The Dancer’s Hip

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I have nothing to disclose regarding potential conflict of interest in this presentation.
Objectives

- Common Hip Injury Prevalence in dancers
- Biopsychosocial considerations when working with dancers
- Basic review of hip anatomy and biomechanics
- Pathogenesis of the dancer’s hip
- Why is hip turnout so important to the dancer
- Evaluation and examination of the dancer
- Dance Movement Analysis of the hip with basic dance movement
- Pilates- based treatment intervention
Dancer as an Artist & an Athlete

“Ballet ranks with football as the most demanding of all physical activities & sports”

(Nicholas, 1975)
Injury Prevalence
Liederback, Dilgen and Rose, 2008

Dance Injury Occurs

Rehearsal
Performance

Increase in workload
Common → Fatigue

Foot-Ankle
Knee
Hip
Spine
Upper Extremity
Other

Ballet
Modern
Injury and Joint Hypermobility in Ballet Dancers

- High Prevalence of hypermobility in dancers
- Found in males and females
- Chronic Injury → increases injury
Hip Problems in Dance
Literature Review

- 10% (Garrick et al. 86)
- 10% (Reid et al. 88)
- 7-14% (Stretanski et al. 02)
- 8-11% (Liederbach et al. 08)

7 - 14% Range of Hip Injuries
Biopsychosocial Considerations
Types of Injuries

- Anterior Hip Pain
  - ‘Snapping’ Hip Syndrome
- Labral Tears
- Iliacus tendinitis
- Trochanteric Bursitis
- SIJ Dysfunction
Hip Anatomy

Hip Joint [Opened]
Lateral View

- Anterior superior iliac spine
- Anterior inferior iliac spine
- Iliac crest
- Acetabular labrum (fibrocartilaginous)
- Fat in acetabular fossa (covered by synovial
- Obturator membrane
- Acetabular ligament
- Transverse acetabular ligament
- Iliac tuberosity
- Neck of femur
- Greater trochanter
- Intertrochanteric line
- Lesser trochanter
- Round ligament
- Ligamentum capitati
- Femoral head
- Articular cartilage
- Lunate surface of acetabulum
Biomechanics

- **Hip Flexion:**
  - Posterior glide of femoral head

- **Hip External Rotation: (ER)**
  - Anterior and medial glide of femoral head
  - Limited by tension of anterior capsule & iliofemoral ligament

- **Hip Internal Rotation: (IR)**
  - Posterior and lateral glide of femoral head in acetabulum
  - Limited by tension of posterior capsule & ischiofemoral ligament

- **Hip Abduction:**
  - Inferior glide of femoral head

- **Hip Extension:**
  - Anterior glide of femoral head
Pathogenesis of the Dancer’s Hip

- Turnout
- Extensive ROM
- Repetitive Flex, Ext with abduction & ER

Hip ER > Hip IR
External Rotation is the “supernormal” and IR is limited
Turnout

- **As turnout increases** the stress of the anterior structures increases

- **Excessive hip ER** is related to increased mobility of capsule-ligamentous restraints and is indicative of hypermobility and instability
  - in the absence of osseous or articular geometry.

- **Instability**
  - Excessive stretching of capsulo-ligamentious structures
Differential Diagnosis

... is it the hip or not the hip? ...

- Etiological source
- Local OR referred phenomenon (O’Kane Am Fam Phys 1999, Lewis et al Phy Ther 2006)
  - Multiple structures: musculoskeletal and other systems
  - Deeper structures (non-palpable)
  - Lumbar Spine
Evaluation
Regional Interdependent Approach

Examination
Objective Measurements

- Posture
- ROM
- MMT
- Special Tests
- Functional Tests
- Dance Movement Analysis
Examination

Objective Measurements: Posture

Examination
Objective Measurements: ROM

- Lumbar ROM
  - Apparent motion
- Hip ROM
  - Measuring Turnout
    - Active
    - Functional Feet

At least 70 degrees of active ER comes from each hip, knee contributing 5 degrees and the ankle/foot with the remaining degrees.
Examination
Objective Measurements: MMT

- Hip Strength
  - Gluteal Maximus
  - Lateral rotators
  - Gluteal Med/Min
  - Hamstrings
- Abdominal strength and endurance
- Ankle Strength

*Altered muscle activation patterns & hip abductor weakness found after a single ankle sprain* (Bullock-Saxon et al, Beckman and Buchanan, Nicholas et al)

