Conservative Treatment of Common Hand Injuries

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MOTA Annual Conference
Saturday, November 5, 2011

Objectives

1. Review the evidence supporting early active motion following hand fractures.
2. Understand conservative treatment options for metacarpal fractures, phalangeal fractures, mallet finger, acute central slip, and thumb UCL injuries.
3. Identify splinting options for various diagnoses.
Conservative Treatment by Diagnoses:

- Metacarpal Fracture
- P1 Fracture
- P2 Fracture
- P3 Fracture
- Bony/Tendinous Mallet
- Boutonniere (Acute Central Slip)
- Thumb UCL Sprain

Considerations for Treatment

- Fracture location and stability
- Extent of soft tissue injury
- Patient’s functional needs for return to work, sports, music, hobbies
Hand Therapists’ Top Questions

- What needs to be immobilized for proper fracture/soft tissue healing?
- How long is immobilization necessary?
- How soon can we start moving?

Effects of Immobilization

- Biochemical changes: Reduction in H2O content and GAGs (glucosaminoglycans) which act as a lubricant between collagen fibers
- Decreased space and lubrication among collagen fibers = altered mechanics:
  - increased collagen synthesis
  - cross-link formation

Effects of Immobilization

- When *normal* tissue is immobilized:
  - Changes in length and structure occur within a week
  - Additional collagen fibers are formed within 3 days
  - Collagen laid down in disorganized pattern
  - Connective tissues gradually contract resulting in restricted motion

- Minimal repetitive use is necessary to maintain normal viscoelasticity of connective tissue

Evidence for Early Mobilization

- Review of literature for treatment after metacarpal and phalanx fractures: Feehan and Bassett
- Goal: Determine whether early motion of joints adjacent to the fracture affects fracture healing and functional outcomes compared to people treated with only immobilization
- *Early motion* defined as motion started < 21 days from injury

Evidence for Early Mobilization

- Conclusion: Lack of scientifically valid clinical evidence to either support or refute
- Suggests that early motion has the potential to:
  - Result in earlier recovery of mobility and strength
  - Facilitate an earlier return to work
  - Not affect fracture alignment

Metacarpal Fracture

- Typical Treatment
  - Forearm-based intrinsic plus ulnar/radial gutter splint, IPs free
  - Immobilize involved digit and adjacent digit
Metacarpal Fracture

• Splint variations include:

- IPs included
- Hand-based or dorsal blocking
- Metacarpal fracture brace/cuff

Metacarpal Fracture

• Current Literature: Cochrane Review
  • Conservative treatment for closed 5th MC neck fractures
  • Reviewed 5 studies, determined they were all of “poor quality”
  • Types of treatment included: splint, functional brace, compression bandage, or no external support
  • Conclusion: No single conservative method can be recommended as superior to another. Recovery is generally excellent regardless of treatment chosen

Metacarpal Fracture

- Current Literature: Van Aaken et al
  - 25 patients with boxer's fracture treated with coban wrap around metacarpals II-V and buddy strapping ring and small fingers for 3 weeks while allowing immediate ROM
  - Inclusion criteria: extra-articular closed fractures with no rotation and volar angulation between 30-75 degrees
  - Results: patients were satisfied, pain-free and had symmetrical ROM and grip strength


P1 Fracture

- Typical Treatment
  - Hand-based splint including IP joints, safe or intrinsic plus position

Presentation by Erin Mack and Erin Hanrahan, TRIA Orthopaedic Center, for the 2011 MOTA Annual Conference.
P1 Fracture

- Current Literature: Rajesh et al
  - Suggest a hand-based splint, IP joints free, MCP joints flexed to 90 degrees
  - ROM begins immediately within splint
  - Splint worn 3-4 weeks
  - Rationale: soft tissues stabilize fracture site


P1 Fracture

- Current Literature: Figl et al
  - Suggest a forearm-based cast, IP joints free, MCP joints flexed to 70-90 degrees
  - Finger stalls of injured finger to adjacent finger
  - ROM begins immediately within cast
  - Cast worn 4 weeks

