The Effectiveness of Joint Mobilization for Shoulder Pain

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Faculty Disclosure

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Why This Topic?

- Do we know which maneuvers are best for reducing pain and/or gaining motion?
- Is there evidence that supports or refutes clinical perceptions of joint mobilizations?

What Do We Know From the Literature?

- Joint mobilizations decrease pain
  - Ho et al Man Ther 2009
  - Moon et al J Phys Ther Sci 2015
  - Desjardins-Charbonneau et al J Orthop Sports Phys Ther 2015
- High grade mobilizations better than low grade for improving motion
  - Vermeulen et al Phys Ther 2006
  - Ho et al Man Ther 2009
  - Muraki et al J Orthop Sports Phys Ther 2014
- Joint mobilizations may need to supplement other interventions
  - Should not serve as stand alone treatment
    - Bergman et al Ann Inter Med 2004
    - Harshbarger et al J Sport Rehabil 2012
    - Tsertsvadze et al J Manipulative Physiol Ther 2014
    - Desjardins-Charbonneau et al J Orthop Sports Phys Ther 2015

Controversy

- Manual therapy alone vs. manual therapy plus exercise
  - Both reduce pain but one not better than another
    - Ho et al Man Ther 2009
    - Desjardins-Charbonneau et al J Orthop Sports Phys Ther 2015
- Exercise alone vs. manual therapy plus exercise
  - Benefit inconclusive
    - Brudvig et al J Orthop Sports Phys Ther 2011
    - Gebremarium et al Br J Sports Med 2014

Adhesive Capsulitis

- Vermeulen et al Phys Ther 2006
  - High grade mobilization better than low grade for improving AROM and PROM
  - No difference on pain relief
- Moon et al J Phys Ther Sci 2015
  - Mobilization techniques (oscillation vs. traction) decrease pain and improve motion, but one not better than another
- Johnson et al J Orthop Sports Phys Ther 2007
  - No difference for pain and disability between anterior and posterior mobs
  - Posterior mobilization improved ER better

Adhesive Capsulitis

Improved ER motion 31° **Improved ER motion 3°**

From: Johnson et al J Orthop Sports Phys Ther 2007

Impingement/General Pain

- Bergman et al Ann Inter Med 2004
  - Joint mobilization as supplement to other treatment for general shoulder pain
- Ho et al Man Ther 2009
  - No clear evidence to suggest additional benefits of manual therapy over other interventions
- Brudvig et al J Orthop Sports Phys Ther 2011
  - No clear evidence that exercise plus mobilization better than exercise alone or vice versa

Rotator Cuff Tendinopathy

- Green et al Cochrane Reviews 2003
  - Favorable but inconclusive evidence supporting joint mobilization for rotator cuff pain
- Desjardins-Charbonneau et al J Orthop Sports Phys Ther 2015
  - Manual therapy can decrease pain but not function

What Don't We Know From the Literature?

- Not all conditions examined
- Not all grades of mobilization have been examined individually
  - Most studies permitted grades I-IV simultaneously
  - Traction grades not often reported

Post-Operative Care

- Review of 3 databases revealed no empirical investigations that examined the effectiveness of joint mobilization for the shoulder following surgery
- In other words **NO EVIDENCE!!!!**
- **BUT….**
  - **Clinical experience suggests we continue to use them**

Which Maneuvers Have Literature Support?

- Most maneuvers involved A/P glides and inferior glides
- Mobilization with movement has not been thoroughly examined but is advocated
  - 15% increase in motion immediately after treatment
  - 20% decrease in pain
  - **Unknown how long effects last beyond 24 hours**
    - Teys et al Man Ther 2008

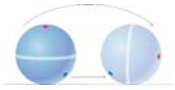
Using the Literature and Experience:

The Practical Aspects of Shoulder Joint Mobilization

Key Concepts

Physiologic Motion	Accessory Motion
• Osteokinematics o Motion from muscle activity or gravity • Voluntary motion • Examples o Flexion o Extension o Abduction	• Arthrokinematics o Motion between 2 articulating surfaces • Involuntary but necessary motion • Examples o Joint play o Scapular rotation o Clavicular motion o Patellar motion

Joint Play



Roll
Multi-Point Contact
(abduction/adduction)

Glide/Slide
Single Point Contact
(anterior/posterior)

Spin
Axis Rotaton
(flexion/extension)

