

The Use of Nonthrust Manipulation in an Adolescent for the Treatment of Thoracic Pain and Rib Dysfunction: A Case Report

Jason L. Kelley, Susan L. Whitney

Amy Bramble, Student Physical Therapist
Sara Halliday, Student Physical Therapist
Kayla Klope, Student Physical Therapist
Ashley Walker, Student Physical Therapist

Bellarmine University
Doctor of Physical Therapy Program
November 28, 2011



Objectives

- Present case report and relevant findings
- Discuss potential differential diagnoses
- Review the outcomes of the intervention
- Present limitations contained in the case report

Purpose of case report

- This case report describes the use of a spinal nonthrust manipulation in conjunction with therapeutic exercise for the management of thoracic and rib pain in an adolescent athlete.

Case History

- **Age:** 16 y.o male, athlete
- **MOI:** Insidious onset of pain during athletic activities
- **DOI:** Approximately 4 weeks prior to initial PT visit
- **PMH:** unremarkable
- **CC:** Diffuse right-sided low back pain while running and kicking. Pain with maximal thoracic side bending and deep inhalation. Pain 0-10=3
- **Patient's Goal:** To return to pain-free sports-related activity

Please use the diagram below to indicate where you feel symptoms right now. Use the following key to indicate the different by symptoms

Key: Pins and Needles = 000000 Stabbing = / / / / / /
 Burning = xxxxxx Deep Ache = zzzzzz

Please use the three scales below to rate your pain over the past 24 hours. Use the upper line to describe your pain level right now. Use the other scales to rate your pain at its worst and best over the past 24 hours.

Rate Your Pain 0 = NO PAIN EXTREMELY INTENSE = 10

Right Now 0 1 2 3 4 5 6 7 8 9 10

Worst in past 24 0 1 2 3 4 5 6 7 8 9 10

Best in past 24 hrs 0 1 2 3 4 5 6 7 8 9 10

Clinical Examination

- Thoracic ROM
 - T3: LSB=55, RSB=60
 - T9: LSB=40, RSB=45
- Girth
 - Rib 8
 - At rest: 90 cm
 - Max inhalation: 92.5 cm
 - Rib 10
 - At rest: 87 cm
 - Max inhalation: 89 cm
- Joint Play
 - Spring testing showed hypomobile and pain-free segments except for T5-8.

Clinical Examination cont.

- Palpation
 - T5-7: rotated right
 - Pain:
 - Rib 6-7: 0-10=4
 - Rib 7-8: 0-10=4
 - Erector spinae muscle, right T5-7: 0-10=3
 - Rib 8 max inhalation: 0-10=3
 - Rib 10 max inhalation: 0-10=3

Differential Diagnosis

- **What is the potential diagnosis?**
 - Thoracic hypomobility
 - Segmental dysfunction
 - Rib fracture
 - Cervical dysfunction
 - Costovertebral, costochondral and costotransverse dysfunction
 - Muscular weakness

What helps us arrive at a diagnosis?

- X-ray: not performed
- MRI: not performed

Diagnosis

Right-sided thoracic facet joint pain of segments 5-7 with associated rib dysfunction

Intervention

1. Thoracic nonthrust manipulation technique for right T5-7 rotation
2. Education on proper posture
3. HEP
 - Increase flexibility and strength
 - Improve overall posture



FIGURE 2. Placement of the mobilizing hand at the level of the fifth thoracic vertebra.



FIGURE 3. The patient is flexed to the point at which movement is perceived between the fifth and sixth thoracic vertebrae.

JOSPT Video

- http://www.jospt.org/issues/articleID.2476,type.2/article_detail.asp - relatedVideo

Immediate status of patient

- Decreased tenderness with palpation
- Improvements in spine AROM
- Improvements in girth measurements

TABLE. Objective measurements taken before and immediately after treatment.

Objective Measurement	Pain (NPRS)		Active Range of Motion (°)		Girth (cm)	
	Before	After	Before	After	Before	After
Intercostal space						
Ribs 6-7	4	2	-	-	-	-
Ribs 7-8	4	3	-	-	-	-
Erector spinae muscle, right T5-T7	3	1	-	-	-	-
T3						
Left side bending	-	-	55	65	-	-
Right side bending	-	-	60	60	-	-
T9						
Left side bending	-	-	40	45	-	-
Right side bending	-	-	45	45	-	-
Rib 8						
At rest	0	0	-	-	90.0	90.0
At maximum inhalation	3	1	-	-	92.5	94.5
Rib 10						
At rest	0	0	-	-	87.0	87.0
At maximum inhalation	3	0	-	-	89.0	91.0

Abbreviation: NPRS, numeric pain rating scale (ranging from 0 [no pain] to 10 [extreme pain]).

