

ELBOW FRACTURES AND SIMPLE DISLOCATIONS NON-OPERATIVE GUIDELINES

The following guidelines for stable elbow fractures and simple dislocations were developed by HSS Rehabilitation and are intended to assist the clinician in structuring an appropriate criteria-based and individualized treatment plan. While based on current evidence as well as clinical pearls from experienced clinicians, they are not meant to be a substitute for clinical reasoning and decision making. These guidelines do not include treatment for complex elbow fracture-dislocations which require a specific varus-protection program (see reference: Wolff AL, Hotchkiss RN, 2006).

Due to the architecture of the joint and the high level of bony congruency, the elbow, which is normally quite stable, is prone to stiffness after sustaining trauma such as fracture or dislocation. In addition, stiffness can occur concomitantly in the presence of instability. A thorough understanding of the anatomy is crucial to achieving optimal outcomes. Communication with the referring physician is also critical to knowing exactly which structures are involved and which motions are safe. A simple dislocation or stable fracture can be progressed more quickly than a more complex dislocation or unstable fracture that has required surgery. Sound clinical reasoning is crucial in determining when to recognize excessive stiffness and when to progress patients to the next level of treatment.

Several factors can contribute to joint stiffness including: lack of joint reduction due to ligamentous insufficiency or fracture, muscle guarding and co-contraction, nerve entrapment (the ulnar nerve is particularly vulnerable to injury with elbow trauma), thickening/scarring of soft tissue, and heterotopic ossification. Evidence has shown that early protected motion yields the best patient outcomes.

Elbow diagnoses leading to stiffness include:

- Elbow dislocation
- Radial head/radial neck fracture
- Supracondylar/distal humerus fracture
- Olecranon fracture
- Monteggia fracture
- Loose body excision

Red flags to watch for and which require referral back to the physician include:

- Increase in ulnar nerve symptoms including paresthesias, intrinsic muscle atrophy and medial elbow pain
- Sudden decrease in elbow range of motion (ROM) in either direction
- In the post-operative patient: appearance of hematoma or seroma; any signs of infection, e.g., increased redness, warmth and increased drainage from incision or wound

FOLLOW PHYSICIAN'S MODIFICATIONS AS PRESCRIBED

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Phase 1: Protection (Weeks 0-2)

PRECAUTIONS

- Protect in thermoplastic removable orthosis (or sling if instructed by MD)
 - To be worn at all times or to be removed for hygiene and/or light exercises as permitted by MD
- No passive range of motion (PROM) of elbow and forearm
- Observe non-weight bearing status of involved upper extremity (UE)
- Wound precautions if post-operative or compound fracture

SPECIAL CONSIDERATIONS

- Length of protective phase varies depending on injury severity and stability; follow MD recommendations for required immobilization time and earliest initiation of controlled motion
- Stable elbow fractures, e.g. non- or minimally displaced radial head fractures, and simple elbow dislocations:
 - MD may clear for elbow motion within 1-3 days to minimize risk of stiffness
 - May not require splint immobilization- MD may order sling only
- Elbow fractures managed with open reduction and internal fixation (ORIF), e.g. olecranon, distal humerus, and complex radial head fractures; radial head replacements:
 - May be immobilized up to 1-2 weeks to decrease inflammation and pain prior to initiation of ROM
- Elbow fractures healing by secondary intention:
 - May be splinted 3-6 weeks to allow fracture consolidation

ASSESSMENT

- Assess fit of orthosis as edema fluctuates, watch for pressure areas
- Functional status
 - Observation and interview
 - Pre-injury level of function
 - Interference of injury in activities of daily living/instrumental activities of daily living (ADL/IADL), work, leisure
 - Patient goals
- Quick Disabilities of the Arm, Shoulder and Hand Score (QuickDASH)
- Numeric Pain Rating Scale (NPRS)

