Thoracic mobilization and manipulation for the treatment of shoulder pain

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Objectives

• Discuss current evidence for cervical, thoracic spine and rib mobilization and manipulation for shoulder pain.

• Engage with presenters as they introduce and demonstrate selected cervical, thoracic and rib manipulation and mobilization techniques.

• Explain Manual Therapy techniques for cervical, thoracic spine and ribs using Current Evidence.

• Upon return to clinical practice, improve management of shoulder pain through the use of cervical, thoracic spine and rib techniques.
Introduction

Cervical, Thoracic Spine and Rib mobilization and manipulation techniques can be included with management for a client with shoulder impingement syndrome.
Systematic Review


- Reviewed 14 RCTs, all performed shoulder MT, and 2 used cervical, thoracic and rib mobilization and manipulation.
- As a whole, conflicting results for patients with SIS, however studies were not of homogenous groups or treatments.
- “Based on findings of our review, clinicians should consider incorporating soft tissue and joint mobilization techniques in addition to therapeutic exercises for patients with SIS, based on an individual assessment”
Manual Therapy Approach vs. Injection


Manual Therapy Approach

One-year outcome of subacromial corticosteroid injection compared to manual physical therapy for the management of unilateral shoulder impingement syndrome: a pragmatic randomized clinical trial

- Glenohumeral Joint (GR I-II): 100%
- Glenohumeral Joint (GR III-IV): 7%
- Acromioclavicular Joint: 7%
- Cervical Spine Mobilization: 15%
- Cervical Spine Thrust Manipulation: 85%
- Thoracic Spine Mobilization: 57%
- Thoracic Spine Thrust Manipulation: 96%
- Scapulo-Thoracic Joint: 9%
Short term effects of isolated thoracic HVLA


• One group pre-test/post-test study
• 56 patients with SIS treated with only thoracic spine manipulation
• Outcomes collected at baseline and 48 hours post treatment
  • NPRS (Neer, Hawkins, empty can, resisted ER, resisted IR, resisted abd)
  • Shoulder Pain and Disability index (SPADI)
  • Global Rating of Change Scale
• Changes were statistically significant but not clinically significant

Boyles et. al. 2009 Manual Therapy
Short term effects

Intervention techniques

• Seated mid-thoracic thrust manipulation
• Seated cervicothoracic thrust manipulation
• Supine rib opening manipulation (provided if rib tenderness noted)
Short term effects

Results
• All outcome measures were statistically significant
• 1/3 of subjects had clinically significant changes in NPRS

How do we identify the 1/3?

Boyles et. al. 2009 Manual Therapy
Subgroup of responders to thoracic OMT


• Prospective single-arm trial
• Standardized examination and treatment
  • 1 non-thrust cervical technique and 5 thoracic thrust techniques
  • 2 ROM exercises for cervical the thoracic spine
• Successful outcome based on GROC score of +4 to +7
• 61% of patients experienced a successful outcome
  • 63% of those were achieved after one visit, other 37% after two visits

Mitken et. al. 2010 Physical Therapy
Subgroup of responders to thoracic OMT

**Prognostic Variables**
1. Pain free shoulder flexion $< 127^\circ$
2. Shoulder internal rotation of $< 53^\circ$
3. Negative Neer test
4. Not taking medications for shoulder pain
5. Symptoms duration of $< 90$ days

Mitken et. al. 2010 Physical Therapy
Conclusions – 3 big questions

1. Can the prediction rule be validated in separate population?
2. What is the basis of the changes observed?
   • Biomechanical?
   • Neurophysiological?
3. Does it Matter?
1. Validity of the thoracic OMT rule

• The Mintekn et al. clinical prediction rule for SIS responding to Thoracic Manipulation has not yet been validated by RCT.

• Internal Validity; Single arm Trial.
• External Validity; References demonstrate reductions of pain, improved function and greater patient satisfaction when OMPT directed at the shoulder and cervicothoracic spine is included with care. (list references)
2. Basis of changes observed?

Muth S, Barbe MF, et. al. The effects of thoracic spine manipulation in subjects with signs of rotator cuff tendinopathy. JOSPT. 2012; 42(12):1005-1016

• Controlled EMG laboratory study
• 30 subjects with signs of RCT, high level overhead athletes not seeking treatment
• Same manipulation as Boyles et. al. 2009
• No changes in range of motion or scapular kinematics
• No changes in muscle activation except small middle trap change
• Positive changes in Pain, force production, and function
2. Basis of changes observed?

Haik MN, Alburquerque-Sendin F, et. al. Scapular kindmatics pre- and post-thoracic thrust manipulation in individuals with and without shoulder impingement symptoms: a randomized controlled study. JOSPT. 2104; 44(7): 475-487.