Prognosis

- Good prognosis
 - Patient was young and active
 - No significant PMH
 - Isolated pain
 - Subacute phase
 - At worst pain=3/10

Outcome

- Follow-up telephone call
 - 1 month post-treatment
 - Patient reported non-compliant with HEP
 - No complaints of thoracic pain
 - 9 month post-treatment
 - Patient reported no return of symptoms

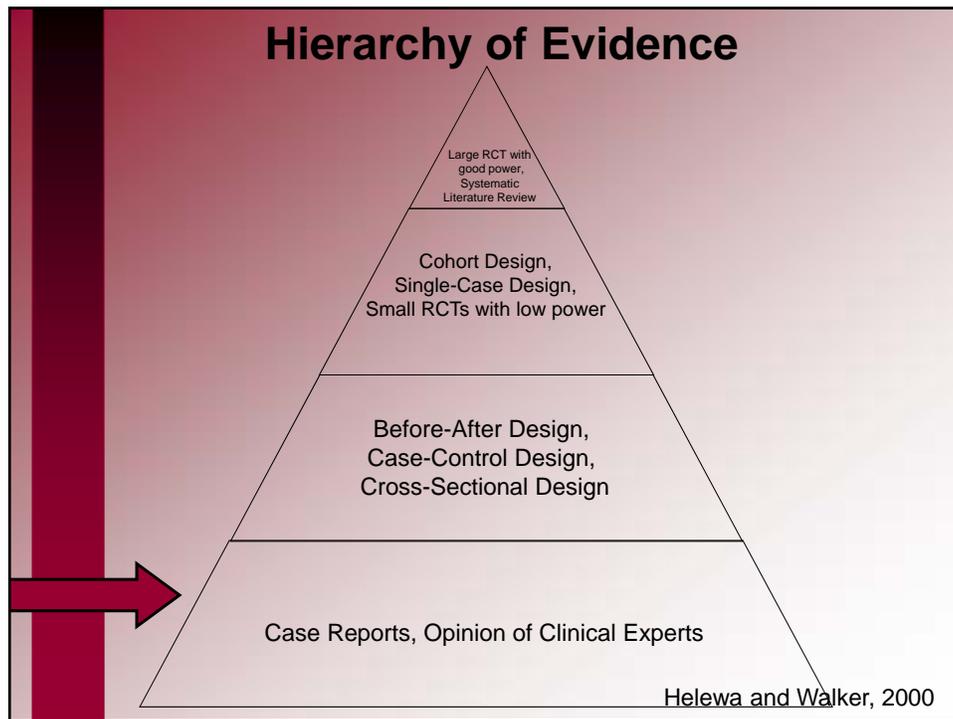
Discussion

Patient's Outcomes:

- Significant and immediate decrease in tenderness to palpation
- Increased active range of motion
- Improved chest expansion

Limitations

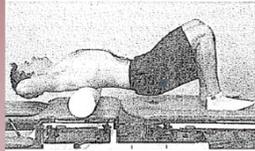
- Non-objective measurements of spinal mobility
- One treatment session with the patient
- Did not report specific exercises in the HEP or patient education
- Cannot generalize to other patients due to lack of available evidence



- ## Principles of Exercises
- A tight muscle loses its elasticity and shortens at rest
 - Unilateral tightness of a muscle group can result in asymmetries in all planes
 - Combination of tightness and weakness of muscle in one region affects posture and can contribute to thoracic spine problems

Self-Mobilization and Mobility Exercises for Thoracic Spine

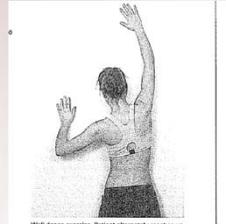
- Self soft tissue mobilization with foam roller



- Cat back exercises



- Wall dance exercise



Self-Mobilization and Mobility Exercises for Thoracic Spine

- Supine theraband D2 shoulder flexion
- Standing theraband shoulder horizontal abduction
- Shoulder external rotation
- Shoulder retraction

Differential Diagnosis and Treatment in a Patient With Posterior Upper Thoracic Pain

Fruth SJ. Phys Ther. 2006.

