Rehabilitation of Proximal Humerus & Clavicular Fractures

19th Annual Primary Care Orthopaedic & Sports Medicine Symposium
January 25, 2019

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No financial disclosures to note.
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- **PT**
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Objectives

- Identify evidence-based exercise programs for patients with humerus or clavicular fractures to increase ADL independence.

- Develop progressions of exercises for return of upper extremity functional independence.

- Identify benefits of evidence-based exercise to improve functional outcomes following upper extremity fracture.
Functional Limitations seen Following Upper Extremity Fractures

- Limited shoulder AROM for ADLs:
  - Overhead and behind the back
- Weakness for lifting, carrying, push/pull
- Difficulty sleeping in bed
- Limitations with household activities
- Compensatory movement patterns
Proximal Humerus Fractures

- 6% of fractures
- MOI: usually Trauma
  - Fall directly on shoulder
  - Forceful collision
  - Car accident
- Osteoporosis factor
- Female > Male
- Displaced vs. Non-displaced
Humerus Fracture Symptoms

- Pain
- Swelling
- Bruising
- Severe shoulder motion restriction
- Numbness/Tingling in arm, forearm, or hand
- Deformity
Post-operative vs. Non-operative Treatment

- Sling for 6 weeks
  - Elbow and wrist ROM immediately after injury

- Koval et al. – Improved outcomes if Physical Therapy initiated within 14 days of injury
  - Decreased rates of stiffness and improved ability to perform ADLs

- Pendulum exercises at 3 weeks

- Active ROM at 6 weeks

- Full ROM and strength restrictions lifted after full healing seen on films.
Interventions for Proximal Humerus Fractures

- Range of Motion:
  - Pendulums
  - Pulleys
  - Cane Exercises
  - Wall slides
  - Table slides
Interventions for Proximal Humerus Fractures

- Strengthening Exercise: started once fracture union is seen
  - Deltoid and Rotator Cuff Isometrics
  - Scapular stabilization exercises
    - Scapular retraction, low trap setting, rhythmic stabilization, rows
  - Active exercises starting supine and then moving to seated/standing
  - Active Resistive = Deltoid and RTC as AROM improves
- Daily Home Exercise Program
Interventions for Proximal Humerus Fractures

- Manual Therapy: to improve functional movement
  - Shoulder mobilizations – when indicated
    - Glenohumeral and scapular
  - Soft tissue mobilizations
  - Scar mobilizations for post-operative
  - PROM
  - Dry needling of trigger points
Interventions for Proximal Humerus Fractures

- Functional Training:
  - Reaching into an overhead cupboard
  - Push/pull a cart to mimic household chores
  - Functional lifting from different heights
  - Opening/closing door
  - Transfers
  - Return to work activities
  - Compensatory techniques if needed
Interventions for Proximal Humerus Fractures

- When to return to Daily Activity:
  - Diagnostic testing reveals closure of fracture and physician approves full return
  - Can be 6 months to full year for full return
    - Expect some limitations
  - Ease into activity to avoid overuse and remember to ice if needed
Outcomes following Proximal Humerus Fracture

- Most patients have functional pain-free shoulder
  - May take up to 2 years for full recovery
  - Rapid improvements within first 6 months, near full recovery in 1 year

- Counsel patient there will be some strength and motion deficits
Patient Screening

- Check for:
  - Falls Risk Reduction Strategies
  - For Contact Sports => proper protective equipment
  - Low Bone Density
    - Possible supplementation of Calcium and Vitamin D
Rehabilitation and Interventions for Clavicular Fractures

- Clavicle Fracture
  - 35% of all shoulder injuries
  - Most common cause = trauma
    - Direct blow or fall
  - Most often diagnosed = <20 y.o.
    - Sports injuries
  - Age increases = result of fall
  - Midshaft = 75-80% of clavicle fractures
Clavicular Fractures

- **Signs and Symptoms:**
  - Pain over injury site
  - Arm pain or changes in sensation in severe cases
  - Bruising
  - Swelling
  - Inability to lift arm
  - Grinding sensation with movement
  - Bump or step-off at injury site
Rehabilitation and Interventions for Clavicular Fractures

- Sling
- 6-8 weeks
- Figure 8 Brace
Rehabilitation and Interventions for Clavicular Fractures

- Early Range of Motion Exercises:
  - Distal extremity motion
  - Pendulums
  - Cane exercises
  - Table slides
  - Early intervention
    - Prevent weakness and stiffness
    - After 4 weeks if physician sees good position and stability, Physical Therapist will guide to achieve full shoulder ROM
Rehabilitation and Interventions for Clavicular Fracture

- When to start strenuous exercise:
  - Both non-operative and operative usually begins around 6-8 weeks after injury/surgery
  - Appropriate healing needed
  - Age, health, complexity of injury/surgery factors
- Active ROM progression
- Strengthening exercise
  - Work on shoulder complex as a whole for good stabilization
  - Scapular stabilizers, RTC, biceps, rhythmic stabilization
Rehabilitation and Interventions for Clavicular Fractures

Strengthening Exercise:
- Phase I (0-6 weeks): isometric exercises at neutral, elbow/forearm exercises, scapular retraction
- Phase II (7-12 weeks): theraband ER/IR, Row, side lying ER, prone Y/T/I, standing scaption, isotonic biceps curl
- Phase III (13-18 weeks): standing forward flexion, rhythmic stabilization and proprioceptive training drills, push up progression, add progressive resistance 1-5#, limited weight training near week 13
- Phase IV – closed kinetic chain exercises, plyometrics for throwing and overhead athletes, interval sport programs, return to weight training based on physician’s advice.
Rehabilitation and Interventions for Clavicular Fractures

