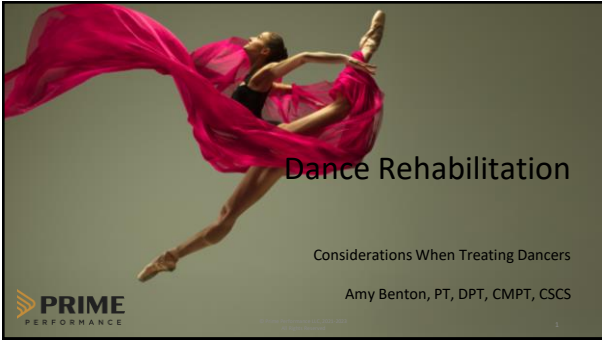




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## Rates of Injury in Ballet

Systematic Review (21 studies included)

- 1365 Amateurs
- 900 Professionals
- Age 16-27
- Injury incidence/1000 dance hours
  - Amateur female (1.09)
  - Amateur male (0.99)
  - Pro female (1.46) – 64% overuse
  - Pro male (1.06) – 50% overuse



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## Common Injuries in Ballet

3 studies reported injury prevalence data by body part

- 66-91% lower extremity
- 14-57% foot and ankle
- 62% lumbosacral pain
- 58% snapping hip
- 29% patellofemoral



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## Physical Challenges

- Overtraining
- No off season = Overuse
- Poor recovery strategies
- Early specialization
- 7+ years of training for proficiency
- Artistic athlete
- Aesthetic
- Movement variety required



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## Psychosocial Challenges

- Disordered eating
- Anxiety and stress
- Shame
- Perfectionism
- Competition
- Self esteem
- Effects of injury



Paula Thomsen, PsyD, and S. Victoria Jaeger, PhD. (2018). Shame and Anxiety: The mediating Role of Childhood Adversity in Dancers. *Journal of Dance Medicine & Science, 22*(1)(100-108)

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## Health History

- Dance history
- Present and past injuries
- Participation in other sports
- Training schedule
- Self care habits
- Growth spurts



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## Physical Exam

- Gait (walk, jog, stairs)
- Squats
- Lunges (multidirectional)
- SL balance + reach
- Heel raises – turned in & out
- Ankle mobility-knee to wall test
- Jumps and hops
- Core



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## Physical Exam

- Beighton Test – hypermobility
- Lumbar and SI assessment
- Hip/Knee/Ankle (MMT, ROM)
- Joint/Ligament assessments
- Neuro scan



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## Dancer vs Non-Dancer LE ROM

| Joint AROM                      | Dancers     | Non-Dancers (WNL) |
|---------------------------------|-------------|-------------------|
| Ankle PF                        | 90 deg      | 70 deg            |
| Ankle DF WB (Knee to wall test) | 10cm        | 10-12cm           |
| Hamstring length                | 110-120 deg | 75-90 deg         |
| Hip Flexion                     | 133-150 deg | 120-140 deg       |
| Hip Extension                   | 19-25 deg   | 10-20 deg         |
| Hip External Rotation           | 56-80 deg   | 40-50 deg         |
| Hip Internal Rotation           | 33-50 deg   | 30-45 deg         |
| Hip Abduction                   | 61-100 deg  | 30-50 deg         |
| Hip Adduction                   | 25-45 deg   | 20-30 deg         |

Duchon, V., Charlevoix, C., Rele, F., Thalmann, N., Boudier, C., Bouvet, C., Coppens, L., Hoffmeyer, P., Menetrier, J. (2013). Correlation of Clinical and Magnetic Resonance Imaging Findings in Hips of Elite Female Ballet Dancers: Arthroscopy. The Journal of Arthroscopy & Related Surgery: Official Publication of the Arthroscopy Association of North America and the International Arthroscopy Association. 29, 10.1054/j.arts.2012.00.012.

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## Measuring Whole Leg Turnout



Passive



Active – Rotational discs

Passive > Active = lacks motor control, strength of deep hip rotators

Active > Passive = forcing turnout



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## Alignment is Key



- Hip – externally rotated
- Knee – tracking down 2<sup>nd</sup> toe
- Foot – maintain arch in all positions



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## Ballet Positions



1<sup>st</sup>



2<sup>nd</sup>



3<sup>rd</sup>



4<sup>th</sup>



5<sup>th</sup>



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## Dance Technique Scan

- Ballet positions
- Pliés
- Cambre
- Arabesque
- Ronde De Jambe
- A La Seconde
- Balance on releve
- Balance in passe – 5 sec
- Airplane test 3/5 = pass
- Topple test (4<sup>th</sup> to 4<sup>th</sup>)
- Quick tendu test
- Gastroc strength



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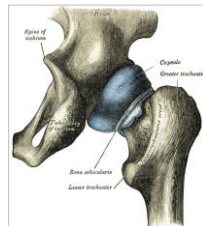
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## Case Study #1: Anterior Hip Pain

- 16 y/o female dancer, 3-4x/ week
- 2-month hx of (L) anterior hip pain
- Pain dull at rest, sharp “pinch” during la seconde position at or above 90 deg
- Catching, gripping, tightness with attempts to get leg higher in a la seconde position
- After 1-week rest slight decrease in pain, but it returned with lifting leg in a la seconde again