Study:

- 35-year-old man

Treatment:

- The primary interventions: costovertebral and costotransverse joint mobilizations, trigger point release, and flexibility and postural exercises.
- 7 PT treatments over 4 week period

Results:

- The patient demonstrated consistent improvement in both pain level and functional ability over the course of 4 weeks
- He did not experience a recurrence of symptoms over the next 5 years

Conclusion:

- This case suggests that CV/CT mobilizations and active TrP release may have been beneficial in reducing pain and restoring function in this patient.
- Authors suggest further research is needed regarding pain and dysfunction in the thoracic area.

HEP

1. Middle trapezius and rhomboid ms stretch: 3x30 s; 2–3 times daily (1)
2. Prone on elbows with upper thoracic extension: 3x30 s; 2–3 times daily (1)
3. Pectoralis ms stretch in a corner: 3x30 s; 2–3 times daily (2)
4. Alt. middle trapezius and rhomboid ms stretch: 3x30 s; 2–3 times daily (2)
5. Scapular retraction with resistive band: 2x20–30 reps; 1–2 times daily (3)
6. Prone middle trapezius muscle strengthening: 3–5x8 reps; 1–2 times daily (3)
7. Push-up with a “plus” at a wall: 2x20–30 reps; 1–2 times daily (3)
8. Trunk rotation stretch seated in chair: 3x30 s; 1–2 times daily (3)
9. Prone lower trapezius muscle strengthening: 3–5x8 reps; 1–2 times daily (4)
10. Postural strengthening/stabilization with back to a wall: 2x10 repx5 s; 1–2 times daily (5)

HEP



Figure 1.
Passive stretch for middle trapezius and rhomboid muscles. Model shown in Figures 1 through 4 is not the patient referenced in the text.



Figure 2.
Alternate stretch for middle trapezius and rhomboid muscles.

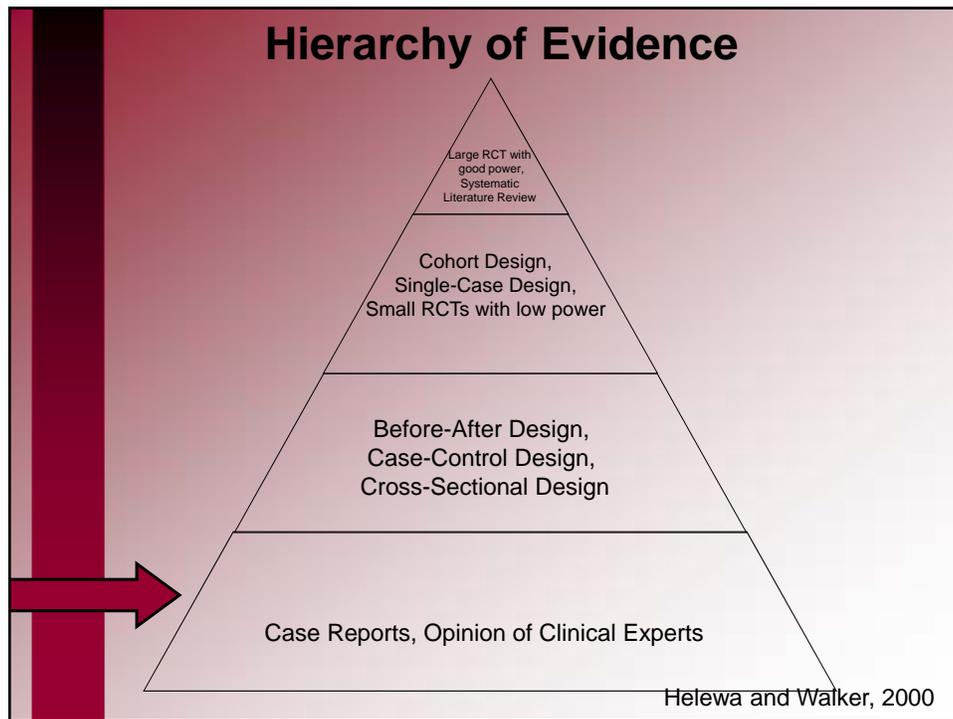
HEP



Figure 3.
Trunk rotation stretch in sitting position.



