# Sex Differences in Lower Extremity Injuries Knee and Hip Hughston Society

# ACL and FAI April 13, 2019





## Mary Lloyd Ireland, M.D.

Professor - University of Kentucky Dept. of Orthopaedic Surgery and Sports Medicine Lexington, Kentucky www.MaryLloydIreland.com



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- Intro/ Links
- <u>Epidemiology</u>
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# **Clarify Definition Sex vs. Gender**

## Sex

- Genetic and biologic property
- XX vs XY
- Physiologic and biologic characteristic that define men and women

## Gender

- Refers to socially constructed roles, behaviors and attributes that society considers appropriate for men and women
- Masculine and feminine are gender categories

## Sex Based Considerations in Caring for Common Sports Injuries

AAOS

American Academy of Orthopaedic Surgeons

Women's Health Issues Advisory Board Laura M. Bruse Gehrig, MD Margaret M. Baker, MD Cordelia W. Carter, MD Christy Hylden, MD Mary Lloyd Ireland, MD Anthony Johnson, MD Elizabeth G. Matzkin, MD

The AAOS Women's Health Issues Advisory Board (WHIAB) seeks to advocate, advance, and serve as a resource on sex and gender differences in musculoskeletal health.

Females suffer from injury/disease in different ways than males. Recognizing sex-related differences is critical to optimizing patient care.

www.aaos.org/women



## **AAOS WHIAB**

https://www.aaos.org/uploadedFiles/PreProduction/Research/Research\_Tools/documen ts/\_2016%20WHIAB%20Scientific%20Exhibit.pdf

# **Links for Female Athlete Information**

- ACSM Female athlete Triad Coalition <u>https://www.ncbi.nlm.nih.gov/pubmed/17909417</u>
- 602 Sex and Sports AAOS Symposium 2016 <u>http://marylloydireland.com/female\_injuries</u>



# Sex and The ACL – Epidemiology and Risk Factors



https://www.vumedi.com/video/sex-and-the-acl-epidemiologyand-risk-factors/?list=6f665d73-54f4-4524-b93d-ef111e2c8323

## AAOS NOW Sex in your practice?

- From AAOS NOW
   August 2012: Is Sex a Risk Factor for Shoulder

   Instability?
   Aglan, SM
   http://www.aaos.org/news/aaosnow/aug12/research2.asp
- June 2012: Cute Shoes Can Lead to Ugly Feet, Ruth L. Thomas, MD <u>http://www.aaos.org/news/aaosnow/jun12/research1.asp</u>
- April 2012: Scoliosis and Sex, McIntosh AL and Weiss JM April 2012 <a href="http://www.aaos.org/news/aaosnow/apr12/research1.asp">http://www.aaos.org/news/aaosnow/apr12/research1.asp</a>

## Council on Research and Quality(CORD)

- Approved Unified Research Agenda Including:
  - Sex/Gender Clinical and basic research
  - Disparities in Health Care Research Based on Sex/Gender and Race
- Reported by John Healy, MD
- Research Interest Groups
- Unknown: Differences in Disease Burden comparing Sexes website

http://www.boneandjointburden.org/

# **Stanford: Londa Schiebinger links**

- <u>http://genderedinnovations.stanford.edu</u>
- Europe: http://ec.europa.eu/research/sciencesociety/genderedinnovations/index\_en.cfmhttp://genderedinnov ations.stanford.edu
- Europe: <u>http://ec.europa.eu/research/science-</u> <u>society/gendered-innovations/index\_en.cfm</u>

# Lois P Frankel, PhD: Nice Girls Don't get the Corner Office:

**101 Unconscious Mistakes Women Make That Sabotage Their Careers** 



NICE GIRLS JUST DON'T GET IT

WAYS TO WIN THE RESPECT YOU DESERVE, THE SUCCESS YOU'VE EARNED, AND THE LIFE YOU WANT

LOIS P. FRANKEL, PHD, and CAROL FROHLINGER, JD



# Pat Heim books

- www.heimgroup.com
- Why aren't there more Wall Street
   Business Leaders who are women?