P1 Fracture

- Current Literature: Freeland et al
  - Identify the most common complication after P1 fracture is a PIP extensor lag
  - Two causes: soft tissue adhesions or skeletal deformity; soft tissue adhesions can be mitigated by early motion
  - Range of treatment depending on type of fracture includes: radial/ulnar gutter with IP joints included, hand-based splint with IP joints free, or buddy straps


P1 Fracture

- Dynamic Treatment Approaches
P2 Fracture

• Typical Treatment
  • Finger-based splint with DIP and PIP at 0 degrees

P2 Fracture

• Current Literature: Cannon
  • Stable incomplete or non-displaced oblique and spiral fractures
    • Early motion with buddy straps for 3 weeks
  • P2 shaft fractures requiring closed reduction
    • Hand-based intrinsic plus splint 3-4 weeks
    • AROM at 3-4 weeks

P2 Fracture

- Current Literature: Blazar and Steinberg
  - Small/stable volar plate avulsion fracture
    - Splint PIP at 20 degrees for no more than 7 days
    - Early AROM with buddy straps for several weeks
  - Unstable volar plate avulsion fracture
    - PIP extension block splint
    - Early active flexion in splint


- Current Literature: Gaine et al
  - Stable volar plate avulsion fractures treated with immediate mobilization
  - No splint or buddy straps
  - 98% had excellent to good results

P3 Fracture

- Typical Treatment / Current Literature: Cannon
  - Tuft fracture
    - Tip protector splint 5-7 days, then as needed for comfort
    - AROM of DIP within the first week


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P3 Fracture

- Typical Treatment / Current Literature: Cannon
  - Proximal P3 Fracture
    - DIP joint immobilization splint 3 weeks
    - AROM of DIP at 3 weeks
    - PROM at 4-6 weeks if needed

Bony/Tendinous Mallet

• Typical Treatment
  • Immobilize DIP in slight hyperextension, PIP free for 6 weeks
  • Continuous casting to increase patient compliance
  • Importance of patient education

Bony/Tendinous Mallet

• Begin AROM to DIP at 6 weeks
  • Transition patient to removable thermoplastic splint
  • Discontinue splint at 8-10 weeks or per MD instructions
Bony/Tendinous Mallet

- Current Literature: Stern and Kastrup
  - Compared splinting vs. surgical treatment
  - No significant difference in extensor lag between groups
  - More flexion in splinting group
  - Greater chance of long-term complications in surgical group
- Conclusion: Recommend splinting for mallet finger


Boutonniere (Acute Central Slip)

- Typical Treatment
  - Immobilize PIP at 0 degrees, DIP free for 6 weeks
    - Continuous casting to increase patient compliance
    - Importance of patient education
Boutonniere (Acute Central Slip)

- Begin AROM to PIP at 6 weeks
- Transition patient to removable thermoplastic splint
- Discontinue splint at 8-10 weeks or per MD instructions

Boutonniere (Acute Central Slip)

- Current Literature: Combs
  - Extension splint with PIP at 0 degrees, DIP free
  - Length of immobilization depends on severity of injury
    - Complete rupture splinted 6 weeks
    - Grade I strain splinted 7-10 days
    - Buddy straps 24 hours per day until full motion regained

Boutonniere (Acute Central Slip)

- Current Literature: Blazar and Steinberg
  - Stable non-displaced P2 dorsal lip fracture
  - Extension splint with PIP at 0 degrees, DIP free for 6-8 weeks
  - Gentle AROM of PIP at 3-4 weeks


Thumb UCL Sprain

- Typical Treatment / Current Literature:
  - Non-operative treatment reserved for partial UCL tears
  - Immobilization in hand-based thumb spica splint IP free or short arm thumb spica cast IP free
  - AROM begins after 4-6 weeks immobilization

Thumb UCL Sprain

- Current Literature: Pichora et al
  - Treatment with hand-based thumb spica splint IP free, 6 weeks minimum
  - Immediate AROM out of splint
  - 91% had normal or satisfactory outcome


Conclusion

- There are benefits to early motion.
- Hand therapists’ top questions:
  - What needs to be immobilized for proper fracture/soft tissue healing?
  - How long is immobilization necessary?
  - How soon can we start moving?
- If we have these questions answered, we can better educate the patient and promote earlier return to function.
References