Acute Knee Ligament Injuries in Athletes

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ACSM Team PhysicianSM Course – Part II
Essentials of Sports Medicine: From Sideline to the Clinic

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565 Biomechanics of Gait

489 Functional Anatomy of the Knee and Leg

490 Examination and Imaging of the Knee and Leg

491 Acute Knee Ligament Injuries in Athletes
A good History and Physical is Key
to a Correct Diagnosis
Grab Sign

Patellofemoral Disorders
Fisted Knuckle Sign

= ACL Tear
Acute Knee Ligament Injuries in Athletes

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Instabilities

- Anteromedial rotatory instabilities (AMRI)
- Combined AMRI and ALRI
- Anterolateral rotatory instabilities (ALRI)
- Straight posterior
- Posterolateral rotatory instabilities (PLRI)
- Combined ALRI and PLRI
- Straight instabilities
PCL

• Mechanism
  • Low velocity – sports blow to anterior tibia, foot plantarflexed

• Exam
  • Grades I-II-III based on relation to medial femoral condyle

• Assess collateral ligaments
  • Most commonly posterolateral instability
  • Greater tibial external rotation

• Acute reconstruction
  • Knee dislocation
  • Grade III collateral ligament injuries
PCL – 22 YO Offensive Lineman

Straight posterior instability
Normal Knee Exam: PCL Exam
Knee dislocation ACL/PCL/MCL tears
Skin only stabilizing medial side of the knee

Combined instabilities: AMRI, ALRI, Straight posterior
Medial meniscus
Acute Knee Dislocations

- Uncommon, but . . . May be underdiagnosed
- If knee opens up to varus/valgus stress testing in extension, assume a knee dislocation
- Direction of dislocation
  - Anterior: hyperextension mechanism
  - Posterior: direct blow anterior proximal tibia
Knee Dislocation

- Happens on fields – not often, but:
- Don’t miss
- Assess vascular status
  - Physical exam
  - Pulse ratios
  - MRI scan
  - Arteriogram
Knee Unstable in Extension...
Marcus Lattimore, running back, MOI: South Carolina vs. Tennessee
Football: Knee Dislocation
Knee Dislocations

- Most knee dislocations reduce spontaneously
- Refer to center with vascular surgeon
- Communicate with ER
  - Use your cell phone to call the ER
  - Put a note on the patient
  - Transfer to facility with angiography suite and vascular surgeon on call
- If high suspicion, do arteriogram
Knee Dislocation Algorithm

Vascular Injury

Arteriogram Gold Standard

Injury ranges from:
- Thrombus
- Tear:
  - Intimal
  - Partial
  - Complete

Late Vascular compromise from:
- Thrombus
- Propagation of Intimal Tear
History

- 16YO white male, high school football player
- Football game, valgus twisting blow to body injury
- Unable to keep playing
- Evaluated on sideline, seen in ER
- Seen in office 3 days later
Knee Instabilities

AMRI
Surgery: Arthroscopy
Surgery: MCL Repair
Gymnastics
Basketball
Basketball: non-contact, unexpected, not thinking
Antero-Lateral Rotatory Instabilities (ALRI)
Knee Instabilities

ALRI

1+ ALRI

ANTERIOR

MEDIAL

POSTERIOR

LATERAL

2+ ALRI

ANTERIOR

MEDIAL

POSTERIOR

LATERAL
EUA:
Correlate mechanism of injury, anatomy, surgical findings to study design in the lab
Pivot Shift
Lateral tibial plateau internally rotating, anteriorly subluxing at 30 to 0 degrees
Medial compartment: compressive forces posterior medial meniscus, typical tear pattern vertical, posterior
Injury Mechanisms – Body Positions

POSITION OF SAFETY

MUSCLE ACTIVITY
BACK
- Normal lordosis

BODY ALIGNMENT
- Flexed
- Neutral Abduction/Adduction
- Neutral Rotation

HIPS
- Flexors
- Adductors
- Gluteals
- Neutral Abduction/Adduction
- Neutral Rotation

KNEE
- Flexors
- Hamstrings

TIBIAL ROTATION
- PLANTAR FLEXORS

LANDING PATTERN
- Gastrocnemius
- Both Feet Control
- Balanced

POSITION OF NO RETURN

MUSCLE ACTIVITY
BACK
- Forward flexed
- Rotated opposite side

BODY ALIGNMENT
- Adduction
- Internal Rotation

HIPS
- Flexors
- Adductors
- Iliopsoas
- Internal Rotation

KNEE
- Less flexed
- Valgus

TIBIAL ROTATION
- Dorsi Flexors

LANDING PATTERN
- One foot
- Out of Control
- Unbalanced

POSTERIOR TIBIALIS
- Balanced

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ACL Injury occurred,
Foot fixed and externally rotated
Wide stance, 15° knee flexion,
20 ° valgus, tibia IR 10 °
ACL injury occurred
Foot fixed and externally rotated, knee 20°, tibia ER 10°, valgus 10°

Off-balance, in the air
Soccer
Knee Instabilities

PLRI
Knee Instabilities

PLRI
14 YO punter was crushed by defensive line
16 YO WM Football Athlete Struck from Lateral Side of Knee
Sideline Assessment of Injuries

To Make the Diagnosis:

Use observation of mechanism, physical exam skills, and talk to the athlete
The End               Thank You!

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