- Edema
 - Observation
 - Circumferential measurements
 - Proximal/distal elbow creases
 - Wrist, hand, digits
- Assessment of surgical incision if applicable
- Neurovascular
 - Screen for presence of distal paresthesias with particular attention to ulnar nerve
 - Assess color, pallor, temperature of elbow and distal UE
- Measure active range of motion (AROM) elbow and forearm in stable ranges if permitted by MD
- Screen AROM proximal/distal segments of affected UE
 - Screen for guarding and postural compensatory movement patterns

TREATMENT RECOMMENDATIONS

- Orthotic fabrication
 - Posterior elbow orthosis most commonly in 90° elbow flexion, neutral forearm rotation, wrist included for comfort (photo below)
 - Olecranon fractures may require immobilization in greater extension to minimize pull on triceps insertion



Posterior Elbow Orthosis

- Patient education
 - Nature of the condition and expectations for course of treatment
 - Protective orthosis wearing schedule and care
 - Management of pain, edema, and scar site
 - Activity modifications
 - Movement strategies for performing ADL/IADL while observing precautions
 - Light hand use
 - Home exercise program (HEP) for hand, wrist, shoulder, and elbow if permitted

- Edema management
 - Compression
 - Elevation
 - Kinesiology taping
 - Ice
- Wound care if applicable
- AROM of shoulder, wrist, and digits
- Gentle AROM of elbow/forearm within stable ranges if permitted

CRITERIA FOR ADVANCEMENT

- Sufficient stability to allow elbow/forearm active assisted range of motion (AAROM) and PROM when appropriate or cleared by MD
- If excessively stiff may need to progress sooner- communication with MD is crucial

EMPHASIZE

- Protect healing structures
- Control edema and pain
- Promote stability

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Phase 2: Mobilization (Weeks 3-8)

PRECAUTIONS

- Continue elbow orthosis for protection as needed until discontinued by MD
- Avoid sharp increase in pain during exercises
- Observe weightbearing status and lifting limitations per MD instructions

SPECIAL CONSIDERATIONS

- Phase 2 may start earlier for stable fractures and simple dislocations with MD clearance
- Distal humeral and olecranon fractures: MD may initially limit active elbow extension and passive elbow flexion to protect triceps repair or olecranon osteotomy
- Unless ulnar nerve transposition was performed, use caution to avoid irritating nerve with overly prolonged elbow flexion

ASSESSMENT

- Functional status: observation and interview
- QuickDASH
- NPRS
- Edema: observation and measurements
- Scar
 - Mobility
 - Sensation/hypersensitivity
 - Hypertrophy
- Neurovascular symptoms: screen for ulnar nerve symptoms, vague medial elbow pain
- ROM
 - Measure AROM/PROM elbow and forearm
 - Screen ROM proximal/distal UE, with attention to shoulder and posture
- Qualities of elbow stiffness
 - Muscle length: muscle tightness/shortening
 - Muscle inhibition, co-contraction
 - Articular end feel
 - Painful hardware
- Assess for need for progressive orthosis to increase ROM
 - Rarely initiated before 6 weeks post injury
 - Requires MD approval

TREATMENT RECOMMENDATIONS

- Patient education
 - Protective or progressive orthosis: wearing schedule and care of orthosis
 - Pain management: heat, ice
 - Management of stiffness
 - Use of affected arm in light ADL/IADL
 - Progress HEP
- Edema management
 - Compression garments
 - Manual edema mobilization
 - Kinesiology taping
 - Thermal modalities (heat, ice)
- Scar management
 - Massage
 - Silicone scar pad
 - Desensitization
 - Kinesiology tape for adherent scars
- Soft tissue mobilization to all musculature around elbow: flexors and extensors of elbow, wrist and forearm
 - Triceps adherence and posterior capsule thickening can prevent elbow flexion
 - Anterior capsule and elbow musculature can prevent elbow extension
- AROM/AAROM elbow, forearm, shoulder, wrist, digits
 - Minimize compensatory strategies
- PROM elbow and forearm
 - Use of moist heat to increase tissue extensibility (consider positioning at end range)
 - Watch for guarding/co-contraction and sharp increase in pain
 - Low load prolonged positioning
 - Gentle muscle energy techniques
- Therapeutic exercises and activities to promote functional elbow ROM
- PNF techniques, e.g. contract-relax
- Increase joint proprioception with gentle isometrics
- Joint mobilizations when cleared by MD, e.g., ulnohumeral joint, proximal radioulnar joint, radiohumeral joint
- Reduce co-contraction (most common in biceps brachii)
 - Breathing techniques
 - Biofeedback device
- Orthoses
 - Protective orthosis
 - Usually wean at week 6- consult with MD