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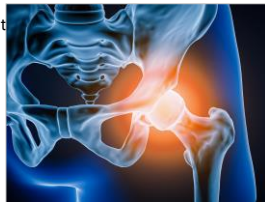
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## Differential Diagnosis

- Femoral Acetabular Impingement
- Labral tear
- Proximal quad tendonitis
- Bursitis
- Adductor strain
- Stress fracture



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## Evaluation Findings

- (+) Thomas test
- (+) FABER/FADIR
- Glute tightness
- Restriction in femoral anterior glide
- Weakness hip ER, IR, adductors, glutes, iliopsoas



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## Evaluation Findings: Dance Technique

- Poor utilization of turnout muscles
- Gripping of quads
- "Hip Scaption"



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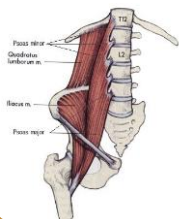
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## Interventions



Active release technique (ART)

- Psoas
- Iliacus

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## Iliopsoas Length and Strength



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## Interventions

- Soft tissue work
- Joint mobilization to improve femoral anterior glide



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## Corrective Exercises

- Clamshells @ 0 deg
- Hip ER re-education in sidelying
- Standing turn out corrections



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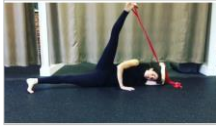
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## Exercises to Include

Turnout Education



A la seconde reverse patterning



A la seconde on unstable surface



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## Patient Education

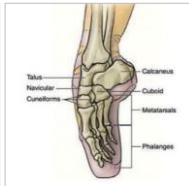


- Ice application
- Avoid pain
- Modify class participation
- Proper stretching techniques
- Average # tx: 3-6
- Average Recovery: 3-4 weeks

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## Ankle Sprains in Dancers



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## Case Study #2: Lateral Ankle Sprain

- 18 y/o female classical ballet dancer
- 2-weeks s/p grade II ATFL sprain
- Bruising and swelling initially
- Happened during rehearsals for show
- 3<sup>rd</sup> episode on this ankle
- Painful to walk for more than 3 blocks
- Ankle feels stiff in plie

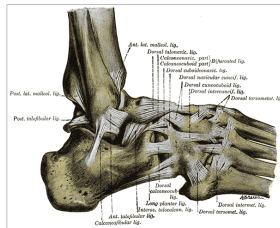


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## Evaluation Findings

- Tender over ATFL insertion and tibiofibular ligament
- Mild swelling present along anterior talocrural joint line and distal tibiofibular syndesmosis
- ROM limited in full DF & PF, painful with INV
- Joint mobility: hypomobile talocrural joint posterior glide, hypermobile tib-fib A/P glides
- Ligament stress tests: ATFL laxity with Anterior Drawer, laxity of tibiofibular ligament (both have end feel)



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## Treatment Considerations: Subacute

- Manual tx: soft tissue, joint mobs
- Vasopneumatic compression boots
- Ice or contrast therapy
- Tape for protection
- Dancers: Avoid ankle PF 1-2 weeks
- Protective shoes



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## Exercise Considerations

- Subacute exs: ankle alphabet, toe crunches, doming/splaying, foot intrinsic
- Cross-training
- Cardiovascular: stationary cycling
- Proprioception: balance w/eyes closed
- Heel rise progressions: 50%, 75%, 100%
- 16-25 heel rises with proper form



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## Ankle Mobilization with Band



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## Exercise Progressions



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## Proprioception and Balance



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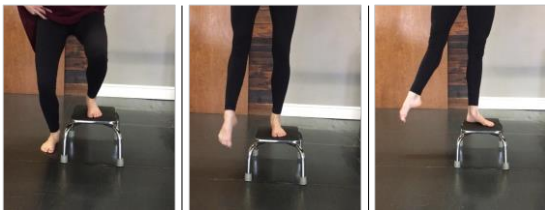
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## Return to Jumping Exercises



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## Criteria for Modified Return to Dance

- Pain free walking, stairs, and standing
- Resolution of swelling
- 80-90% of ankle AROM in all planes
- Ankle/Foot strength >4/5
- Demo proper alignment and control with basic dance movements



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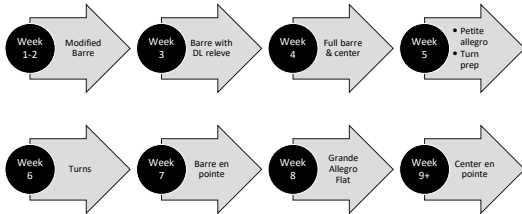
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## Return to Dance Progression



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## Full Return to Dance and Pointe Work

- 4-9+ weeks
- Full ankle ROM: PF=90 deg DF=20+ deg
- SL heel raise 16-25+
- Balance on ½ foam roll or pointe shoes during complex movements
- 200+ jumps with optimal landing mechanics
- Proper turning on full releve
- Demo proficiency working in pointe shoes



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Thank you!

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