Making Sense of the Thoracic Spine

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Spine Rotation

Spinal Level	Degrees of Rotation
T1-2	9
T2-3	8
T3-4	8
T4-5	8
T5-6	8
T6-7	8
T7-8	8
T8-9	7
T9-10	4
T10-11	2
T11-12	2
T12-L1	2
L1-2	2
L2-3	2
L3-4	2
L4-5	2
L5-S1	0-5

Key Concepts

- Always chase dysfunctional, non-painful patterns first.
- Always work proximal to distal (in to out).
- The inability to achieve a desired position is governed by:
  - Stiffness/Shortness (Tissue Extensibility)
  - Motor Control/Strength
  - Structural Limitations

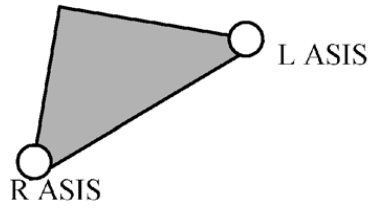
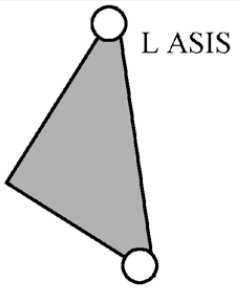
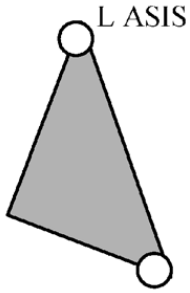
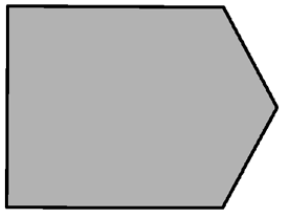
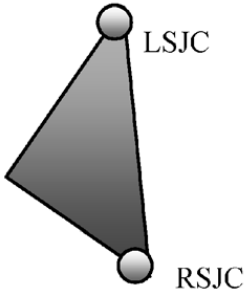
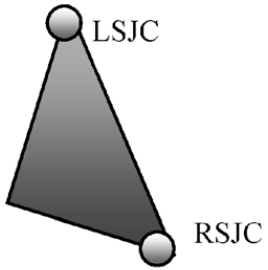
Thoracic Mobility Matters for Two Reasons

1. Adequate thoracic extension and rotation allows for effective hip-shoulder separation and allows the arm to settle into a good arm action at lay-back.

2. Adequate thoracic flexion and rotation delivers the scapula and, in turn, the arm.

- It's a torque *converter*: rotational-to-linear.

Nissen CW, et al. Adolescent baseball pitching technique: a detailed three-dimensional biomechanical analysis. Med Sci Sports Exerc. 2007 Aug;39(8):1347-57.

	Foot Contact	MER	BR	Home Plate
PELVIS	 –64 ± 12°	 +11 ± 10°	 +18 ± 8° R ASIS	
THORAX	 –92 ± 11°	 +10 ± 12°	 +25 ± 9°	

Shaffer B, Jobe FW, Pink M, Perry J. Baseball batting. An electromyographic study. Clin Orthop Relat Res. 1993 Jul;(292):285-93.

- 18 professional baseball hitters
- EMG analysis of 12 muscles during the swing
- "There was no significant difference in activity between the lead and trail erector spinae during any phase."
- "No significant differences in activity were found between lead and trail obliques."
- It is about creating power in the hips, not the lumbar spine!

Kyphotic (Rounded) Thoracic Spine: Expect (but Don’t Assume) Poor Thoracic Rotation

Extended (Flat) Thoracic Spine: Expect (but Don’t Assume) Good Thoracic Rotation

Assess, Don’t Assume!

