

ISAKOS CONGRESS 2019: SPORTS REHABILITATION CONCURRENT COURSE

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SESSION VIII: FOOT AND ANKLE

Rehabilitation of Running Injuries

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1. Running mechanics and tissue capacity
 - a. Ensure mechanical demands of running are less than the individual's capacity to meet those demands
 - b. Physical differences prevent everyone from using the same running form
 - c. Key characteristics to avoid
 - i. Landing too far ahead of center of mass (Overstriding)
 - ii. Excessive vertical displacement of center of mass (Bounce)
 - iii. Excessive compliance of running spring (Compliance)
 - d. 3D analysis is the gold-standard but 2D video can reliably identify above mechanical flaws
 - e. Gait modifications to correct above flaws can be an important component of injury management
2. Anterior knee pain
 - a. Pain commonly present during loading response phase
 - b. Primary mechanics to consider:
 - i. Knee flexion angle at initial contact and midstance
 - ii. Center of mass vertical displacement
 - iii. Hip peak adduction
 - iv. Ground reaction forces: active peak of vertical and braking impulse
 - c. Increasing step rate can positively affect each of the above
 - i. Reduced negative work performed at the knee (Heiderscheit et al Med Sci Sports Exerc 2011)
 - ii. Reduced peak patellofemoral compressive force (Lenhart et al Med Sci Sports Exerc 2013)
 - iii. Reduced patellofemoral stress (Lenhart et al J Biomechanics 2015)
 - iv. Reduced peak hip adduction (Chumanov et al Gait Posture 2012)
3. Tibial bone stress injury & medial tibial stress syndrome
 - a. Primary mechanics to consider
 - i. Foot inclination angle
 - ii. Tibial inclination angle
 - iii. Cross-over
 - iv. Center of mass vertical displacement
 - v. Vertical loading rate
 - b. Changing foot-strike to forefoot is commonly recommended but may be insufficient
 - i. Non-linear relationship between foot inclination angle and vertical loading rate (Stiffler-Joachim et al Med Sci Sports Exerc 2019)
 - ii. Need to consider magnitude of change and effect on load to adjacent tissue, i.e., Achilles tendon and calf
4. Achilles tendinopathy

- a. Primary mechanics to consider
 - i. Peak ankle dorsiflexion during stance
 - ii. Center of mass vertical displacement
 - b. Reduce ankle dorsiflexion angle by increasing step rate (reduce ground contact time)
 - i. Increases lower limb stiffness (Morin et al J Biomechanics 2007)
 - c. Need to consider increased compliance and reduced energy storage ability of Achilles tendons of middle-aged and older adults (Slane et al Physiol Meas 2015)
5. Which retraining strategy is best?
- a. Best strategy is the one that:
 - i. reduces current symptoms without producing new symptoms
 - ii. the specific patient can learn most easily and quickly
 - iii. follow a rhythm vs correct a specific angle
 - iv. does not compromise performance
 - b. Likely to promote long-term compliance
6. Return to running and training load progression