*Maximum gastrocnemius PF power is generated by use of the hip muscles*

*26% more activation* can occur in the ankle if proximal muscles are activation

Examination
Objective Measurements: Special Tests

- Scour test
  - non-specific hip pathology such as femoral acetabular impingement or labral tears
- FABER
  - Screens for intra-articular hip pathology, hip, lumbar or sacroiliac dysfunction, or iliopsoas spasm
- FABIR
  - Screens for anterior-superior impingement syndrome, anterior labral tear and iliopsoas tendinitis
- Clusters to rule out SIJ dysfunction/instability
Examination
Objective Measurements: Functional Tests

- Balance & LE dynamic alignment
  - Airplane Test
  - Single leg squat/step down (neutral)
  - SL Balance (neutral)
    - Even surface
    - Uneven surface
    - Eyes open
    - Eyes closed
Examination

Objective Measurements: Dance Movement Analysis

- Leg/hip alignment affects the foot ... the foot affects the hip
  - 1st sprain occurs by age 13
  - Reoccurrence rate > 80%
Dance Movement Analysis
Parallel

- **Plie**
  - Lumbar spine: natural lordosis, observe for lateral shifts
  - Pelvis: neutral
  - Femur: neutral in terms of abd/add & IR/ER; equal degrees R <>L; femur glides posteriorly upon descent

  **Common Dysfunction:**
  - **Descent:** flexion of L-spine, “butt gripping” with PPT, limited posterior glide of femoral head
  - **Ascent:** shearing forward of femoral head

  *Seen in dancers with superficial glut max dominance with associated poor motor control of sacral fibers from glut and TFL dominance; poor motor control of iliacus*
**Dance Movement Analysis**

**Parallel**

- **Releve**
  - Lumbar spine: natural lordosis throughout movement
  - Pelvis: Neutral
  - Femurs: remain parallel in neutral abd/add & IR/ER. Minimal extension of hip upon descent

**Common Dysfunctions**

**Ascent**: L-spine extension, anterior shear/extension of femurs, knee hyperextension, increase in ankle DF

**Descent**: L-spine extension, excessive extension of hips and knees

*Seen in dancers with L-spine hypermobility, anterior hip impingement/instability & labral tears*
Dance Movement Analysis

Turnout

Turnout should come from the hip down, **NOT** the floor up

Malalignment can occur as result of:
- TFL dominance
- Poor standing posture
- Weakness in deep ER of hip

Common Faults:
- Anterior Pelvic Tilt (common)
- Posterior Pelvic Tilt (butt gripping)
- Excessive tibialfemoral ER/femoral IR
  - Patella medial to 2nd MET
- Inability to maintain neutral WB in foot
  - Medial WB (“rolling in”)
  - Lateral WB (“rolling out”)


Dance Movement Analysis

Turnout

- Measuring/Observing Turnout
Physical Therapy Intervention
Physical Therapy Intervention
Lumbo-Pelvic Hip Complex

Triad of Muscles of Turnout:

Abdominals: activate from pubic bone to rub cage; lumbar spine is in neutral, back and gluts relaxed

Adductors: inside thigh forward

Deep Rotators: Turnout hip without changing pelvic alignment

Proper elongation of appropriate postural muscles (iliopsoas and erector spinae)
Physical Therapy
Pilates Based Rehabilitation

- **Initial stage:**
  - Management of pain
    - Restricting height and/or movement
    - Manual therapy - mobilization
  - Biomechanical Counseling
    - Standing posture
    - Gait
  - Neuromuscular Re-education
    - Lumbar Stabilization: Core, TrA, Pelvic floor
    - Hip Dissociation
Physical Therapy
Manual Techniques
Physical Therapy
Pilates Based Rehabilitation

Anterior Hip Glide MWM with mob belt:
Physical Therapy
Pilates Based Rehabilitation
Physical Therapy
Pilates Based Rehabilitation
Functional Retraining of Turnout

- Neuromuscular Re-education on proper functional turnout
  - Parallel > Turnout
  - Straight leg > Plie
  - Double leg > Single leg
  - Flat foot > releve

Made by Jean Claude West & Marika Molnar, PT
Physical Therapy
Pilates Based Rehabilitation

Towson University Dance Department
In Summary in dancers:

- Hip pain is multifactorial accompanied with postural-behavioral movement impairment syndrome that defines one common diagnostic label.

- Postural Re-education and teaching of turnout with proper lumbar stabilization and deep lateral rotator activation.

- Remembering the value of aesthetic ideals in the dance world within the individuals limits.
Thank you

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Reference


