

Hand Fractures: Keeping it simple – Tips and Tricks
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- Hand Fractures
 - History
 - 3000 B.C. - Imhotep –
 - Ancient Egyptian describes reduction and immobilization of fractures
 - 160 A.D – Galen
 - Prolonged immobilization and frequent dressing changes
 - 10th century – Middle East – plaster based materials
 - 1904 – Lambotte
 - Described operative care of phalangeal fracture
 - Stabilized the proximal phalanx with *fixateur externe*
- Hand Fractures
 - The hand is resilient
 - Most fractures can be treated non-operatively
 - Bone injuries are forgiving
 - Soft tissues injuries are not
 - Surgery – more harm than good?
- Hand Fractures
 - Young men and elderly women
 - Young – sports and work related
 - Older patients – fall or MVC
 - Distal phalanx most common fracture in the hand
 - Young males – 5th metacarpal commonly fractured
- Diagnosis
 - Skin integrity
 - NVI
 - Angular/rotational deformity
 - May be subtle
 - Patient unable to make full fist
 - End on digital pulp and planar nail alignment versus opposite hand
- Hand Fractures
 - Stable fractures
 - Non-displaced or reduced fractures with stable configuration
 - Splint in “safe” or “functional” (intrinsic plus) position for 3-4 weeks
 - Unstable fractures
 - Excessive shortening
 - Angular deformity
 - Rotational malalignment

- Intraarticular step-off
 - If it looks unstable it probably is...
- Hand fractures
 - Non-operative
 - Stiffness, pressure sores
 - Intrinsic plus position
 - Do not immobilize more than 4 weeks
 - Radiographs lag behind clinical healing
- Distal phalanx – Problem fractures
 - **Seymour fracture**
 - **Dorsal epiphyseal avulsion**
 - **Apex dorsal angulation**
 - **Nail plate avulsion – reduce nail plate or repair nail bed**
 - **Sterile matrix may be trapped in fracture (adult) or physis (child)**
- Middle and Proximal Phalanx
 - Stable fractures – buddy tape and early motion
 - Unstable fractures
 - Displaced
 - Intra-articular fractures
 - Volar base injuries of middle phalanx
 - Longitudinal Bicondylar/unicondylar fx of head of proximal/middle phalanx
 - Comminuted
- Middle and Proximal phalanx
 - Middle Phalangeal Neck Fractures – Quick Tip
 - Middle Phalangeal neck fracture
- Proximal phalanx fractures
 - Transverse fractures
 - Pinning versus orif
 - Oblique fractures
 - Screws
 - 2-3 screws
 - Comminuted
 - ORIF vs. Pinning
- Proximal phalanx exposure
 - Mid-lateral or dorsal tendon splitting
 - Adhesions common
 - ? Less adhesions with mid-lateral
 - Early motion critical
- Lag Screw Fixation
 - Rule of 2's
- Proximal phalanx base fracture
 - Assume an apex volar angulation
 - Malunion may lead to pseudo claw position

- Hyperextension at fracture site
- Extensor lag at IP joints
- Adherence of the flexor tendons
- Unhappy patients!
- Adhesions with plates
- Transarticular pinning
 - 50 fractures
 - Transarticular versus extraarticular pinning
 - 50% flexion loss > 20 degrees
 - 1/3 flexion contracture >15 at PIP
 - More transarticular had secondary procedures
 - Outcomes equal
- PIP fracture dislocation
 - Common injury
 - Goals: Joint stability and concentric reduction
 - Risks: Recurrent instability, arthritis, stiffness, pain
 - Stability – size/degree of comminution of middle phalangeal volar base fragment
- PIP fracture dislocation
 - **Stability**
 - **<30% stable**
 - **30-50% tenuous**
 - **>50% unstable**
 - **V Sign**
- PIP fracture dislocation
 - **Surgery - No procedure is superior**
 - **Dorsal block pinning**
 - **Volar plate arthroplasty**
 - **Hemi-hamate arthroplasty**
 - **Percutaneous pinning**
 - **ORIF**
 - **ORIF is preferred**
 - **If simple**
 - **Easy to fix with screws**
 - **Early motion can be achieved**
- Outcomes
 - Stiffness, post-traumatic oa
- Shotgun approach
- PIP fracture dislocation
 - ORIF
 - Cerclage wire
 - External fixator
 - Ruland, JHS 2008
 - Dynamic traction device
 - K wires block the middle phalanx from subluxing dorsally

- Tips and Tricks
 - Unicondylar/Bicondylar fractures
 - Unstable
 - ORIF versus CRPP?
 - Unicondylar/Bicondylar fractures
 - Excellent reduction and alignment of joint surface
 - Patient had severe tendon adhesions
 - Underwent tenolysis but never regained DIP motion
 - Percutaneous pinning avoids soft tissue injury and adhesions
- Tips and Tricks
 - Osteochondral shearing fracture
 - Simple tension band technique
- Metacarpal fractures
 - Alignment
 - One degree at MC – 5 degrees at finger tip (1.5cm digital overlap w/ closed fist)
 - 6 mm shortening tolerated before ext lag or weakness
 - Angulation tolerated well at neck
 - Metacarpal neck – among the most common
 - “Boxer’s fracture” – 5th metacarpal
 - Most mobile metacarpal – compensates for malunion
 - Malunion
 - **40 degrees (some authors accept up to 70 degrees)**
- Boxer’s fracture
 - **No difference in outcome**
 - Immobilization of MP in flex/neutral
 - Cast for four weeks vs bracing/buddy taping
 - Percutaneous pinning vs cr and casting
 - Reduction and casting – angulation recurs
 - Consider surgery when adjacent metacarpal also fractured
- Metacarpal fractures
 - Shaft fx – less angulation tolerated
 - Index/long – 0 degrees; Ring – 20; Little – 30
 - Operative tx for open, excessive bone loss, mal-rotation or adjacent mc fx
 - Rotational malalignment is the least well tolerated of all displacements
 - MC fx
 - K-wires, lag screws, plates and screws, tension band, intramedullary devices, headless screws, ex fix
 - Locking vs Non-locking plates
- Metacarpal fractures
 - IM fixation – Best for fractures in the mid-diaphysis, transverse and non-comminuted
 - Implant designed with proximal locking pin

- Must be removed
- Headless screw fixation
 - 39 patients
 - MC Neck 26
 - MC Shaft 13
 - Active motion by 1 week
 - Full motion in all
 - Union by 6 weeks
- Metacarpal head fracture
 - Headless screws
- Tips and Tricks
 - Malunion
 - **Unicondylar malunion**
 - **Osteotomy through original fracture site technically demanding**
 - **Risk of osteonecrosis of small fragment**
 - **Risk of joint contracture**
 - **Extraarticular osteotomy**
 - **Larger surface area for healing**
 - **Fixation less technically demanding**
 - **Shortening is minimal - no extensor lag!**
- Complications
 - Loss of motion
 - Most common
 - Malunion
 - Malrotation, angulation, shortening
 - Nonunion
 - Uncommon
- Conclusions
 - Respect the soft tissues
 - Balance the need for rigid fixation and early mobilization
 - Percutaneous K-wire & Intramedullary fixation
 - May avoid stiffness/adhesions associated with plates/screws
 - Tension band constructs
 - Helpful in small marginal fractures
 - Plates and screws
 - Comminuted fractures
 - Minimize soft tissue dissection and beware of adhesions
 - Intra-articular malunion
 - Consider extra-articular osteotomy