- Static progressive orthoses
 - Initiate when sufficient tissue healing has occurred to withstand prolonged forces required to increase motion and cleared by MD
 - Worn intermittently throughout day and/or at night
 - Apply prolonged low load vs. strong force
 - Patient may adjust splint as tolerated to increase motion as tissue relaxes
 - Designs and recommended wearing schedules:
 - Flexion: 30-45 minutes at a time, 3-5x daily to avoid irritation of ulnar nerve
 - Custom: Come along flexion orthosis (photo below), flexion cuff



- Prefabricated options
- Extension: up to 8 hours at a time while sleeping to achieve low-load prolonged stretch
 - Custom: turnbuckle extension (left photo), serial static extension (right photo)



Turnbuckle Extension Orthosis



Serial Static Extension Orthosis

- Prefabricated options

- Supination/pronation: 30-45 minutes at a time, 3-5x daily
 - Custom/prefabricated options



Sugartong Supination Orthosis

CRITERIA FOR ADVANCEMENT

- Bony/soft tissue sufficient for participation in unrestricted activity per MD

EMPHASIZE

- Enhance function
- Increase ROM
- Limit stiffness

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Phase 3: Strengthening (Weeks 9-12)

PRECAUTIONS

- Avoid using forceful stretching or other high loads to address stiffness

CONSIDERATIONS

- May use supportive garments during sports/activities as desired
- Static progressive splints may be required for up to 1 year to maximize motion- educate patient on orthosis program

ASSESSMENT

- Functional status: observation and interview
- QuickDASH
- NPRS
- Scar quality
- Measure AROM/PROM of elbow and forearm
- Screen proximal and distal ROM, with attention to postural adaptations and compensatory movement patterns
- Quality of elbow stiffness
 - Muscle length: muscle tightness/shortening
 - Muscle inhibition: co-contraction, guarding
 - Articular end feel
 - Painful hardware
- Persistent neurovascular symptoms: assess sensation and watch for signs of muscle atrophy, especially in ulnar nerve distribution
- Strength testing: MMT, dynamometer grip testing
- Assess for need to initiate progressive orthosis program to increase end-range motion or continued benefits of existing orthosis if initiated in phase 2
 - Fit
 - Frequency of use

TREATMENT RECOMMENDATIONS

- Continue AROM/AAROM/PROM and stretching of affected joints
- Continue manual therapy techniques to achieve increase in ROM
- Continue use of static progressive orthoses up to 1 year to maximize ROM
 - Patient may require additional visits to adjust extension and flexion orthoses to accommodate ROM progress or signs of wear
- Postural reeducation as needed
- Progressive resistive exercises
 - Isolate triceps to increase extension
 - Strengthen biceps, brachialis, brachioradialis to increase flexion
 - Proximal/distal UE strengthening
- Endurance exercises, e.g., UE ergometry
- Weightbearing activities
- Work conditioning

CRITERIA FOR DISCHARGE

- Elbow and forearm AROM maximized and within functional limits
- Functional performance uninterrupted by elbow ROM
- Sufficient strength for return to previous activities
- Independent in HEP and use of progressive orthoses to manage stiffness
- Recommend for surgical consultation if:
 - Stiffness persists for 6 months despite therapy and use of static progressive orthosis
 - Functional performance continues to be significantly interrupted by ROM limitations

EMPHASIZE

- Maximize function and return to fitness and sport
- Increase strength and endurance
- Limit stiffness and maximize ROM

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