IC 20: Proximal Interphalangeal Joint Fractures

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Session Handouts

Friday, September 06, 2019
Speaker has not provided a handout for this presentation
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Closed Techniques for Management of Proximal Interphalangeal Joint Fractures

Disclosures
• None

Outline
• Condylar fractures of the proximal phalanx
• Middle phalanx base fractures
  • Extension block pin
  • Dynamic external fixation
  • Transarticular pin
Proximal Phalanx Condyle Fractures

• Unicondylar vs. Bicondylar

• Operative management
  • Nonoperative management
    • High risk of displacement
      • 5/12 displaced, requiring surgery (Shawring et al, JHS E, 2013)
      • 5/7 displaced (Weiss et al, JHS 1993)

Condyle Fracture: Closed Techniques

• Percutaneous K-wire
• Percutaneous mini screw fixation

Condyle Fracture: Closed Techniques

• Advantage
  • No soft tissue dissection
    • AVN
• Disadvantage
  • Indirect reduction
  • Be prepared to open if necessary
  • If K-wires, risk of pin tract infection
Outcomes

- Final PIP AROM
  - 79+/5 degrees for CRPP
  - 77+/4 degrees for ORPP
- No difference in final AROM if ROM started within first 4 weeks
- High rate of displacement with single K-wire

Weiss, Hastings JHS 1993

Dorsal PIP fracture dislocation

- Unstable PIP dorsal fracture dislocations
- Recognition of residual subluxation is key

Calfee et al; JHS 2009

Extension block pinning

- Indications
  - Extension block splint not tolerated or does not fit (swelling)
  - Described for varying amounts of articular fracture involvement

- When I use it
  - Reduces in flexion (45° or less)
  - Fragments reapproximate volar lip
  - Limited central articular impaction
Extension block pinning

- Outcomes
  - Inoue et al
    - N=14
    - Mean articular involvement 38%
    - AROM 94°
  - Maalla et al
    - N=22
    - AROM 85°
  - Waris et al
    - N=10
    - Mean articular involvement 69%
    - AROM 97°
    - 29% with recurrent minimal subluxation
    - Virtual NDA
    - More pain

Adjunctive Techniques

- Percutaneous intramedullary reduction is described
- Impacted volar articular fragments reduced using IM K-wire

- Percutaneous fragment reduction with towel clip and volar Kirschner wire
- “Extremely gentle compression” for fragment reduction
- 0.028” K wires inserted from volar to dorsal around tine of towel clip
Dynamic External Fixation

- Many described techniques/commercial devices
- Useful for unstable comminuted dorsal PIP fracture dislocations and pilon fractures

Goals of Dynamic External Fixation

- Goals of dynamic ex-fix
  - Traction
    - Unload the joint
    - Ligamentotaxis
  - Joint reduction
  - Early motion
    - Prevent stiffness

External Fixators

- Considerations
  - Fixators are bulky
  - Interfere with adjacent digits
  - Can get caught on clothing/objects
  - Avoid if multiple digits
  - Pin tract infection
Outcomes

<table>
<thead>
<tr>
<th>Study</th>
<th>Method Type</th>
<th>Number of Patients</th>
<th>Length of Follow-up</th>
<th>Final PIP Angle</th>
</tr>
</thead>
<tbody>
<tr>
<td>Schneck 2004</td>
<td>Transarticular percutaneous pinning for dorsal</td>
<td>11</td>
<td>16 months</td>
<td>81°</td>
</tr>
<tr>
<td>Apgar 1997</td>
<td>fracture dislocations</td>
<td>10</td>
<td>21 months (6 and</td>
<td>80°</td>
</tr>
<tr>
<td>Hearn 1993</td>
<td>Multiple small case series</td>
<td>4</td>
<td>7 months (6, 9,</td>
<td>80°</td>
</tr>
<tr>
<td>Okuda 2002</td>
<td>Transarticular percutaneous pinning for dorsal</td>
<td>10</td>
<td>12 months (6 and</td>
<td>80°</td>
</tr>
<tr>
<td>Delee 2005</td>
<td>fracture dislocations</td>
<td>6</td>
<td>24 months</td>
<td>84°</td>
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<tr>
<td>Dru 2007</td>
<td>Transarticular percutaneous pinning for dorsal</td>
<td>14</td>
<td>6 months (9 and</td>
<td>85°</td>
</tr>
<tr>
<td>Kubat 2009</td>
<td>fracture dislocations</td>
<td>34</td>
<td>16 months</td>
<td>85°</td>
</tr>
</tbody>
</table>

