Overall complication rate of 4% (Major: 0.3%)
Complication: DVT

• Incidence of 2%
  • Risk Factors Included:
    • Increased age
    • Obesity
    • Prolonged traction
    • OCP use
    • Trauma
    • Prolonged non weight bearing

• Stratification of risk profile will determine who may need prophylaxis
Complication: Pudendal Neuralgia

- Pudendal Nerve
  - Urinary and Sexual function
- 1.8%, typically resolves by 3 months
- Under reported in the literature
- Perineal Post and Long traction times (>90 minutes are risk factors)
Complication: Instability

- Common surgical factors
  - unrepaired capsulotomy
  - iliopsoas release

- Patient factors
  - female gender
  - acetabular dysplasia
  - general ligamentous laxity

- Rehabilitation factors
  - Unknown and often under reported
FAI EVIDENCE: 2005-2010

- Dramatic rise in FAI related publications
- Multi-Specialty but mostly in Orthopaedics
- Level 4 & 5 studies dominate
FAI EVIDENCE: 2011-2015

Sources and quality of literature addressing femoroacetabular impingement: a scoping review 2011–2015

Mola Khan1,2, Kayode O Osinho1,2,3, Farel Stastny1,3, Mark Phillipy1,3, Supr Eklund1,3, Natan S Harver1,3, Kristine Samudis1,3, Olufemi R Ayeni1,2

Articles identified by search: 3352

Title and abstracts screened: 2869

1511 articles excluded
- 965 – Not related
- 339 – Not primary research
- 153 – Inadequate information
- 56 – Other

Full text screened: 1358

292 excluded

Included Studies 1066
CLINICAL CHALLENGE: COMBINED DIAGNOSES

OSTEOARTHRITIS  LABRAL TEAR/FAI
Addressing Hip Pain: Layer Concept

The layer concept: utilization in determining the pain generators, pathology and how structure determines treatment

Peter Draovitch - Jaime Edelstein - Bryan T. Kelly
CLINICAL CHALLENGE OA/FAI/LABRAL TEAR: OPTIONS

• INDIVIDUALIZED & MULTIMODAL APPROACH:

• COMBINATIONS OF:
FUTURE PERSPECTIVES

- Transition from Eminence to Evidence
- RCT & Long Term Registry Based Studies

- Early Detection with cartilage sensitive imaging
- Genetic Screening for FAI
THANK YOU