# **Epidemiology of Injury in Pediatric Athletes**

- Cross sectional study performed at Boston Children's Hospital
- Retrospective Chart Review 5% random sampling children age 5-17 (N=2133)
- Females had a high rate of
  - Overuse injury (62.5%) versus traumatic injury (37.5%)
  - Lower extremity and spine injury
- Hip and pelvis injury differed by sex
  - Female: overuse and soft tissue injury
  - Male: traumatic and bony injury
- ACL injury was almost equal
- Sex differences were seen in:
  - Patellofemoral pain 3X greater (F>M)
  - OCD 2X greater (M>F)
  - Fractures (M>F)

Pediatric Sports Injuries: A Comparison of Males Versus Females (Stracciolini et al, Am J Sports Med, 2014)

# **Joint Specific Sex Differences: Knee**

## **Risk factors for ACL injury**

(Smith, Sport Health, 2012)

- Female sex in matched sport (3-8 x increased risk)
- Anatomic differences in Females
  - Movement and muscle activation patterns
  - Smaller ACL with decreased stiffness
  - Greater Knee Laxity
  - Decreased hip abduction strength

## **Swedish National Patient Register**

#### (Nordenvall/AJSM, 2015)

- Male patients more prone to ACL injury
- Peak incidence was younger in females
- Rates of reconstruction were similar

# **Joint Specific Sex Differences: Knee**

# Risk factors associated with revision and contralateral ACL reconstruction

- Kaiser Registry
  - (Maletis, AJSM, 2015)
    - 17,436 ACL reconstructions
    - Male sex is associated with increased risk of revision
    - Female sex is associated with increased his of contralateral ACL

## Swedish National Reglister

(Andernord, AJSM, 2015)

- 9,061 primary ACL reconstructions
- Female sex and constralateral ACL injury

#### **Review Article**

## Sex-based Differences in Common Sports Injuries

Cordelia W. Carter, MD Mary Lloyd Ireland, MD Anthony E. Johnson, MD William N. Levine, MD Scott Martin, MD Asheesh Bedi, MD Elizabeth G. Matzkin, MD

#### Abstract

The patient's sex plays an important role in mediating the risk for, and experience of, disease. Injuries of the musculoskeletal system are no exception to this phenomenon. Increasing evidence shows that the incidence, clinical presentation, and treatment outcomes for male and female patients with common sports injuries may vary widely. Stress fracture, which is associated with the female athlete triad, is a sports injury with known sex-based differences. Other common sports-related injuries may also have distinct sex-based differences. Understanding these differences is important to optimize each patient's musculoskeletal care.

# JAAOS July 1, 2018, Vol 26, No 13

#### **FIFTH EDITION**

#### DeLee, Drez, & Miller's

## Orthopaedic Sports Medicine

**Principles and Practice** 

Mark D. Miller Stephen R. Thompson

27



The Female Athlete

#### POSITION OF SAFETY POSITION OF NO RETURN Muscle Muscle **Body alignment Body alignment** activity activity Back Normal lordosis Forward flexed, rotated opposite side Flexed Hips Adduction Neutral abduction/adduction Internal rotation Neutral rotation Flexors Adductors Extensors lliopsoas Abductors Gluteals Extensors Knee Less flexed. Flexed Flexors Quadriceps valgus Hamstrings External Neutral Tibial Plantar Dorsi flexors rotation Flexors One foot Both feet Landing Gastrocnemius Peroneals out of control pattern control Posterior tibialis Balanced Unbalanced **Tibialis anterior**

#### Abstract

Over the past several decades there has been a rapid development of competitive sporting events for women, and parallel to this, an emergence of increasing numbers of excellent competitive women athletes. Not only have the numbers and recognition of highly competitive female athletes increased over the last 50 years, but also the prevalence of women of all ages participating in recreational athletics has skyrocketed, making it essential that those caring for the female athlete appreciate her uniqueness as gender-based differences are important when developing novel approaches to prevention, diagnosis, and treatment of injury and illness. The term sexual dimorphism is defined as: "The condition in which the two sexes of the same species exhibit different characteristics beyond the differences of their sexual organs" (Wikipedia 2017

https://en.wikipedia.org/wiki/sexual\_dimoprhism#External\_links (2)). In humans, these differences are related to the expression of genes on the X and Y chromosomes. These differences form the basis of this chapter and include not only anatomic and physiologic differences but also certain aspects of illnesses and injuries unique to the female athlete.

