The Effect of Lower Extremity Dysfunction on pelvic pain and incontinence

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LQ Dysfunction and the Pelvic Floor

• Consider
  – Pelvic floor dysfunction as a secondary or tertiary response to adaptations to movement dysfunctions from the lower quarter
    • Foot
    • Ankle
    • Knee
    • Hip
    • Lumbar spine

LQ Dysfunction and the Pelvic Floor

• Biomechanical changes can lead to:
  – Decreased shock attenuation
  – Change in gait pattern
  – Change in load transfer through the pelvis
  – Change in neurology
  – Changes in breathing patterns
  – Change in mm activation
    • Inhibition
    • Compensatory activation
    • Dyscoordination of proximal postural mm
  – Conversion to chronic postural adaptations

LE Dysfunction

• Foot
  • Altered gait
  • Spinning of first ray medially to accommodate for adduction of first phalange
  • Functional pes planus or cavus each has a high correlation of more proximal injury (Kaufmann et al 1999)

Foot

• Common Dysfunctions
  – Hallux Rigidus
    • Forces altered gait to accommodate stiff first joint (Nawoczenski 1999)
      – Roll through on lateral surfaces of MTP to offload
      – Less DF, displaced centers of rotation, and early jamming of the articular surfaces
      – Increased pressures on plantar surface especially during toe off due to increased lever arm caused by joint stiffness
    • Decreased push off
      – Decreased push off increases anterior hip forces (Lewis and Ferris 2008)
Ankle

- Common dysfunctions
  - Inversion ankle sprains
    - Lack of talar reposition (Denegar et al 2002)
      - Talus in a more anteriorly stuck position
      - Creates a abnormal axis of motion
      - Likely contributes to further joint dysfunction
    - Landing styles especially in decreased DF situations lead to large knee valgus excursion during landing (Sigward et al 2008)
    - Ankle DF loss leads to higher risk of ACL tear (Fong et al 2011)

- Achilles Tendonitis
  - Maintenance of ankle in mild PF not allowing full DF
    - Decreased ability for push off
  - Faulty biomechanics leading to achilles tendon overuse injuries
    - 58% of all achilles tendonitis cases can be linked back to bad biomechanics of the foot (Kaufmann et al 1999)
  - Lack of eccentric control
    - Importance of ecc. plantar flexors in gait
  - Chronic high heels (non wedge)
    - Shortened gastrosoleus
    - Decreased excursion of ankle joint during all phases of gait

Knee

- Common Dysfunction
  - Limited ROM
    - Lack of full knee extension frequently seen in OA
    - Not allowing for proper loading response
    - Overflexed knee leading to bent knee gait
    - Less force distribution combined with overworking quad leads to a stiff joint thereby increasing force distribution needs of surrounding joints also likely progressing OA at the knee (Child et al 2004)

- Mismatched Dynamic Response
  - Lack of hip abductor and glute strength leading to patella femoral pain usually associated with tight ITB (Ireland et al 2003).
  - Hip adduction and femoral IR caused by weakness contributing to increased knee valgus with gait

Hip

- Common Dysfunction
  - Lack of ROM
    - Hip extension ROM loss leading to anterior hip labral fraying
    - thrust of femoral head into anterior rim of acetabulum due to decreased available posterior excursion
    - Patient may compensate by maintaining a mild anterior tilt of pelvis contributing to chronic LBP

- Lack of Strength
  - Lack of External Rotation, Abductor strength found to be a high predictor of LE injury in athletes (Leetun et al 2004)
  - Weak hip extensors may not control femoral head eccentrically allowing anterior translation and possible anterior labral tear (Lewis et al 2007)
  - Increased ankle push off may be able to decrease hip strength requirement during gait (Lewis and Ferris 2008)
Nerve root compression

- Differences between nerve root susceptibility to compression vs. peripheral nn

Lumbar Spine

- Spinal Nerve Root Compression and partial denervation
  - Neurotomesis
  - Axonotemesis
  - Recovery rate
  - Clinical presentation
    - Fatiguable weakness

(Bohannon and Gajdosik, 1987)

Lumbar Spine

- L5/S1
  - Key muscles
  - Secondary muscles
  - Sensory
  - Reflex

- L4/L5
  - Key muscles
  - Secondary muscles
  - Sensory
  - Reflex

Lumbar Spine

- Functional changes with SNRC
  - Postural adaptations/muscle and biomechanics
    - The role of the psoas
    - The role of the gluteus medius/minimus
    - The role of the gluteus maximus
    - The role of the multifidus
    - The role of the TFL
    - The role of the adductor
    - The role of the hip rotators

Pelvic Floor Fatigability

- Changes in evidence regarding strength training and functional performance of the pelvic floor
  - Anal Sphincter Fatigue (Hodges et al)
  - PFM submax training (Junginer et al, 2013)
  - PF fatigue after strenuous exercise (Ree et al, 2007)
  - Max strength training vs. sub max?
Pelvic Floor Fatigability

- Submaximal and eccentric training of postural and pelvic floor muscles in functional context with the lower quarter

Functional Considerations

- Runners
- Tri-athletes
- Dancers
- Age related changes
- Other activities

Case Presentations

References


References

References

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