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## Rehabilitation of the Traumatic Lower Extremity Injury


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## Objectives

- Review literature of conservative management
  - Hip dislocation/athletic femur fracture
  - Multi-ligament knee injuries
  - Exertional compartment syndrome
- Provide a functional “treatment map” for return to sport

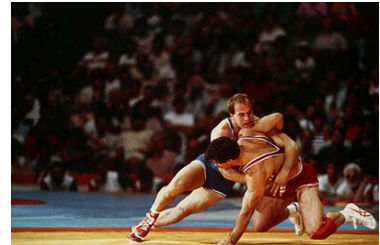




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## Traumatic Hip Injuries

- Hip dislocation
  - High velocity mechanism
    - Dashboard MVA
    - In athletics – high velocity contact injuries
      - Fall onto a flexed/adducted knee
      - RARE



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## Traumatic Hip Injuries

- Femoral fractures
  - Most common in the young and the old
  - In athletics similar mechanisms as previously discussed
    - Bone vs joint injury
  - Surgical reduction – can be life threatening



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## Traumatic Hip Injuries

- Consideration for other injuries
  - Hip specific – Philippon et al 2009
    - Chondral defects, loose bodies, FAI, capsular adhesions or tears
    - 16 professional athletes
  - Ipsilateral knee (89%) – Schmidt et al 2005
    - Meniscus, bone bruise, effusion, cruciates, collaterals, fracture
  - Sciatic nerve
    - 10-15% - various authors
    - Likely irritation at minimum given the extent of trauma to nearby tissue

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## Treatment considerations

- Surgical vs non-surgical
- Weightbearing considerations – Foulk and Mullis 2016
  - Inherently stable
  - NWB? - PWB – WBAT progression – MD discretion
  - Avoidance of endrange in “injury” planes of motion
    - Posterior – avoid flexion/adduction
    - Anterior – avoid ER/Abduction



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## Treatment considerations

- Restore posterior hip strength

- Glute Max

- Side-lying hip abduction
- Single-limb squat
- Lateral band walk
- Single-limb deadlift

- Glute Med

- Single-limb squat
- Single-limb deadlift
- Transverse lunge
- Forward lunge
- Sideways lunge

- Distefano et al. JOSPT 2009



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## Multi-ligament knee injuries

- Factors to consider

- Staging of repair
  - 1 vs 2, and time in-between stages if 2 stage
- Ligaments affected
- Repair vs reconstruction
- Concomitant injuries
  - Vascular
  - Neurologic
- Risk factors for stiffness – Hanley et al 2016
  - >3 ligaments
  - Dislocation event



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## Treatment considerations



- Respect healing times
  - Both pre and post surgery(s)
- Respect surgeon's protocol
- For staged procedures – respect non-repaired structures
  - Still unstable, still vulnerable

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## Treatment considerations

- Key factors- Mook et al 2009
  - Final ROM not significantly different based on early immobilization
  - In acute single stage procedures, early aggressive ROM favors better outcomes
  - Flexion loss > 10 degrees more likely in acutely managed group
  - Staged treatment resulted in the highest excellent or good subjective ratings
  - Return to work
    - Acutely managed patients who were immobilized early had a decreased likelihood of RTW
  - Return to Sport
    - Acute management group were less likely to return to sport than staged management
      - Low N in comparison groups

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## Treatment considerations

- Guidelines
  - Early ROM within restrictions
  - Isometric quadriceps and hamstrings per restrictions
  - Weightbearing progression – typically FWB by 6-10 weeks
  - PCL considerations/Brace use
  - Initiate lateral and posterior hip strengthening early
  - Power's protocol

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## Exertional Compartment Syndrome

- Athletics and military
  - Most commonly running but can be any endurance activity
    - Onset of symptoms at a set distance into the run
    - Unable to continue
    - May have associated paresthesia and/or foot drop



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## Compartment Syndrome

- Often a dx of exclusion
- Imaging
  - MRI, EMG
- Pre/Post exercise pressures -“normal” < 10 mmHg
  - Pre ex > 15mmHg
  - 1 min post > 30mmHg
  - 3 min post > 20mmHg
    - Pedowitz et al. 1990



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## Compartment Syndrome

- Systematic Reviews
  - Vajapey and Miller 2017
    - Fasciotomy as “gold standard” of care
    - Evidence for conservative management – Deibal et al 2012
      - Hindfoot runners, Military
      - Anterior compartment involvement
      - 6 weeks of forefoot running training showed statistically significant change
        - » Decreased post-run pressures
        - » Run distance
        - » Pain scores
        - » 2 mile run time

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## Compartment Syndrome

- Systematic review
  - Rajasekaran and Hall 2016
    - Conservative treatment options
      - Shoe type/gait changes
        - » Negative sole
        - » Cadence to 180 BPM
      - Massage, stretching, rest
        - » Limited follow up after treatment to assess return to activity



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## Functional Progression

- How do we get there?
  - Transitional from strength to sport
  - Treatment map??









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## Functional progression

	Two legged	One to the other	Single leg
STATIC	Squat 	Lunge 	Single limb squat 
DYNAMIC	Jump 	Leap 	Hop 

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## Functional progression

- Progression of difficulty
  - Jump/landing surface
  - Speed
  - Direction
    - Side, quadrants, angles
  - Height vs distance
  - Repetitions
  - Resistance



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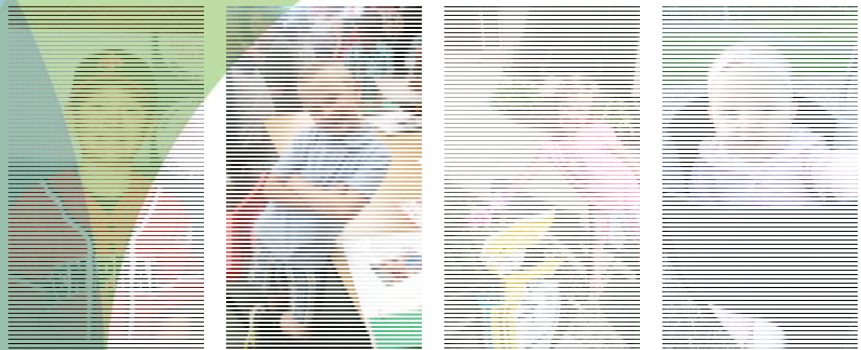
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## Questions?

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