#### Keywords

- female
- athlete
- foot/ankle
- concussion
- triad
- knee
- shoulder

Letha Y. Griffin Mary Lloyd Ireland Fred Reifsteck Matthew H. Blake Benjamin R. Wilson

## **Multiple Factors Resulting in ACL Injuries**

- NOT modifiable:
  - Anatomic/Structural
  - Hormonal
- Modifiable:
  - Neuromuscular/biomechanical
- Expert think tanks agree that modifiable factors are most important
- Emphasize modifiable factors for return-to-play and prevention programs

Ireland ML, Durbin T, Bolgla Lori. Gender Differences in Core Strength and Lower Extremity Function During Single Leg Squat. In: ACL Injuries in the Female Athlete: Causes, Impacts, and Conditioning Programs, Noyes FR, Barber-Westin SD Eds, Springer-Verlag, Berlin Heidelburg, 2012.

# Anatomic

- Quadriceps angle, knee valgus, and increased foot pronation, have been associated with increased risk of anterior cruciate ligament (ACL) tear in some studies.
- The role of body mass index is not clear, but higher indices seems to be associated with injury risk.
- Femoral notch indices, ligament geometry, and tibial measurements are not definitively associated with increased risk of ACL tear; however, the smaller femoral notch in females, even when normalized to body weight, seems to be more associated with risk of injury.

The Female Athlete - Chapter 27

#### DeLee, Drez, & Miller's

## Orthopaedic Sports Medicine

**Principles and Practice** 

Mark D. Miller Stephen R. Thompson

## Hormonal

- Sex hormones affect knee ligament laxity, but the overall effect is not clear.
- Injury rates have been noted to vary with the phase of the menstrual cycle.
- No evidence exists to recommend activity modification or restriction with respect to the phase of menstrual cycle to prevent ACL injury.

## **Environmental**

- Harder ground, resulting from high evaporation and low rainfall, may increase the shoe traction interface.
- Increasing the shoe-surface coefficient may increase risk of injury (direct) and alter movement (indirect).

## The Female Athlete - Chapter 27

#### DeLee, Drez, & Miller's

## Orthopaedic Sports Medicine

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# **Biomechanical**

- The ACL has different mechanical properties in women.
- Neuromuscular factors appear to be the most critical difference between adult men and women and are modifiable.
- The knee is part of a kinetic chain and as such is influenced by motion of the trunk, core, hips, and ankle.
- Awkward landing, inability to recover from perturbed gait, and difficulty changing directions have been associated with increased risk of ACL injury.
- Women exhibit less knee and hip flexion, increased knee valgus, increased internal rotation of the hip, and increased external rotation of the tibia when landing from a jump or changing direction.
- Quadriceps-dominant activation patterns during deceleration, landing, and cutting have been noted in females.
- Decreased quadriceps stiffness and strength and decreased knee stiffness in females are thought to be associated with increased risk.
- Fatigue is associated with loss of dynamic control of the lower extremity.
- Imbalance in strength, flexibility, and coordination is thought to be associated with increased risk of ACL injury.