Compression

Distraction

Images from Houglum, Human Kinetics 2016

Joint Play Key Points

- Since there is never pure congruency between joint surfaces; all motions require rolling and gliding to occur simultaneously
- This combination of roll and glide is simultaneous but not necessarily in proportion to one another

Joint Play

- The more congruent = the more the gliding

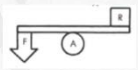
- The more incongruent = the more the rolling

Convex-Concave Patterns

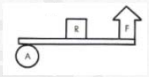
- Basis for determining the direction of the mobilizing force when joint mobilization gliding techniques are used to increase a certain joint motion
  - Convex bone
    - If the moving joint surface is **CONVEX** and the stationary surface is CONCAVE, the arthrokinematic motion (joint) moves in the **OPPOSITE** direction as the osteokinematic motion (bone).
  - Concave bone
    - If the moving joint surface is **CONCAVE** and the stationary surface is CONVEX, the arthrokinematic motion (joint) moves in the **SAME** direction as the osteokinematic motion (bone).

Similar to Law of Levers

- Convex rule
  - First class lever
  - Push down on humeral head so humeral shaft can abduct



- Concave rule
  - Second class lever
  - Push up on scapula so humeral shaft can abduct
    - Schomacher Man Ther 2008



Shoulder Abduction Example

- Convex (A)
  - If scapula is stable, humeral head moves downward as shaft moves upward
    - Joint motion ↓
    - Bone motion ↑

Shoulder Abduction Example

- Concave (B)
  - If humerus is stable, scapula and glenoid move upward
    - Joint motion ↑
    - Bone motion ↑

Joint Position

- Close Packed
  - Max contact of joint surfaces
  - Least amount of joint play

- Loose Packed
  - Least contact of joint surfaces
  - Most amount of joint play

Mobilization should occur in this position

Treatment Plane

- The treatment plane falls perpendicular to or at a right angle to a line running from the axis of rotation in the convex surface to the center of the concave articular surface
  - Thus the treatment plane lies within the concave surface

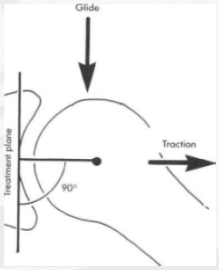
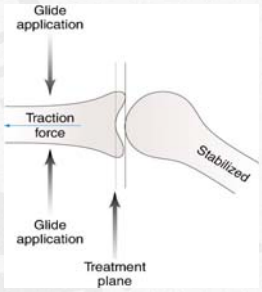


Image from Prentice, McGraw-Hill 2004

Understanding the Treatment Plane

- Plane moves if concave bone is mobilized
  - Remains fixed if convex bone is mobilized
- Mobilizations are parallel to plane
- Tractions are perpendicular to plane



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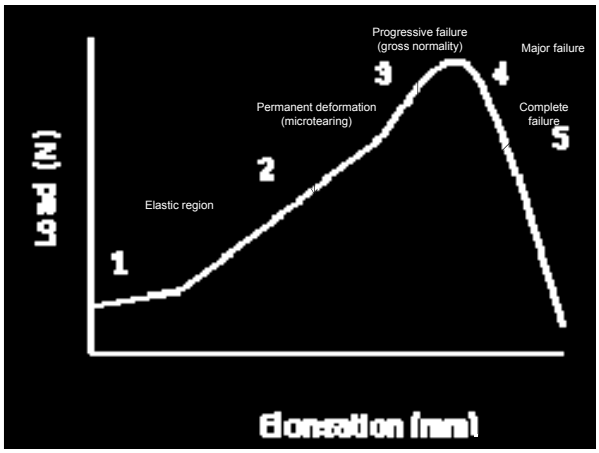

2 Techniques

- Maitland
  - 5 grades of oscillatory mobilizations
- Kaltenborn
  - 3 grades of traction

Maitland Grades of Mobilization

- Grade I
  - small amplitude at the beginning of motion
- Grade II
  - large amplitude in the midrange of motion

For Pain

- Grade III
  - large amplitude up to the pathological limit
- Grade IV
  - small amplitude at the end range of motion
- Grade V
  - small amplitude at end range of motion (manipulation)

For Motion

What Does the Evidence Say?