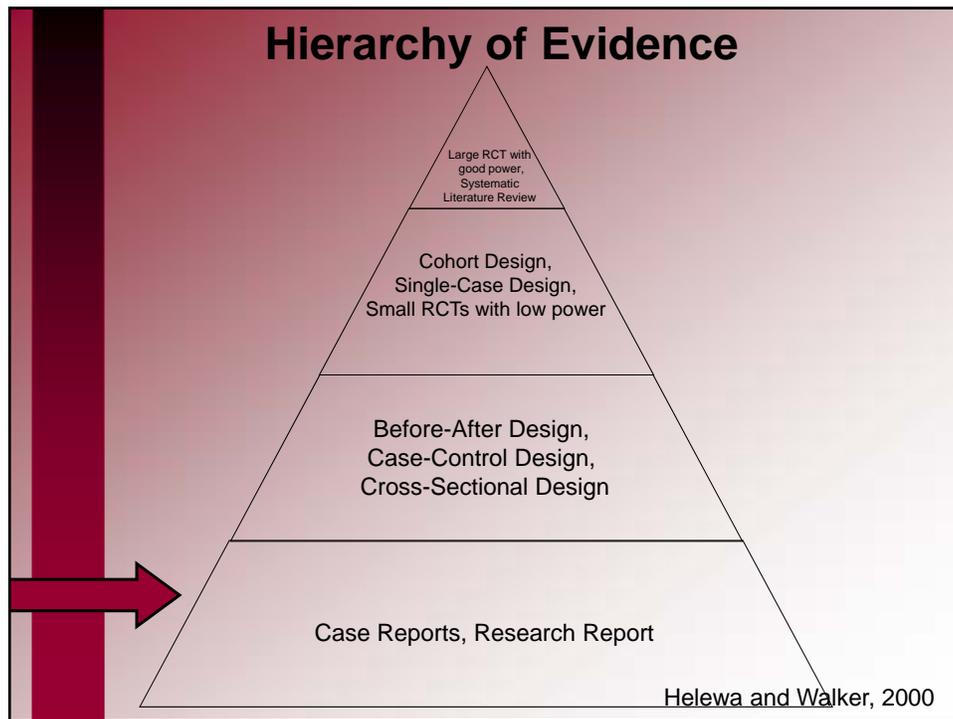
Figure 4.
Exercise for strengthening postural muscles. Patient presses arms into wall [arrows] while retracting scapulae.



The effects of thoracic manipulation on posteroanterior spinal stiffness

Campbell BD, Snodgrass SJ., JOSPT, 2010

- Subjects: 24 asymptomatic males and females (mean age: 21.9 ± 2.5 years)
- Intervention: Thoracic vertebra lacking the most mobility was identified and a PA thrust was applied with the patient in a supine position
- Results: No statistical significance indicating improved mobility after PA thrust
- Conclusion: It is suggested stiffer individuals would have a greater improvement in mobility than the asymptomatic individuals.



Thoracic pain in a collegiate runner

Austin GP, Benesky WT, *Manual Therapy*, 2000

- Subject: 20 year-old male sprinter of university track and field team with left-sided mid-thoracic pain
- Treatment: Postural education, exercise, mobilization, and manipulation
- Results: <3 weeks biweekly sessions re-established normal and pain free thoracic mechanics
- Conclusion: Normal mechanics and joint mobility can be restored by mobilization and manipulation

Hierarchy of Evidence



Reference

1. Olson, K Manual Physical therapy of the spine. Saunders Elsevier chapter 9 pg 206-207
2. Austin G, Benesky W. Thoracic pain in a collegiate runner. Manual Therapy. August 2002;7(3):168-172.
3. Campbell BD, Snodgrass SJ. The effects of thoracic manipulation on posteroanterior spinal stiffness. JOSPT. 2010; 40(11):685-693.
4. Flynn SJ. Differential Diagnosis and Treatment in a Patient With Posterior Upper Thoracic Pain. Phys Ther. 2006 Feb;86(2):254-68
5. Flynn, T The thoracic spine and rib cage, musculoskeletal evaluation and treatment. 1996 Butterworth-Heinemann chapter 12 pg 293-295
6. Kelley J, Whitney S. The Use of Nonthrust Manipulation in an Adolescent for the Treatment of Thoracic Pain and Rib Dysfunction: A Case Report. JOSPT. 2006 Nov;36(11):887-92
7. http://www.jospt.org/issues/articleID.2476,type.2/article_detail.asp#relatedVideo

Questions?