## The Female Athlete - Chapter 27

#### DeLee, Drez, & Miller's

## Orthopaedic Sports Medicine

**Principles and Practice** 

Mark D. Miller Stephen R. Thompson

## Intrinsic

- Hormonal / Joint Laxity
  - Data are insufficient to make any conclusive statement regarding menstrual cycle of knee laxity and on the rate of ACL injury in females

Sutton K, Bullock J. Anterior Cruciate Ligament Rupture: Differences Between Males and Females. The Journal of the American Academy of Orthopaedic Surgeons 01/2013; 21(1):41-50. The COL5A1 Gene Is Associated With Increased Risk of ACL Tears in Females

 Gene that encodes alpha1 chain of type 1 collagen ACL tears type 5 collagen Achilles tendon injuries

Posthumus M, September A, O'Cuinneagain D, Merwe W, Schwellnus M, Collins M. The COL5A1 Gene Is Associated With Increased Risk of Anterior Cruciate Ligament Ruptures in Female Participants. Am J Sports Med NOV;37(11) 2234-40

## **30 Years Ago At Olympic Basketball Level:** Non-contact ACL significantly higher rates in women's basketball







# **30 Years of Observation has led to many research ideas**

- 80 males, 64 females
  - Knee injuries: Number (% of gender)
    - Males, 11 (13%); Females 34 (53%) p<.0001</li>
- 20 (18%) underwent surgery
  - Males 6 (7.5%); Females 20 (31%) 21 surgeries p=.0007
- ACL reconstructions: 2 males, 8 females
  - M. L. Ireland, C. Wall, "Epidemiology and Comparison of Knee Injuries in Elite Male and Female United States Basketball Athletes" MSSE 1989.Presented at ACSM Annual Meeting Salt Lake City, Utah

# **Position of No Return**

- Is it really knee valgus?
  - Seen from frontal plane, YES, but NOT from sagittal plane
  - Injury Landing Pivot Shift
  - Knee: Anterior subluxation of tibia
  - Hip: Internal Rotation and Adduction
- Femoral rotation
  - first internal, then external
- Anterior tibial translation = "valgus collapse"

# What I Have Observed Mechanism of Injury High risk vs. low risk landing position



# **Extrinsic**

- Kinematics
  - Valgus Collapse and increased knee abduction moment
  - 205 female athletes, 9 ACL tears
  - Greater abduction moment predicted ACL injury p<.001</li>



Hewett TE, Myer GD, Ford KR, et al: Biomechanical measures of neuromuscular control and valgus loading of the knee predict Anterior Cruciate Ligament injury risk in female athletes: A prospective study. *AM J Sports Med* 2005;33(4):492-501.

## **Gymnastics**





# VROOM . . .

- Valgus
- Rotation
- Out
- Of control
- Movement



## It takes 70 milliseconds to tear the ACL

# **Basketball**



# **Knee: Cone of Stability**



## With apologies to Get Smart 'Cone of Silence'



## Proximal Control Most Important!

# ACL Injuries in the Female Athlete

Causes, Impacts, and Conditioning Programs

Frank R. Noyes Sue Barber-Westin *Editors* 

Second Edition

EXTRAS ONLINE

🖄 Springer

Part II	Proposed	Risk	Factors of	Noncontact	ACL	Injuries
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Ireland ML, Durbin T, Bolgla Lori. Gender Differences in Core Strength and Lower Extremity Function During Single Leg Squat. In: ACL Injuries in the Female Athlete: Causes, Impacts, and Conditioning Programs, Noyes FR, Barber-Westin SD Eds, Springer-Verlag, Berlin Heidelburg, 2012.

## Single-Leg Squat is the best assessment of altered core stability and neuromuscular activity

Ireland ML, Durbin T, Bolgla Lori. Gender Differences in Core Strength and Lower Extremity Function During Single Leg Squat. In: ACL Injuries in the Female Athlete: Causes, Impacts, and Conditioning Programs, Noyes FR, Barber-Westin SD, Eds. Springer-Verlag, Berlin Heidelburg, 2012.


# **Diagnosing Core Instability**



# Single leg squat test

This subject is demonstrating excessive movement of the right femur into adduction and internal rotation, both of which are positive signs of decreased core muscle capacity.

Willson JD, et. al., "Core stability and its relationship to lower extremity function and injury," JAAOS 2005 Sept; 13(5):316-25.



#### Isometric femoral abduction strength test and Isometric femoral external rotation strength test





Willson JD, et. al., "Core stability and its relationship to lower extremity function and injury," JAAOS 2005 Sept; 13(5):316-25.