• Randomized controlled clinical trial
• Seated mid thoracic manipulation and sham manipulation
• Shoulder pain decreased in both groups
• No clinically significant change in scapular kinematics
2. Basis of changes observed?


• Randomized controlled clinical trial
• Seated mid thoracic manipulation and sham manipulation
• Shoulder pain decreased both groups 1.2 points; 95% CI: 0.3, 1.8; P<.001
• Penn shoulder score improved 9.1 points; 95% CI: 6.5, 11.7; P<.001
• No clinically significant changes in scapular kinematics or thoracic excursion in either group
2. What is the basis of changes?

• NOT – changes in scapular kinematics
• NOT – changes in shoulder muscle activity

• Pain and Function more likely improved through neurophysiological mechanisms
• Mechanical Stimulus initiates a neurophysiologic effect. Bialosky 2009 Peripheral, Spinal and Supraspinal
2. What is the basis of changes? - Peripheral

- Inflammatory mediators affect healing
- Peripheral nociceptors directly affect pain processing
- Reduction of blood and serum cytokine
- Beta-endorphin, anandamide, N-palmityolethanolamide, serotonin, endogenous cannabinoids
2. What is the basis of changes? - Spinal

• Bombard spinal cord with sensory input from muscle proprioceptors
• Inhibition of dorsal horn following MT
• Hypoalgesia
• Afferent discharge
• Motorneuron pool activity
• Changes in muscle activity
2. What is the basis of changes? - Supraspinal

Pain experience anatomy;
- Anterior cingular cortex
- Amygdala
- Periaqueductal gray
- Rostral ventromedial medulla
- Ascending pathways stimulate periaqueductal gray matter of mid brain, which inhibits ascending pain pathways via interneurons.
2. What is the basis of changes? - Psychological

- Placebo
- Expectation
- Psychosocial factors
3. Does it matter?


• Found no significant difference in scapular kinematics between subjects with/without SIS

• Similar improvements of pain and function were observed following thoracic manipulation or sham intervention.
Contraindications to Thrust Manipulation

- Vertebral Malignancy
- Local infection, severe inflammation, osteoporosis, aneurysm
- Myelopathy
- Multiple adjacent radiculopathies
- Cauda Equina Syndrome
- Vertebral bone disease
- Bony Joint Instability
- Cervical Rheumatoid Disease

- Vertebral Fractures
- Systemic Anticoagulation
- Severe Diabetes or Atherosclerotic Disease
- Vertebral Basilar Artery Disease
- Active Spondyloarthropathies
- Ligamentous Joint Instability
- Congenital Joint Laxity
- Local Osteoporosis, Osteomalacia
- Acute Disc Herniation
Precautions to Thrust Manipulation

- Unhealed fracture
- Excessive pain or irritability
- Hypermobility
- Joint arthroplasty
- Pregnancy of 1st Trimester
- Spondylolisthesis
- Muscle Guarding
- Anticoagulants
Shoulder impingement versus Intra-articular


• Combine with impingement and apprehension signs.
• Highly accurate in differentiating intraarticular pathology (positive predictive value 88%, negative predictive value 96%, sensitivity 88%, specificity 96%, and accuracy 94.5%).
Neck Pain, Radiculopathy

• Manipulation in the presence of multilevel radiculopathy is discouraged.

• Clinical predication rule for cervical radiculopathy; Spurling, Distraction, ULTT, less than 60 cervical rotation to involved side. All 4 variables present, + IR 30.3 Wainner et al. 2003

• Cervical Radiculopathy likely to respond to PT interventions; Age < 54, dominant arm not affected, looking down does not aggragate symptoms, multi-modal treatment > 50% visits (OMPT, traction, DNF, strengthening). 3 variables + LR 5.2 (95% CI 2.4, 11.3) 4 variables + LR 8.3 (95% CI 1.9, 63.9) Cleland 2007

• Pain radiates to beyond elbow
Guidelines for CT Manipulation and Mobilization for Shoulder pain

• Who; Patients with Shoulder Pain
• When; Early in plan of care
• How; Average number of treatment sessions was 11. Ho et al.
Cerviothoracic Manipulation and Mobilization Techniques suggested for Shoulder Impingement

- Seated Cerviothoracic Manipulation and Mobilization
- Seated Thoracic Manipulation
- Seated Thoracic Distraction with Alligator Grip
- Supine Thoracic Manipulation with flexion and extension bias
- Supine Cervical Mobilization and Manipulation, Translation, Rotation, Upglide and Downglide
- Scapulothoracic Manipulation
- Prone Cervical Posterior to Anterior Glide
- Prone Cerviothoracic Manipulation
- Prone Thoracic Manipulation
Seated Cerviothoracic Manipulation and Mobilization