- 1 article
  - 1 clinician can reliably perform 3 different grades of inferior mobilization
    - ICCs
      - Grade I: 0.68
      - Grade II: 0.89
      - Grade III: 0.90
        - Witt and Talbott Man Ther 2016

Kaltenborn Grades of Traction

- Grade I
  - Small distraction with no stress on capsule
  - Use for pain relief
- Grade II
  - Enough distraction to "tighten" tissue around joint
    - Taking up the slack
  - Use to maintain joint play when ROM not allowed
- Grade III
  - Enough distraction to stretch capsule and surrounding tissue
  - Use to increase joint play

Maitland vs. Kaltenborn

- Both techniques reduce pain and increase motion but one not better than another
  - This was in adhesive capsulitis patients
    - Moon et al J Phys Ther Sci 2015
- No difference between grade 2 and grade 3 traction on increasing joint space width
  - More spacing with grade 3 but not statistically significant
    - Moon et al J Phys Ther Sci 2016

Let's Practice

Before You Begin

- Must determine if pain needs to be reduced, motion needs to increase, or a combination of both needs to occur
- In other words, your evaluation is key

Start Here

- Generalized laxity assessment
  - 5 maneuvers to assess joint laxity
    - Thumb parallel to ventral aspect of forearm
    - Fingers parallel to dorsal aspect of forearm
    - ≥10° of elbow hyperextension
    - ≥10° of knee hyperextension
    - ≥40° dorsiflexion
  - Any 3 of 5 maneuvers present = generalized joint laxity
    - Carter and Wilkerson J Bone Joint Surg (Br) 1964

Motion Assessment

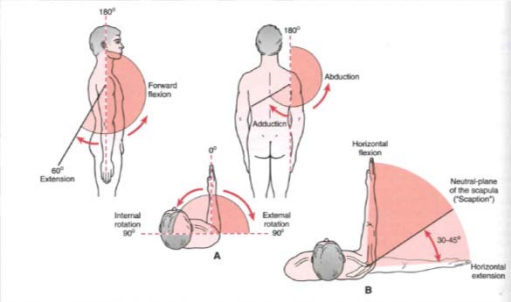

Image from Magee, Saunders 2008

Contraindications

- Bacterial infection
- Recent fracture
- Joint hypermobility
- Neurological involvement
- Bone disease
- Inflammatory arthritis

If Joint Mobilizations are Indicated

- Relax the patient
- Clinician must be relaxed
- Be aware of the patient's pain
- Consider direction, amplitude, and velocity of movement
- One movement is performed at a time
- Always reassess
  - Compare motion to opposite side

Cyriax End Feels

Normal End Feel	Example	Abnormal End Feel
Capsular	**All shoulder motions at end range**	Capsular at abnormal point in motion
Bone-to-Bone	**End range abduction**	Bone-to-Bone at abnormal point in motion
Tissue Approximation	**Horizontal adduction**	Springy block: **Internal derangement**
		Spasm: **Muscle guarding**
		Empty: **Premature cessation of motion due to pain**

Cyriax J. *Textbook of Orthopaedic Medicine, Volume One: Diagnosis of Soft Tissue Lesions*, 8th ed. London: Bailliere Tindall, 1982

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Kaltenborn End Feels

Normal End Feel	Cyriax Equivalent	Abnormal End Feel	Possible Cause
Soft	**Soft tissue approximation**	Firm	**Scar tissue/ adhesions**
Firm	**Capsular**	Soft	**Increased muscle tone**
Hard	**Bone-to-bone**	Empty	**Premature cessation of motion due to pain**

Kaltenborn et al. *Manual Mobilization of the Joints: The Kaltenborn Method of Joint Examination and Treatment: The Extremities.* Minneapolis, OPTP, 1999

What Does the Literature Say?

- 1 article
  - Abnormal end feels are associated with more pain
  - Cyriax end feel names may not truly represent the tissue causing the issue
  - Kaltenborn more broad but still based on anatomy
    - Both are subjective so **DO NOT** over-interpret the presentation
      - Petersen and Hayes J Orthop Sports Phys Ther 2000

Technique

- Patient position
  - Supine, prone, side-lying, sitting, standing
- Limb position
  - Depends on direction and location of restriction
- Stabilizing hand
- Mobilizing hand

Shoulder Abduction

- Patient position
- Limb position
- Stabilizing hand
- Mobilizing hand

- Supine
- Neutral
- Distal humerus
- Humeral head

Inferior Glide

Inferior Glide MWM

Inferior Glide MWM

Inferior Glide Self Mobilization

Incorrect

Correct

Posterior Glide

Anterior Inferior Glide MWM

Lateral Glide

THANK YOU