Anterior Hip Impingement & Labral Tears
A case of biomechanical overload?

Presented by: Nichole Hamilton
Will commence LIVE from Sunshine Coast, Australia at 7:00pm AEST

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B.App.Sc (Phys)
Physiotherapist
• Graduated from Sydney University at the end of 1997
• Has a passion for physiotherapy education. She is the Queensland representative for the APA's Educator group.
• Worked in private practice in London for five years and completed courses with Dianne Lee and Shirley Sahrmann.
• Nichole has subsequently worked as an assistant teacher on AMTA courses teaching manual therapy and MET techniques for the lumbar spine and pelvis.
• Started work with a rheumatoid hip specialist Dr Michael O'Sullivan in 2005 at North Sydney Orthopaedic and Sports Medicine Centre to develop post-operative protocols for arthroscopy.
• Michael and Nichole have lectured together on management of anterior and hip impingements since 2007.
• Nichole has subsequently worked as an assistant teacher for LJ Lee's "Discover the Internal Pelvis" course.
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Summary

- Hip: Anatomy and biomechanics review
- Anterior Hip Pain - Causes
- Labral tears and impingement - biomechanical overload
- Potential effects of the SIJ and lumbar on the hip
- Potential effects of the foot on the hip
- Potential effects of the thorax on the hip

Anatomy and biomechanics review

Bony Anatomy - femoral head

- Femoral Head should contour with acetabulum (structural variations)
- Normal angle of inclination 125 degrees
- Coxa Varus
- Coxa Valgus

Femoral Structure - normal anteversion
Structure of the Acetabulum

- Faces obliquely, downward and outward:
  - Rotated 30-40 degrees inferiorly to absorb superiorly directed forces
  - Rotated 30-40 degrees anteriorly to absorb posteriorly directed forces
  - If forces directed anteriorly through femur absorbed more by labrum

(Sahrmann 2003)

Hip Stability; ligaments

Iliofemoral ligament, Pubo-femoral ligament and ischio-femoral ligament. Small anterior area without ligamentous support.

Acetabular Labrum

- Fibrocartilage, mostly triangular
- Length 4-7 mm (longer ant-sup)
- Attachment to bone via zone of calcified cartilage
- Continuous with transverse acetabular lig
- Relatively avascular
- Innervated

Anatomy of the Labrum

Hip capsular ligaments insert onto the bony acetabulum, proximal and distinct from the acetabular labrum

(Seldes Tan, Hunt, Katz, Winiarsky & Fitzgerald 2000)

Common Hip Complaints- Anterior

- Cartilage: Labral Tear and articular cartilage wear
- Soft Tissue: Anterior capsule sprain, Iliopsoas tendinopathy, Iliopsoas Bursa
- Joint: OA, Synovitis
- Other Dx: Stress Fracture (NOF, Pubic ramus), OP, hernia/abdominal pathology ➔ Sports Medicine Review

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Anterior Hip Pain - Why?

- Excessive load on the anterior hip - structural dysfunction?
- Excessive load on the anterior hip can also occur with biomechanical dysfunction
- Increased biomechanical load on anterior hip can occur with excessive anterior translation of the femoral head. (Sahrmann 2003)

Normal Accessory Motion

- Accessory PA glide of 0.4 to 1.54mm with 89 N (Harding et al 2003)
- Anterior Femoral Glide - with hip extension and external rotation
- Posterior Femoral Glide - with hip flexion and internal rotation

Postural Malalignment

Excessive anterior translation of the femoral head can place increase load on the anterior hip

Increased anterior hip joint force with increased hip extension (Lewis & Sahrmann 2007, 2009)
Basic Postural Assessment

Standing plumb line:
- Manu-sternal junction to Pubic Symphysis
- ASIS symmetrical
- Greater Trochanter to Lat fem condyle to Just anterior to lateral malleolus

Other causes of anterior translation of the femoral head?

Hypertonicity in the deep posterior hip muscles can restrict the hips ability to glide posteriorly and contribute to anterior impingement of labrum or capsule during hip flexion (Sahrmann 2003)

Tight Posterior Hip

- A consequence of dysfunction in the SIJ or pelvis
- A consequence of poor motor control strategies
- Muscles that become overactive in an attempt to compensate for poor lumbar-pelvic stability, can reduce hip joint motion.

