**Patella Fractures- Treatment Options**

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**Disclosures**

NO DISCLOSURES FOR YOU

**Objectives**

- Discuss unique patella anatomy
- Discuss challenges in patella imaging
- Discuss patella fracture patterns
- Discuss treatment options for various patella fracture patterns

**Patellar Anatomy- The Reverse Mullet**

BUSINESS UP FRONT  
PARTY UP FRONT

PARTY IN THE BACK!!

BUSINESS IN THE BACK!
Patellar Anatomy

*Flat articular surface*
*Proximal beak*
*Round dorsal surface*

Patellar Imaging

Defining the Lateral and Accessory Views of the Patella: An Anatomic and Radiographic Study With Implications for Fracture Treatment

Patellar Imaging

- Flat articular surface
- Proximal beak
- Round dorsal surface
**Patellar Imaging**

**LATERAL FACET VIEW**
- Flat articular surface
- Proximal beak
- Round dorsal surface

**MEDIAL FACET VIEW**
- Pentagon
- Mild articular concavity
Patellar Imaging

This looks great!

Patellar Imaging

C-ARM

Patellar Imaging

I PITY THAT FOOL

Patella fractures – When to Fix?

Consensus
• Extensor mechanism disruption

Debatable
• > 2-3 mm articular step off
• > 1-4 mm displacement

Patella fractures – Challenges

• Subcutaneous
• Soft tissue injury
• Small
• Cancellous
• Articular topography
• Imaging difficult/confusing
Patella fractures – Treatment Options

1. Nonoperative
   - Cerclage wire
   - Tension band wire
   - Lag screws + tension band wire
   - Tension band plating
   - Lag screws
   - Lag screws + neutralization plating
   - Suture button

2. ORIF
   - Cerclage wire
   - Tension band wire
   - Lag screws + tension band wire
   - Tension band plating
   - Lag screws
   - Lag screws + neutralization plating
   - Suture button

3. Partial patellectomy

Patella fractures – Treatment Goals

- Restore extensor mechanism
- Reduce articular incongruity
- Facilitate early knee mobilization
- Respect soft tissues

Approaches

- Extensive medial parapatellar
- Anterior
- Direct reduction
- Devascularization
- Indirect reduction

Patellar Fracture Patterns

- Undisplaced
- Transverse
- Lower or upper pole
- Comminuted undisplaced
- Comminuted displaced
- Vertical
- Osteochondral

Nonoperative

Operative
Patellar Fracture Patterns

Mostly Nonoperative, but Variable

Patellar Fracture Patterns - Transverse

Tension band

Suture button

Lag screws + tension band

Lag screws + neutralization plating

Lag screws

Technical Points:
- Longitudinal K-wires close to articular surface
- Longitudinal K-wires bent and rotated to capture tension band wire, cut short to minimize irritation
- Tension band figure of 8 symmetric with knots tamped down, buried under quad tendon

Tension Band Wire Problems

Prominence

Failure

Migration

Patella Fractures - Tension Band Wire

Inexpensive

HW prominence

Requirement:
Cortical surface that can withstand compression

Patella Fractures - Tension Band Wire

Too long

Too far

Technical Points:
- Longitudinal K-wires close to articular surface
- Longitudinal K-wires bent and rotated to capture tension band wire, cut short to minimize irritation
- Tension band figure of 8 symmetric with knots tamped down, buried under quad tendon
**Patellar Fracture Patterns - Transverse**

- **Tension band**
- **Suture button**
- **Lag screws + tension band**
- **Lag screws + neutralization plating**

**Patella Fractures – Lag Screws + Tension Band Wire**

![Biomechanically superior]

- Longitudinal screws close to articular surface
- Screws antegrade vs retrograde - threads into larger/intact fragment
- Screws stop short of cortex - screw tip may cut wire, want to tension bone, not screw

**Technical Points**

+ More flexible
- More expensive

**Patella Fractures – Lag Screws + Cable & Crimp**

+ More flexible
- Stronger
- More expensive

**Patella Fractures – Lag Screws + FiberTape®**

+ More flexible
- Less prominent
- More expensive

**Patella Fractures – Tension Band Material**

**Patellar Fracture Patterns - Transverse**

- **Tension band**
- **Suture button**
- **Lag screws + tension band**
- **Lag screws + neutralization plating**

**FiberWire® is superior in strength to stainless steel wire for tension band fixation of transverse patellar fractures**

Fitch, Wright et al, J Orthop Res 2001; 19: 691-697. Department of Orthopaedic Surgery, University of North Carolina, Chapel Hill, NC. Department of Physiology, University of Florida, Gainesville, FL. Department of Biomechanical Engineering, College of Engineering, Florida Atlantic University, Boca Raton, FL. Department of Pathology, University of Virginia, Charlottesville, VA. Department of Orthopaedics, University of Virginia, Charlottesville, VA.
Patella Fractures – Isolated Lag Screws

- Literature scarce
- Wang et al.
  - Shorter operative time
  - Lower loss of fixation
  - Lower rates symptomatic HW
  - Lower rates second surgery

Patellar Fracture Patterns - Transverse

- Tension band
  - Transverse
  - Lag screws + tension band
    - Lag screws + neutralization plating

Patella Fractures – Lag Screws + Neutralization Plate

- Synthes X-Plate
  - *off label

Patella Fractures – Lag Screws + Neutralization Plate

- Titanium mesh plate
  - *off label
  - Easily contoured
  - Multiple holes
  - Low profile

Patellar Fracture Patterns - Transverse

- Tension band
  - Transverse
  - Lag screws + tension band
    - Lag screws + neutralization plating

- Lag screws
Patella Fractures – Suture Button

- No difference between TBW & Tightrope in fracture gapping and failure.
- Possible lower risk of implant migration and soft tissue irritation.

McDonough VuMedi: *Patella Fracture Fixation using Minimal Hardware (7/2013).

Patella Fractures – Patella Specific Implants

- Zimmer Cable-Ready Pin System

McDonough VuMedi: *Patella Fracture Fixation using Minimal Hardware (7/2013).

Patella Fractures – Patella Specific Implants

*not available in US

Complex Patellar Fracture Patterns

Comminuted displaced
Complex Patellar Fracture Patterns

Cerclage wire

Partial Patelllectomy

Typically for severe, “non-reconstructable” inferior pole fractures. Treat as patellar tendon repair—suture hole through remaining patella ANTERIOR attachment to prevent tilting. Can augment with cerclage cable.
Fix It or Discard It? A Retrospective Analysis of Functional Outcomes After Surgically Treated Patella Fractures Comparing ORIF With Partial Patellectomy
Nicolas S. Bonneig, MD, Chris Castrevec, MD, Michael T. Archdeacon, MD, MKE, Camille Connolly, MD, Nathan Monaco, MD, John B. Wyrick, MD, and Theodore T. Le, MD
(J Orthop Trauma 2015;29:80-84)

- Partial patellectomy was only used when anatomic reduction could not be achieved
- No statistical difference in ROM, functional outcomes, and complications

Complete Patellectomy

- Historical
- Avoid if possible
- Only in unsalvageable cases
- Low patient satisfaction (6-25%)
- Extensor strength reduced by 50%
- Average 18 degrees loss of motion

Conclusion

- Patella anatomy- Reverse Mullet
- Patella imaging- Lateral & Medial facet views
- Patella fracture patterns
- Various treatment options exist
- Goals:
  - Restore extensor mechanism
  - Restore articular congruity
  - Facilitate early knee mobilization
  - Respect soft tissues

Thank You