#### Simple Single-Leg Squat

 Give clinicians information on neuromuscular control Plank Test

- Measures lumbar and pelvic control in side or sagittal plane
- Can see excessive lumbar lordosis

**Observe in Fatigue and Non-fatigue states** 

Ireland ML, Durbin T, Bolgla Lori. Gender Differences in Core Strength and Lower Extremity Function During Single Leg Squat. In: ACL Injuries in the Female Athlete: Causes, Impacts, and Conditioning Programs, Noyes FR, Barber-Westin SD Eds, Springer-Verlag, Berlin Heidelburg, 2012.

	Male	Female
Pelvis	Level	Contralateral Drop
Hip	No Rotation	Internal Rotation and Adduction
Knee	0° Varus/Valgus	Valgus
Tibia	Neutral	<b>External Rotation</b>
Foot	Flat	Pronation
Back	Flat	Lordotic
Pelvis	Neutral	Anterior Tilt



Ireland ML, Durbin T, Bolgla Lori. Gender Differences in Core Strength and Lower Extremity Function During Single Leg Squat. In: ACL Injuries in the Female Athlete: Causes, Impacts, and Conditioning Programs. Noyes FR, Barber-Westin SD Eds, Springer-Verlag, Berlin Heidelburg, 2012.

#### **Biomechanical/Neuromuscular**

- **Proximal Control** •
- **Mini Squat Normal Subjects** ٠

Μ	a	e

Pelvis Hip Knee Tibia Foot

Level **No Rotation** 0<sup>0</sup> Varus/Valgus Neutral Flat

**Female Contralateral Drop Internal Rotation and Adduction** Valgus **External Rotation Pronation** 



Ireland M, Durbin T, Bolgla L. Gender Differences in Core Strength and Lower Extremity Function During the Single-Leg Squat test. IN: ACL Injuries in the Female Athlete: Causes, Impacts, and Conditioning Programs. Noyes FR, Barber-Westin SD Berlin Heidelberg, 2012.:203-219

# Mini Squat Normal SubjectsMaleFemaleBackFlatLordoticPelvisNeutralAnterior Tilt



Ireland M, Durbin T, Bolgla L. Gender Differences in Core Strength and Lower Extremity Function During the Single-Leg Squat test. IN: ACL Injuries in the Female Athlete: Causes, Impacts, and Conditioning Programs. Noyes FR, Barber-Westin SD Berlin Heidelberg, 2012.:203-219



# **Alignment Proximal control / Core stability**



# Spino-Pelvic Measurements

SS

- Parameters assessed:
  - Pelvic Incidence (PI)
  - Sacral Slope (SS)
  - Pelvic Tilt (PT)
  - Anterior Pelvic Plane (APPA)

#### • PI = PT + SS



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# Pelvic Tilt Terminology Differences

• Hip Surgeons:

- Anterior Pelvic Plane angle
- An APP increases, pelvis rotates forward (ASIS forward)
- Spinal Surgeons:
  - Pelvic Tilt (PT) angle
  - As PT increases, pelvis rotates backwards (ASIS backwards)
  - 'Better measure of sagittal balance as reflects position of hip joint centre relative to gravity line'



#### Ongoing ACL Research at the University of Kentucky

Brian Noehren, Ph.D.: <u>b.noehren@uky.edu</u> Director of Gait Lab and Research



#### What we test:

- Trunk control: through side plank, plank test
- Knee control: Repeated step downs- assess frontal and Sagittal plane control
- Knee strength: Isometric quadriceps strength test
- Through these functional tests we aim to better quantify, qualitative assessments of neuromuscular control that we feel may predispose someone to a subsequent injury.

# Single Leg Mini Squat



# How Many Step Downs in 60 sec?

ACLR Side 31.8 p=.008 "Normal Side" 36 p=.026 Normal Control 40

Noehren B. et al work in progress

# **Trunk Control**



#### How to best get Quadriceps Back ....

- Eccentric
- Open Chain
- Safe variations
   of Eccentric Quad
  - Total Gym with bands early
  - Later Higher Weights

#### **ACL Reconstructions**

 Most common age ACL reconstructions in US: 15 for females, 18 for males

-- American Board of Orthopaedic Surgeons

Females are younger than males by 5 years

 Ott SO, Ireland ML, et. al.: Comparison of outcomes between males and females after anterior cruciate ligament reconstruction. Knee Surg Sports Traumatol Arthrosc 11:75-80, 2003.