Other

- Transarticular percutaneous pinning for dorsal fracture dislocations
  - Multiple small case series
  - Newington et al: 85° PIP TAM
  - Aladin et al: 75° PIP TAM
  - de Haast et al: A 10° PIP AROM
- Temporary bridge plate for pilon fx (Ozer JHS 2019)
References

Internal Fixation for Proximal Interphalangeal Joint Fractures

Lindley B. Wall-Stivers, MD MSc

Objectives
- General concepts
- Technical approaches:
  - Volar plate/lip fractures
  - Central slip fractures
  - Pilon fractures
- Outcomes

General Concepts
- Do not open if you do not have to!
- Avoid soft tissue striping
- Reduced joint
- Stable joint
- Congruent joint
- Early motion

Volar Lip Fractures
- Open treatment if failed closed treatment or CRPP
- Volar Approach
  - Brunner
  - Retract flexors
- Visualization difficult
  - Utilize fluoro for congruity
Volar Lip Fractures

- Fixation Technique
  - K-wire fixation: palmar to dorsal
  - Screw fixation
  - Palmar hook plate

Ikeda et al, Tech Hand & UE Surg 2011

Dietch et al JHD 1999

Volar Lip Fractures

- Avoid dorsal prominence
  - Risk injury to
- Early Early motion
- Edema control

Cheah et al JHS 2012
Literature

- Dorsal Fx/dislocations
  - Kiefhaber et al. JHS 2006– mini-screw fixation
    - 9 pts, ~3yr f/u
    - 7/9 no pain
    - 8/9 flexion contracture
  - Cheah et al. JHS 2012 – plate fixation
    - 13 pts, 2yr f/u
    - 11/13 satisfied
    - 39% complications

Central Slip Fractures

- Range
  - Small avulsion fractures
  - Large fracture fragment
  - Any size can cause instability

Central Slip Fractures

- Open Approach
  - Dorsal approach
- Central slip attached to dorsal fracture
- Fixation options:
  - Small fragment
    - Small suture anchor
    - Two small screws vs K-wires
  - Larger fragment
    - Two screws vs K-wires

Central Slip Fractures

- Assess Joint Congruity
  - Can excise lateral band and dorsal capsule for visualization.
- Do not strip collateral ligament
- Assess Joint Alignment
  - Ensure no subluxation
  - Subtle impaction
    - Elevate and strut with screw/K-wire
Central Slip Fractures

• Pin the joint
• Early motion if possible
• Counsel stiffness

Literature

• Volar Fx/dislocation
  – Imatami et al JHS Br 1997
    • Rec ORIF with K-wires for all
  – Rosenstadt et al. JHS 1998
    • 9 pts and 13 digits, 55mo f/u
    • 9 acute injuries –
      – 5/9 extensor lag, 4/9 poor results
    • Chronic tx open fixation
    • PIP motion 87% of normal
    • Rec CRPP with transarticular K-wire

• Meyer et al JHS 2017
  – 8pts, 43mo ave f/u
  – Open treatment in 7/8
  – PIP PROM 62° and AROM 54°
  – 4/8 poor outcome, 3 salvage procedures
    (amputation, 2 PIP arthrodesis)

• Doering et al Hand 2018
  – 5 patients, 8 mo ave f/u
  – ORIF with dorsal plate, 1.5mm
  – ROM “good”, 0.5 Quick DASH
Pilon fractures

- Loss of stability between joint surface and phalangeal shaft
- Often impaction
- Approach:
  - Typically dorsal approach, allows visualization of joint congruence

Internal fixation options
- When closed options fail
- Open reduction
  - K-wires/Ext fix
  - Plate fixation
  - Bridge plate fixation

Pilon Fractures

- Internal fixation options
- When closed options fail
- Open reduction
  - K-wires/Ext fix
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  - Bridge plate fixation

Pilon Fractures

- Plate Fixation
  - Small lateral plate +/- locking technology
  - Excise lateral band
- Necessary to have sufficient metaphyseal for fixation
- Optimal to establish fixation for Early motion
- ** Scaring and contracture are common

Pilon Plate fixation

- Small lateral plate +/- locking technology
- Excise lateral band
- Necessary to have sufficient metaphyseal for fixation
- Optimal to establish fixation for Early motion
- ** Scaring and contracture are common

Stern et al JHS 1991

Henry, Tech Hand & UE Surg 2017
Approach

• Bridge plating
  – Allows for maintaining joint congruity and bone healing
  – Can be applied to more than just volar plate
  – Necessitates removal and joint release and tenolysis

References

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