Forward Flexion with Reduced Posterior Glide of the Hip
Basic Sitting to centre femoral head

- Feet even symmetrical and relaxed on the floor
- Wide relaxed buttocks to sit, allow thorax to fold over femoral heads to centre into acetabulum
- Pelvic ‘bucket’ neutral
- Thorax then should stack directly over pelvis
- Effortless

Pathways to Anterior Hip Pain- Clinical Observations

- Hypermobility or long inhibited psoas
- Reduced hip stability & motor control
- Increased translation femoral head in extension
- Increased load anterior hip structures
- Articular SIJ or lumbar dysfunction and/or
- Poor motor control strategy
- Hypertonic posterior hip
- Restricted posterior hip glide during flexion
- Anterior hip impingement with flexion

Ant hip impingement
Labral Tear

SIJ Dysfunction- effects on the hip

Implication for the hip: Clinical observations:
Increased tonic activation posterior hip muscles in patients with signs of SIJ dysfunction, limiting posterior glide of the femoral head

SIJ Dysfunction- Implications for the Hip

- Altered muscle recruitment with single leg balance: Delay in onset IO, Multifidis, Glut Max, Increase in activation hamstrings
  (Krugfeld et al, 2005)
- Hamstrings dominance during hip extension is correlated with increased anterior hip joint forces (anterior translation of femoral head)
  (Sahrmann, Lewis 
  Sahrmann 2009)
- Other studies suggest delayed firing, reduced/assymetric strength in hip extensors in people with chronic LBP

Lumbar Dysfunction- Implications for the Hip

- Reduced CSA psoas evident in patients with unilateral back pain (Barker, Shamley, Jackson 2004)
- During ASLR reduced activity ilioypoas results in increased anterior hip joint force (Lewis & Sahrmann 2009)
- Implicates reduced hip stability anteriorly? More research needed
Foot & Lower Limb Chain - implications for the hip

- Foot: Rigidity & Mobility
- Propulsion: Requires a more rigid lever (supination)
- Shock absorption and adaptability: Requires mobility or “give” in the system (pronation)
- Inability to perform either can have a knock on effect up the chain
- Clinical observation - excessive rigidity in either forefoot, midfoot or rearfoot can contribute to excessive anterior hip load

Assessment Options

Subjective: WHEN does the patient feel symptoms of impingement? Related to hip flexion? Related to load into extension?
Test: Does femoral head remain centred in the activity?
Observe: Are there other areas of the body that might be adding to load on the anterior hip? Thorax? SIJ? Foot?
Palpate: Are there local areas of the hip that are hypertonic and are also contributing to poor hip centring?

Treatment Options

- Educate: Posture and daily habits, mechanics and injury management, pain education
- Manual Therapy: Areas of hypertonicity that may be contributing to non optimal centring of the femoral head.
- Exercise prescription: Could include self ‘release’ based exercises, correct activation of core, functional hip centring supine, with squats, lunges and progress challenges according to patient goals.
Summary

Biomechanical overload onto the anterior hip can contribute to repeated microtrauma and pain.

Poor centring of the femoral head is not just about motor control within the hip, but can also be influenced by daily habits and postures, non-optimal function in the foot, lumbar/SIJ and/or thorax.

Addressing the causes of a patient's symptoms by looking at their unique "big picture" will allow a more tailored approach to management.

References

- Pirouzi, Soraya MS; Hides, J; Richardson C; Darnell, R; Toppenberg, R 2006 Low Back Pain Patients Demonstrate Increased Hip Extensor Muscle Activity During Standardized Submaximal Rotation Efforts Spine. 31(26):E999-E1005, December 15

Live Q & A
With Nichole Hamilton
**Coming up next week**

**Part 5 / 6 in our Hip & Groin Series**

“Post-Operative Rehabilitation & Return to Sport after Groin Surgery”

1. Understand the anatomy of structures that may require surgery in the groin
2. Understand the indications for surgical intervention
3. Understand the principles that underpin the rehab process and indications for caution and poor prognosis
4. Understand and implement the Physiotherapeutic protocols for management of these post-operative patients
5. Understand, apply and communicate realistic goals and criteria for return to sport
6. Understand the research that supports the rationale for the rehabilitative process discussed

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**Live Q & A**

**With Nichole Hamilton**

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**Thank you**

From Nichole Hamilton

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