15 YO Female Soccer Athlete is the most noncompliant and difficult to treat after ACL reconstruction

#### **Surgical Management**

- Graft Choice
  - No Sex Difference
  - Do not change based on cosmetic concerns
- Pearls
  - Smaller Shorter Patient
    - Adjust Femoral Fixation
    - Use Suspension or Bioabsorbable Devices
    - Avoid latrogenic ITB Syndrome



# 16 YO Female Soccer Athlete • Autograft B-PT-B graft • Height 5' 2", weight 106 lbs.



#### Allograft Mismatch in Size 16 YO Female

# Prominent femoral screw removed 10 months after ACL surgery



#### **Outcomes** Graft Failure / Future Surgeries

Meta Analysis 13 studies – no sex differences in

- Graft Failure (8)
- Contralateral ACL Rate (3)
- Laxity Post OP (6)

Ryan J, Magnussen R, Cox C, Hurbanek J, Flanigan D, Kaeding C. ACLR: Do Outcomes Differ by Sex? Journal of Bone and Joint Surgery 2014;96:507-12

#### 84 female Sweetish soccer players ACL injuries

- 12 year follow up.
- 42% Symptomatic Knee OA
- 75% Symptoms affected QOL
- No difference if underwent ACLR compared to those who had not

Lohmander LS, Ostenberg A, Englund M, Roos H. High prevalence of knee osteoarthritis, pain, and functional limitations in female soccer players twelve years after anterior cruciate ligament injury. Arthritis Rheum 2004;50:3145-3152.

# **Successful ACLR:**

Short term - safer not faster return to play Long term - prevention of osteoarthritis

- Average return to play 6 months
- Varies with each individual patient age and sport
- Many factors the athlete must overcome prior to return
  - Fear of reinjury
  - Reestablishing strength balance hip and knee control

# "The Uneven Playing Field"

- By Michael Sokolov New York Times, May 11, 2008
- Janelle Pierson
  - High school soccer player
  - Multiple ACL injuries, both knees
  - Mindset: after surgeries, multiple knee injuries
    - Rehab hard
    - Get back on the field
    - Compete fiercely
    - Hope not to be injured

#### **Thomas Byrd's** Thoughts on Hip Arthroscopy Comparing Females and Males

- Similar results and revision rates
- Pincer More common in Females
  - Acetabular Overcoverage Crushes the Labrum Results in Pain but minimal MRI Findings
  - Do Arthroscopy Early in Teenage girls If Fail Rehab and Improve with Ultrasound Guided Intrarticular Injection
  - Pincer is Crier of Wolf Pain occurs long before Labrum Damage Severe enough to see on MRI
- Cam More common in Males
  - 'Silent Killer' of the Hip "Ganz"
- Pincer is 'Crier of Wolf' Pain occurs long before Labrum Damage Severe enough to see on MRI "Byrd"



### **Joint Specific Sex Differences: Hip**

**Prevalence of abnormal hip finding in asymptomatic patients** (Register et al./ AJSM/ 2012)

- MRI cross-sectional study
- Males were 8.5 times more likely to have an osseus bump

Age was correlated with cartilage defects and subchondral cysts

FAI in former high level youth soccer players (Johnson et al/ AJSM/ 2012)
Cross-sectional study, age 18-30

- 25 males/25 females soccer players, 50 controls
- No difference between athletes and controls
- Cam deformity.: 29/50 males and 17/50 females

Slide courtesy of Mary K. Mulcahey, MD

# **Joint Specific Sex Differences: Hip**

#### **Sex-based differences in clinical presentation**

(Lindner et al, AJSM, 2014)

- Cohort study, 1401 patients treated for symptomatic labral tears
- Females presented with increased ROM compared with males
- Acute injury was greater in males
- No sex difference in clinical testing

#### Sex differences in hip morphology

(Kohnlein et al, CORR, 2009; Hetsroni et al, Arthroscopy, 2013)

- Females shave increased acetabutar version, increased femoral anteversion, decreased lateral CEA
- In patients presenting with hip pain:
  - Females have increased head-neck offset with smaller alpha angles
  - Females have increased anterversion
  - Females had worse outcome scores? soft tissue laxity?