- **When to Return to Daily Activity:**
  - Nonstrenuous activity after about 6 weeks
  - Strenuous job duties = 9-12 weeks

- **Return to Sport:**
  - Non-operative 9-11 weeks following trauma (Faldini et al)
  - Operative:
    - ~12 weeks gradual return to activity
    - ~16-18 weeks – full sports based on healing and physician approval
    - Functional Testing
Seated Medicine Ball Test (*Harris et al*)

- Sit on the floor with back against the wall, legs extended and apart for balance
- Bring ball to chest and throw while keeping the back against the wall
- Best of 3 trials
- Males use 6 lb. ball, Females 4 lb. ball
Upper Limb Functional Testing

- **Seated Medicine Ball Toss**

<table>
<thead>
<tr>
<th>Rating</th>
<th>Distance (meters)</th>
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<tbody>
<tr>
<td>Excellent</td>
<td>5.76+</td>
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<tr>
<td>Good</td>
<td>5.00-5.75</td>
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<tr>
<td>Average</td>
<td>4.25-4.99</td>
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<tr>
<td>Below Average</td>
<td>3.50-4.24</td>
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<tr>
<td>Poor</td>
<td>0-3.49</td>
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</table>

- Highly reliable test of upper body power in older adults
Single Arm Seated Shot Put Test (*Negrete et al.*)

- Seated in a chair without armrests
- Feet and legs placed on chair in front
- Nonthrowing arm placed across the chest and a strap placed across the chest to secure the subject to the chair
- 6 lb. medicine ball
- 4 warm up puts and then 3 trials
- At least 90% symmetry in distance side to side
Upper Limb Functional Testing

- **Timed Push Up Test** (*Negrete et al*)
  - Widely used in lots of settings to test upper body strength
  - Significant reliability
    - 90% confidence in minimal detectable change represents true improvement (2 reps)
  - How many you can do in 1 minute
    - Male: > 18 reps, Female: > 12 reps
    - Also can do to exhaustion
      - Male: >39, Female: >27
  - Safe, inexpensive, repeatable, practical
Upper Limb Functional Testing

- **Modified Pull-up Test** *(Ervin et al)*
  - Used in schools age 5-15
  - Test of strength focused on the back, shoulder, forearm, and arm strength
  - Complete as many as possible until break form or pause for more than 2 seconds
  - Adjustable bar positioned to allow participant to grab bar with back flat on surface. Strap hangs down 8 inches and chest has to touch strap.
## Upper Limb Functional Testing

### Modified Pull-Up Test

<table>
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<th>Girls</th>
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<tbody>
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<td>5-6 ≥ 2</td>
<td>5-6 ≥ 2</td>
</tr>
<tr>
<td>7 ≥ 3</td>
<td></td>
</tr>
<tr>
<td>8 ≥ 4</td>
<td>7 ≥ 3</td>
</tr>
<tr>
<td>9-10 ≥ 5</td>
<td></td>
</tr>
<tr>
<td>11 ≥ 6</td>
<td>8-15 &gt; 4</td>
</tr>
<tr>
<td>12 ≥ 7</td>
<td></td>
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<tr>
<td>13 ≥ 8</td>
<td></td>
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<tr>
<td>14 ≥ 9</td>
<td></td>
</tr>
<tr>
<td>15 ≥ 10</td>
<td></td>
</tr>
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</table>
**Upper Limb Functional Testing**

- **Upper Quarter Y Balance Test** *(Gorman, Westrick, Butler)*
  - Weight bearing on the contralateral limb
  - Test medial reach, inferolateral reach, superolateral reach
    - Start with right and do in that order, repeat on left
    - Best of 3 trails, allowed 1 practice trail
  - Reach as far as possible without loss of balance
  - Challenges balance, proprioception, strength and ROM
  - Normalize reach distance
    - Measure arm length from C7 to the most distal tip of the right middle finger
  - Must have good form
    - Cannot touch down with reach hand, fall off platform, shoved the sliding platform, used sliding platform for support, failed to come back to starting position, and lifted feet off floor
Upper Limb Functional Testing

- **Upper Quarter Y Balance Test**
  - Reliable test for measuring UE reach in a closed chain position\(^1\)
  - No difference in baseball and softball players
  - No difference in throwing and non-throwing in un-injured athletes
  - Not a good measure of strength
Closed Kinetic Chain Upper Extremity Stability Test

(Tucci, Roush, Butler)

- Push up position, or modified push up position
- Hands 36 inches apart
- Count how many times one hand can touch the other hand in 15 secs
  - Hand must come back to the starting position each time
  - 3 trials with rest up to 45 secs between sets
Closed Kinetic Chain Upper Extremity Stability Test

- Improvement of 3-4 touches is considered significant
- Reliable tool for healthy, subacromial impingement, and different levels of physical activity
- Collegiate-level baseball players no differences existed in scores by position
- Clinically relevant for use in upper extremity function
Effect of Exercise

- Bruder et al. - Exercise reduces impairment and improves activity in people after upper limb fractures
- Early commencement of exercise beneficial for conservatively managed proximal humerus fractures
- Supervised exercise and home exercise program leads to reduction in impairment, particularly ROM.


