Musculoskeletal Pearls

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Objectives

• Describe key concepts in the evaluation and treatment of common upper extremity and lower extremity musculoskeletal injuries

• Discuss the importance of proper movement patterns in the prevention and treatment of musculoskeletal injury
Case #1: Shoulder pain

- 18 yo female varsity tennis player; gradual onset R shoulder pain without precipitating factor  Deltoid region pain, radiates to upper arm
- Increased with overhead activity, lying on R side
- Denies numbness or specific weakness
Shoulder: Rotator Cuff 
Tendinopathy/Tear 

History: Thrower, repetitive overhead, fall on outstretched hand (including backwards fall)

- Overhead, reach behind back pain
- Mid-deltoid, radiate to upper arm
- Painful arc: Usually 60 degrees to 120 degrees abduction and overhead motions (incl throwing)
- Night pain
Importance of scapular stabilization

Seal & Ball
Lateral Displacement of Scapula
The Kinetic/Kinematic Chain

The site of the pain may not always be the source of the problem…. The “fix” to the problem does not just involve the site of the pain
Importance of the Kinetic Chain

- Pitcher’s throwing arms are not “stronger” than non-throwing side (Sirota, Malanga, Laskowski, AJSM)
- In water polo, elite players throw with 50 percent of their velocity in water compared to land (Whiting, 1985)
- Only looking at the area of pain without looking at the biomechanics/movement of the task or action can contribute to perpetuation of symptoms, and may not “fix” the problem
What if axial motion of skeleton decreased or potential GRF reduced? (Toyoshima)

Normal overhead throw: 100% peak velocity

No forward stride: 84%

Lower body restricted: 63.5%

LB and trunk restricted: 53.1%
Treat the Kinetic Chain

- Technique/movement analysis
- Fix “weak links”
- Fix imbalances, asymmetries
- “Perfect practice” makes perfect
Management of Rotator Cuff Injuries

- Most tendinopathies, partial tears do well with non-operative management
- Emphasize balanced shoulder muscles
Clinical Pearls

- Pain with overhead activities, shoulder abduction, and sleeping on the involved side usually signifies rotator cuff involvement
- Remember the kinetic chain and proper movement
- The scapula is the foundation for the shoulder
- Injections are an adjunct, not the cure
Strength Training Pearl

90% of strength gains can be achieved with

1 set

12-repetition program

2 times/week
Flexibility Pearls

“Range of motion about a joint”

• Stretching increases muscle blood flow
• Enables more efficient movement
• Symmetry is key
• May be injury protective
• Genetic differences
• Stretch after exercise; consider dynamic movement prior
• Hold for 30 seconds
Don’t Forget the “Core!”

- Core is the platform from which LE force applied
- Core is also the acceptor of force from the legs and transmitter of force to the arms
Practical Assessment: Core Strength Screening

• Ability to hold plank
Core Strength Screening

• Ability to hold reverse plank position
Core stability
mayoclinic.org

• Fitness Healthy Lifestyle Center

• Stretching Slide Show

• Core Training

• Strength Training videos: body weight, free weights, tubing, machines
R knee pain

• 17 yo female soccer player
• 1 day pta: decelerated, stopped to cut, felt a “pop” in the knee; no contact
• Knee swelled; unable to return to play
• Pain with weight bearing; feels “tentative”
R knee pain:

ACL tear

• ACL injury: usually non-contact; deceleration, cut/pivot; “pop”; rapid swelling/hemarthrosis; unable to return to play; “feels unstable”

• Meniscal tear: flexion, compression, rotation mechanism; usually smaller effusion which develops more gradually; hx of lock or “unlock”
ACL tear
Non-Contact ACL Injuries

• Risk Factors
  • Environmental (external)
    • Weather, surface, footwear, braces
  • Anatomic
    • Q-angle, BMI, pronation, notch/ACL size, ACL material properties
  • Hormonal
    • Progesterone, estrogen
  • Gender
    • Female > Male
  • Genetic
  • Neuromuscular
    • Movement patterns, muscle activation patterns, fitness
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Non-Contact ACL Injuries

- Neuromuscular
  - Men tend to undergo a “neuromuscular spurt” that occurs at the time of their growth spurt, while women do not (Hewett et al. 2006, Yu et al. 2005)
Factors involved in LE injury: Lateral Pelvic Tilt at Midstance, Dynamic Valgus
Dynamic/Functional Knee Valgus
Hip Conditions related to Dynamic Medial Valgus

- Trochanteric bursitis
- Proximal ITB
- “Snapping” hip
- Hip Flexor strains
- Hip adductor strains
- Low abd strains
- ? “Sportsman’s hernia”
Knee Conditions Related to Dynamic Medial Knee Valgus

• Distal ITB friction syndrome
• Patellofemoral Pain
• ACL tears
Training the Lower Body

Abnormal

Normal
Functional Hip Abductor Strengthening
Functional movement training
Functional movement training
Running Gait Analysis: ? Adjust Technique
ACL Tear

**ACL Treatment goal:** prevent instability episodes and cartilage damage

- ACL reconstruction does not significantly modify the risk of later onset osteoarthritis
- Those willing to modify activity, have no functional instability, and comply with strength/stability program may do well with non-operative treatment
- ACL reconstruction: those desiring return to aggressive cut/pivot, jumping activity
Ankle pain

• 18 yo male basketball player, lands awkwardly from jump on L foot/ankle
• Thinks his foot rotated “outward”
• Has ankle swelling, difficulty weight bearing
Ankle pain, basketball

• Most ankle sprains lateral (85%); involve outside of ankle, ATF ligament

• “High ankle sprain”: anterior distal tibiofibular ligament; more common with eversion/medial sprains; can cause proximal fibula fracture and disruption of ankle mortise

• Morbidity of missing mortise disruption high: rapid onset OA
Normal ankle x-rays

“High ankle” sprain
Ankle pain

Treatment:

If mortise disruption: surgical referral

Uncomplicated inversion sprain:

- PRICE
- ROM, progressive strengthening
- Proprioceptive retraining is key: stability/balance exercises (Osborne, Laskowski)
- Ankle brace for return to play after sprain; may be prophylactic in high risk sports
Lower Extremity Stability Training
“Good balance is the ability to react to imbalance”
Clinical pearls

- Proprioceptive/stability training key to enhancing ankle stability and protecting against future sprains
Thank You!!