Slide courtesy of Mary K. Mulcahey, MD

#### **FAI and Labral Tears**

- Most common mechanism the development of early osteoarthritis in the nondysplastic hip
- Anatomic abnormalities of the proximal femur and/or acetabulum → repetitive collision with dynamic hip motion that damage the cartilage and labrum
- Regional loading of femoral head-neck junction with acetabular rim and abnormal kinematics can precipitate early osteoarthritic changes

Ganz et al, COOR 2003 Leunig et al, CORR 2009

**Courtesy of Asheesh Bedi, MD** 

# **Epidemiology of FAI**

- 17% Males and 4% Females (Gosvige et al)
  - >3000 (Copenhagen Osteoarthritis Study)
- 90% presence of at least one radiographic sign in NFL athletes (Larson et al)
- 94% cam and /or pincer morphology in symptomatic football players (Nepple et al)
- 70% cam morphology in elite hockey players (Lerebour et al, Bedi and Larson et al)

Leunig et al, CORR 2009

Beck et al, JBJS-B, 2005

**Courtesy of Asheesh Bedi, MD** 

Arthroscopic Hip Surgery in the Elite Athlete Comparison of Female and Male Competitive Athletes Kotaro R. Shibata,\*yz MD, PhD, Shuichi Matsuda,\* MD, PhD, and Marc R. Safran,y § MD Investigation performed at the Department of Orthopaedic Surgery, Stanford University School of Medicine, Stanford, California, USA

#### **Comparing Sex:**

- Elite Athletes Return to Competitive Sports Activity at same or higher level after arthroscopy
  - 84.2% Females
  - 83.3% Male
- Females more Pincer and Instability
- Type of Sports
  - Females Flexibility and Endurance
  - Males Cutting, Contact and Asymmetry

#### Increased Prevalence of Concomitant Psychiatric Diagnoses Among Patients Undergoing Hip Arthroscopic Surgery

Kag C. Iglinski-Benjamin,\* BA, Michelle Xiao,\* Marc R. Safran,\* MD, and Geoffrey D. Abrams,\*†‡ MD Investigation performed at Stanford University, Stanford, California, USA.

- 22.6 million in Data Base
- 2428 Females underwent Hip Arthroscopy
- Prevalence of concomitant psychiatric diagnosis more common in Hip Arthroscopy Females for diagnosis of pain.
- Not Increased for Diagnosis of Instability as in ACL and Shoulder
- 2 most common Depression and Anxiety
- Interplay between hip and back pain

#### Microinstability of the Hip—Gaining Acceptance. Marc R. Safran, MD

- Women Have More Instability
- Avoid making Hip Instability worse with Arthroscopy
- Need to improve to identify microinstability patients PreOp



Journal of the American Academy of Orthopaedic Surgeons. January 1, 2019, Vol 27, No 1

Prevalence of Generalized Ligamentous Laxity in Patients Undergoing Hip Arthroscopy: A Prospective Study of Patients' Clinical Presentation, Physical Examination, Intraoperative Findings, and Surgical Procedures

Registry data retrospective level 3 patients primary hip arthroscopy and documented Beighton score to access generalized ligamentous laxity. 1381 Patients included.

