Evaluation and Treatment of Intra-articular Fractures

Benjamin Maxson, DO
Florida Orthopaedic Institute
Orthopaedic Trauma Service
Disclosures

• Nothing to disclose
Articular Fractures: Overview

• Require increased suspicion in evaluation
• Goal of management is to minimize damage the articular surface
• While bone tissue will repair, hyaline articular cartilage does not regenerate
• Initial insult is often responsible for sequela seen months and years later, but this is poorly understood
• Anatomic reconstruction with stable fixation is required for best possible outcome
Hyaline Cartilage: Basic Science Review
Hyaline Cartilage

• Avascular
• No innervation
• Diffusion from synovial fluid for nutrition and oxygen
  • High proportion of anaerobic metabolism
Hyaline Cartilage

- Cushion/Shock absorber

- Ultra-low friction surface, lubricated by synovial fluid
  - No synthetic material ever developed can replicate
Composition of Hyaline Cartilage

- Chondrocytes
  - The only cellular component, very small percentage of total volume
  - Highly metabolically active
  - Synthesize ECM
Composition of Hyaline Cartilage

- Extra-cellular matrix
  - Type II Collagen
  - Proteoglycans
  - HA
  - Glycosaminoglycans

- Water
  - 80% of in vivo weight of cartilage
Mechanisms of Articular Injury

• Axial Load

• Traction or Rotatory Force

• Combined Mechanism

• Crush injury
Mechanisms of Injury

• Highly variable

• High Energy
  • Motor vehicle accidents
  • Falls from height

• Low Energy
  • Ground level fall
  • Twisting injury with or without fall
Physical Exam Findings

• Joint Effusion

• Inability to bear weight

• Difficulty ranging the joint
Basic Guidelines for Advanced Imaging

• Obvious fracture, with deformity, or instability
  • Defer advanced imaging to orthopedic surgeon

• Unsure if there is a fracture
  • CT scan is useful

• MRI
  • Almost never indicated acutely
Basic Guidelines for Initial Management

• Immobilization

• Avoid weight bearing

• Ensure adequate imaging
  • With any long bone fracture, obtain imaging of the joint above and below
How Urgent is Surgical Evaluation?

• Articular fractures should be evaluated by an orthopedic surgeon within the first few days of injury

• Urgent Evaluation
  • Unstable fractures
  • Progressive swelling
  • Uncontrolled pain
Goals of Treatment, Articular Fractures

• Nonoperative Management
  • Maintain reduction

• Avoid weight bearing

• Allow motion, when possible

• Prevent displacement
Goals of Treatment, Articular Fractures

• Operative Management
  • Anatomic realignment of joint surface
  • Stable fixation to allow primary bone healing
  • Early motion of the joint to allow cartilage nutrition
Postoperative Management

• Encourage gentle range of motion

• Avoid weight bearing until fracture is healed

• PT/OT to guide recovery and appropriate motion, strengthening when healed
Expectations for Recovery

• Degree of joint damage and comminution plays a role

• Quality and stability of reconstruction plays a role

• Upper Extremity tends to do better than Lower Extremity

• Tibial Plateau tends to do well

• Pilon fractures tend to do poorly
Articular Fractures: Post Traumatic Arthritis

• Well documented but poorly understood mechanism of progressive joint damage

• Biomechanical and cellular mechanisms play role in degeneration, beyond the initial physical damage sustained

• Little research done, when compared to osteoarthritis and rheumatic arthritis
Summary

• Identifying the articular injury is the first step

• Stable anatomic reconstruction for displaced fractures

• Prevent displacement for stable non-displaced fractures treated nonoperatively

• Joint range of motion to promote synovial fluid nutrition to chondrocytes
THANK YOU

Questions?