Treatment of Metacarpal Fractures

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Disclosures
- Consultant for Arthrex, Inc
- Speaker's Bureau Endo Pharmaceuticals

Introduction
- Majority of hand fractures are closed, simple, and stable
- Function follows form \to tolerance for some deformity
  - Minimal splinting + early mobilization
  - Closed reduction + immobilization
  - Closed reduction + pinning (CRPP)
**Surgical Indications**

- Failure to achieve closed reduction (irreducible)
- Failure to maintain closed reduction (unstable)
- Displaced intra-articular fractures
- Multiple unstable (comminuted) fractures
- Open fractures
- Segmental bone loss

**Metacarpal Fractures Classification**

- Fracture Pattern:
  - Transverse
  - Oblique
  - Spiral

- Fracture Locations:
  - Head
  - Neck
  - Shaft
  - Base

**Metacarpal Head Fracture**

- Rare
- Direct blow or axial load
- Often severely comminuted
- ORIF with goal of anatomic articual reduction
- Headless Screws
- Rarely MCP arthroplasty vs. fusion (Poorly tolerated)
Metacarpal Neck Fracture

- Boxer's Fracture: fighting
- Direct impact
- Axial loading
- Apex dorsal angulation
- Pull of flexors and interossei muscles

Acceptable Angulation:
- 2nd/3rd: <10-15°
- 4th: <30°
- 5th: <50-70°

Malunion:
- Digital pseudoclawing

Metacarpal Shaft

- Most shaft fractures treatment: Immobilization
- Intermetacarpal ligaments prevent shortening of more than 3-4 mm

Surgical Indications:
- Comminution
- Malrotation
- Shortening
- Angulation
**Metacarpal/Phalangeal Fractures**

- **Surgical Fixation:**
  - Closed reduction + cast immobilization in anatomical position x 4-6 weeks
  - Pins
  - Headless screws
  - Multiple small plate options
    - Including fracture specific plating

- 2.4/2.0 mm Plating for Metacarpals
  - 2.4/2.0 mm Plates
  - Multiple plate designs and lengths
  - Key: the plate is low profile and does not irritate tendon

- 2.4/2.0 mm Plating for Metacarpals
Headless Screws

Benefits
- Simple technique
- No hardware prominence
- Stable fixation for transverse fractures
- Can use 4.0mm for 5th metacarpal (50 mm)

Limitations
- Screw length limitations
- Not for long oblique fractures
- Cartilage defect

Retrospectively reviewed nine patients treated with retrograde intramedullary screw fixation of fifth metacarpal neck and shaft fractures between 2011 and 2013.

Outcomes:
- 0° extension and 90° flexion,
- DASH 47 → 0.7
- The mean postoperative grip strength was measured of the injured hand (40 kg) and un-injured hand (41 kg).
Technique

- Open versus Percutaneous
- Obtain reduction
- K-wire placed under fluoroscopic guidance
- Confirm reduction
- Open articular surface with drill
- My preference is to use a herbert style screw without any intrinsic compression
- Screw introduced across fracture site while maintaining rotation
- Fluoroscopic or visual confirmation the screw is sunk below articular surface

Keys to Operative Fixation of Metacarpal Fractures

- I prefer rigid internal fixation to relative fixation with pins and plaster
- I begin therapy ASAP (often within 48 hours)
- The patient is provided with a hand or forearm based splint for rest
- Active/Active Assist ROM is initiated with a supervised and home exercise program

<table>
<thead>
<tr>
<th>Patient</th>
<th>Age</th>
<th>Gender</th>
<th>Fracture</th>
<th>Fracture Line</th>
<th>Operative Fixation</th>
<th>Therapy Start</th>
<th>Followup</th>
<th>Notes</th>
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Note: This is a hypothetical table for demonstration purposes.
Use of Headless Screws:

- Intramedullary
- Stable
- Early motion well tolerated
- Limited surgical approach minimizes operative scarring

My current treatment of choice for axially stable fractures in skeletally mature patients.

Thank You!