#### **Conclusion:**

Hip Arthroscopy patents with GLL are:

- More often Female
- Overall younger
- Lower body mass
- Greater ROM
- Smaller Intraoperative Labral size and tear dimensions
- More likely to undergo labral repair capsular plication and IP lengthening

Ardavan A. Saadat, MD, Ajay C. Lall, MD, MS, Muriel R. Battaglia, BA, Mitchell R. Mohr, BS, David R. Maldonado, MD, Benjamin G. Domb, MDII - AJSM 2019: 47(4):885893

#### What about the Hyperflexible Athlete? Arthroscopic Clinical Outcomes

Christopher M Larson MD, James R Ross MD, M Russell Giveans PhD, Rebecca M Stone MS, ATC, Emma F Grossi BS, and Asheesh Bedi MD

**Courtesy of Asheesh Bedi, MD** 

### **Methods**

- Retrospective review of 77 hips in 63 Competitive Dancers who underwent hip arthroscopy by the senior authors (CML, AB)
  - Mean age of 21.0 years (range 14 58 years)
- Inclusion criteria (Careful Selection)
  - Anterior / groin pain with dance activities
  - Positive impingement test / FADIR
  - No more than MILD Dysplastic Features
  - Predominance of Impingement Anatomy
  - ADL Disability was NOT severe
- Types of Dance
  - 36 Studio dance (Ballet, Jazz, Tap, Lyrical, Contemporary)
  - 32 High kick dance (Dance line)

#### **Courtesy of Asheesh Bedi, MD**
## **Imaging and Outcomes**

- Pre-op / Post-op radiographs:
  - AP pelvis
  - 45° Dunn lateral
  - False profile
- Radiograph & CT measurements
  - LCEA
  - Alpha angle
  - Femoral Head Neck Offset ratio (HNOr)
- Patient Related Outcome Measures obtained (pre- and post-op)
  - Modified Harris Hip Score (mHHS)
  - 12-Item Short Form Health Survey (SF-12)
  - Visual analog score (VAS) for pain
  - Return to Dance Rates





## **Surgical Approach**

**Activity Specific Intra-operative Approach** 

- High ROM Activity results in impingement between the Pelvis and Distal femoral Neck
- Subspine / AllS Decompression = Flexion ROM
- Femoral Neck Osteoplasty extending Distal Medial (Flexion ROM) and Distal Lateral (Abduction ROM)
- Rim Resection if Over-covered
- Capsular Plication (Laxity Frequent)



#### **Courtesy of Asheesh Bedi, MD**

# What would Dr. Hughston have thought of FAI?

## Must Know who to and who not to operate on



#### "There's nothing that cannot be made worse with surgery."

# Do we need a Hip protection program???

## Patellar Protection Program



## **Snapping Hip Syndrome**

#### • External:

- Iliotibial band on greater trochanter
- Most common

#### Internal – coxa soltans

- Iliopsoas tendon on anterior capsule
- Ballet dancer



#### How do we teach athletes to land in a safe position?

POSITION OF SAFETY						POSITION OF NO RETURN		
	MUS C ACTIVI	ELE ITY	BODY AL	JGNMENT			BODY ALIGNMENT	MUS CLE ACTIVITY
BACK			Norma	lordosis			Forward flexed, rotated opposite side	
HIPS		Neut	Flexed tral Abduction/Adduction Neutral Rotation				Adduction Internal Rotation	FLEXORS
	EXTENSORS ABDUCTORS GLUTEALS							ADDUCTORS ILIOPSOAS
KNEE	E FLEXORS HAMSTRINGS			Flexed			Less flexed, valgus	EXTENSORS QUAD RICEPS
TIBIAL ROTATI (	ON	PLANTAR FLEXORS		Neutral			External	DORSI FLEXORS
LANDIN PATTERI	IG N	GASTROCNEMIUS		Both Feet Control		$\sum_{i=1}^{n}$	One foct Out of Control	PERONEALS
	I	POSTERIO	OR TIBIALIS	Balanced	(a)		Unbalanced	TIBIALIS ANTERIOR
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#### Learn how to land at a good age

Encourage physical activity

Make sports fun and exciting

Sports allowed me to succeed in a maledominated career and stay active



MLI, on swing set, real band-aids

The phrase "Be the Man" is commonly used during the action of a competition.

> Also included should be "Be the Woman."





#### "Now get out there, Jennifer, and KILL!"





### Thank you for your attention



#### Links at www.marylloydireland.com/hughstonsociety