Seated Mid-thoracic Manipulation

• Patient seated with arms folded across chest, hands on shoulders
• PT places towel roll and chest at lower level of targeted segment
• PT wraps arms around patient and grasps elbows interlocking fingers
• Induce thoracic flexion by leaning patient back into PT, add compression by scooping elbows and distract thoracic spine through elevation of scapulas
• Thrust is provided as HVLAT distraction through legs, flexion through arms, and PA shift through chest

• VIDEO/Sketch HERE

https://www.dropbox.com/sh/3inezldxopvryca/AADOvSg7TvipoemHyOYzwYva?dl=0
Seated Thoracic Manipulation

Seated Cervicothoracic Mobilization

• Patient seated on edge of chair with arms crossed and resting on forehead
• PT threads arms around patient’s head to make finger contact at C7-T1
• Patient sits tall, exhales, and performs slight chin tuck as he leans forward into PTs chest side
• PT is able to perform mobilizations with movement of extension and rotation by provided PT. Provide sufficient PA glide through DIPs.

https://www.dropbox.com/sh/3inezldxopvryca/AADOvSg7TvipoeqmHyYzwYva?dl=0
Seated Thoracic Distraction, Alligator Grip

• Similar setup to seated thoracic manipulation
• Lace operators hand between crossed arms of patient.
Supine Thoracic Manipulation, Flexion Bias

- Cross patients arms
- Fulcrum hand medial to transverse process of inferior vertebra
- Localize segment through flexion
- May also side bend or rotate towards operator
- HVLA in and AP motion

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Supine Upper Thoracic Extension Bias

- Patients arms cross
- Localize fulcrum
- Patient performs bridge
- AP thrust directed towards fulcrum

• VIDEO/Sketch HERE
  https://www.dropbox.com/sh/3inezldxopvryca/AADOvSg7TvpoeqmHyOYzwYva?dl=0
Supine Cervical Manipulation, Upglide

- Cradle occiput with one hand
- Engage lateral side glide with other
- Both induce side flexion, flex down to segment
- Add opposite rotation to engage barrier
- HVLA up towards the opposite eye socket with slight/rapid rotation

• VIDEO/Sketch HERE
Supine Cervical Manipulation, Downglide

- Cradle occiput with one hand
- Engage lateral side glide with other
- Both induce side flexion
- Add a small amount of opposite rotation to engage barrier
- HVLA downwards towards the opposite shoulder with slight/rapid side bending

• VIDEO/Sketch HERE
Supine Cervical Manipulation Translation

• Mid to Lower segments
• Contact articular pillars
• Flex head and neck up to segment
• Lateral side flexion glide to first barrier
• Apply gentle lateral thrust

• VIDEO/Sketch HERE
Supine Cervical Manipulation Rotational

• For mid to lower segments
• Left MCP on articular pillar of C5
• Gently glide into left rotation, skin lock
• Rotate left cervical spine 40-50 without sidebending
• Right sidebend to barrir
• Apply gentle thrust into left rotation

• VIDEO/Sketch HERE
  https://www.dropbox.com/sh/3inezldxopvryca/AADOvSg7TvpoemHYywYva?dl=0
Scapulothoracic Mobilization and Manipulation

- Patient position in sidely
- Circular motion in sagittal plane
- Manipulative thrust increases posterior tipping of scapula

• VIDEO/Sketch HERE
Prone Cervical CPA, UPA

• Subject positioned prone
• Use digits of both hands to scoop soft tissues up
• Use thumbs to perform CPA or UPA
• For CPA; pressure to spinous process
• For UPA; pressure to articular pillars
Prone Cerviothoracic Manipulation

• Prone
• Elevate arm, and rotate towards it.
• Slight sidebend away from elevated arm
• Ensure upper cervical flexion, lower cervical extension
• Contact points; C7-T3 and Zygomatic Arch
• HVLA on C7-T3 towards shoulder, stabilizing and rotating the head and neck
Prone Thoracic Manipulation Extension Bias

- Right pisiform to right transverse process
- Left pisiform to left transverse process
- Rotate hands caudally to engage skin lock and barrier
- HVLA PA thrust

https://www.dropbox.com/sh/3inezldxopvryca/AADOvSg7TvipoegmHyOYzwYva?dl=0
References


- Ho CYC, Sole G, Munn J. The effectiveness of manual therapy in the management of musculoskeletal disorders of the shoulder: A systematic review Published Online: May 22, 2009


- Video images: Patrick Cook Sketched Images: Brent Perdrizet
THE END
Outline

I. Evidence for cervical, thoracic spine, rib mobilization and manipulation for patients with SIS

II. Thoracic Manipulation and SIS, RCTs and CPR

III. Discussion of Thoracic Manipulation for SIS, Validity, Mechanisms of Action, Clinical Relevance

IV. Selected Techniques