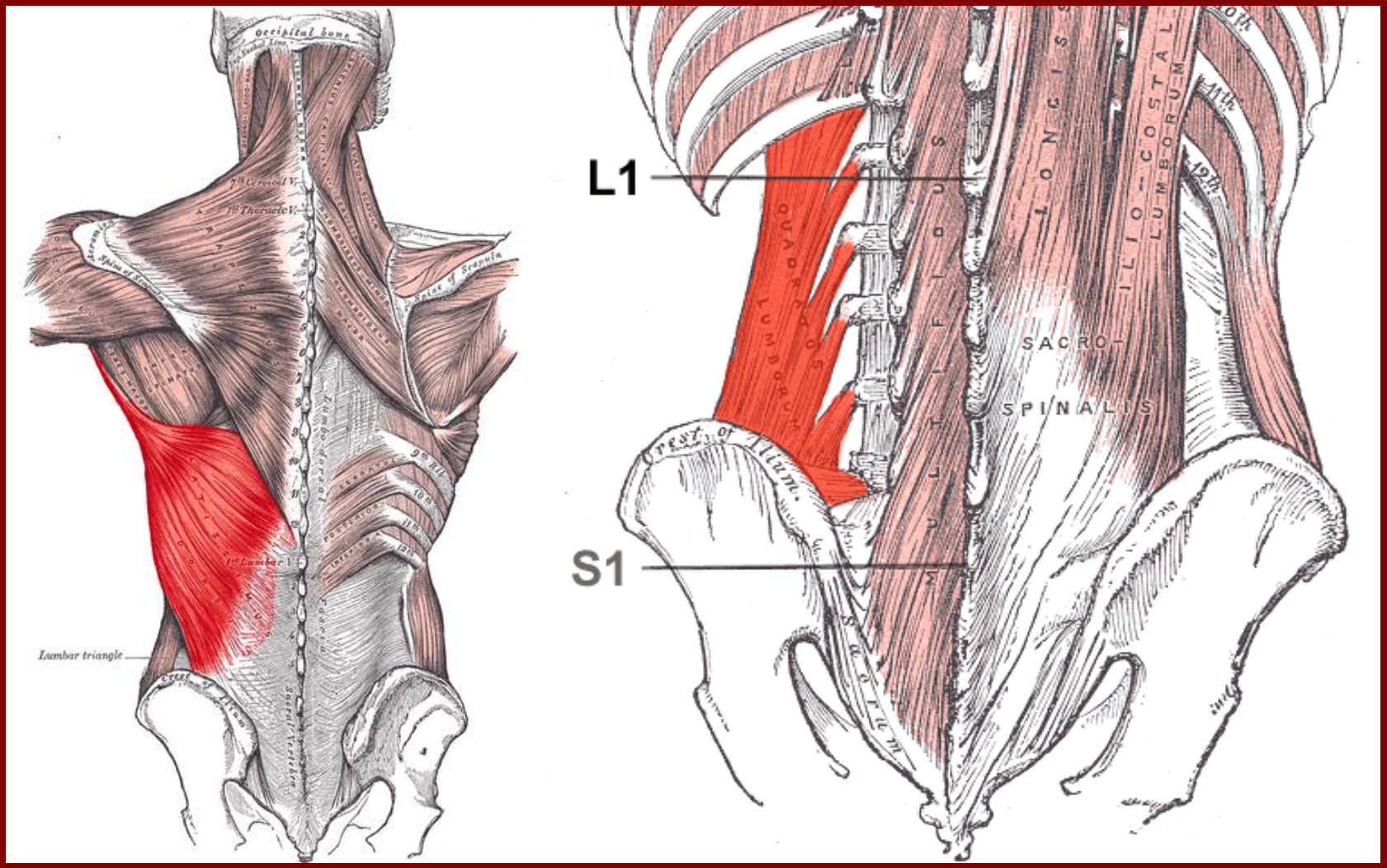
- Lumbar Locked Rotation
- Dr. Greg Rose: TPI
- Goals: 50-70° general population, 70-90° rotational sport athletes
- Hand behind back, Lumbar spine rounded

Thoracic Rotation

Active vs. Passive ROM

Different Findings

- If it's good actively, train!
- If it's poor actively, check passive range-of-motion.
- Limited active, good passive = motor control (stability/strength) issue
- Limited active, limited passive = dig deeper to determine whether it's a joint or tissue limitation


L1
S1
QUADRATUS LUMBORUM
ILIO-COSTALIS
LUMBORUM
SACRO-SPINALIS
MULTIFIDUS
Crest of Ilium.
Sacrum
Lumbar triangle
Occipital bone
Spine of Scapula
Latissimus dorsi
Trapezius
Rhomboideus minor
Rhomboideus major
Serratus posticus inferior
Sacral Vertebræ
Great sciatic notch

For Motor Control Deficits…

- Make it easier for them!
- Assist them into position
- Shorten lever arm

Progressions

- Quadruped Assisted Thoracic Rotation
- Quadruped Extension-Rotation Variations
- Bent-over T-Spine Rotation
- Adductor Stretch w/Extension-Rotation
- Adductor Stretch w/Offset Extension-Rotation

For Soft Tissue Limitations…

Options

- Lean Away Lateral Line Stretch
- Side-Lying Windmill
- Bench T-Spine Mobs
- 1-arm Bench T-Spine Mobs

For the Flat Thoracic Spines…

Progressions

- All Fours Belly Lift Variations
- Serratus Wall Slide Variations
- Bear Crawl Variations
- Short Plank w/Reach Across and Under

The Research!

- Szymanski DJ et al. Effect of torso rotational strength on hip, angular shoulder, and linear bat velocities of high school baseball players. J Strength Cond Res. 2007 Nov;21(4):1117-25.
- 12 week study of HS baseball players (mean: 15.4 years)
- Group 1: lifting and hitting only
- Group 2: lifting, hitting, and 3x/wk med ball program
- Although both groups made statistically significant increases ($p < \text{or} = 0.05$) in dominant (10.5 vs. 17.1%) and nondominant (10.2 vs. 18.3%) torso rotational strength and the medicine ball hitter's throw (3.0 vs. 10.6%), group 2 showed significantly greater increases in all 3 variables than group 1.

Frost DM, et al. Exercise-Based Performance Enhancement and Injury Prevention for Firefighters: Contrasting the Fitness- and Movement-Related Adaptations to Two Training Methodologies. J Strength Cond Res. 2015 Sep;29(9):2441-59.

- Three groups: movement-guided fitness (MOV), conventional fitness (FIT), and control
- 12 weeks of training
- Five pre/post test non-training tasks to evaluate transfer of training
- MOV and FIT both improved fitness, but only MOV improved movement quality.
- “FIT exhibited less controlled spine and frontal plane knee motions while squatting, lunging, pushing, and pulling.”
- “These findings suggest that placing an emphasis on how participants move while exercising may be an effective training strategy to elicit behavioral changes beyond the gym environment.”

Med Ball Work

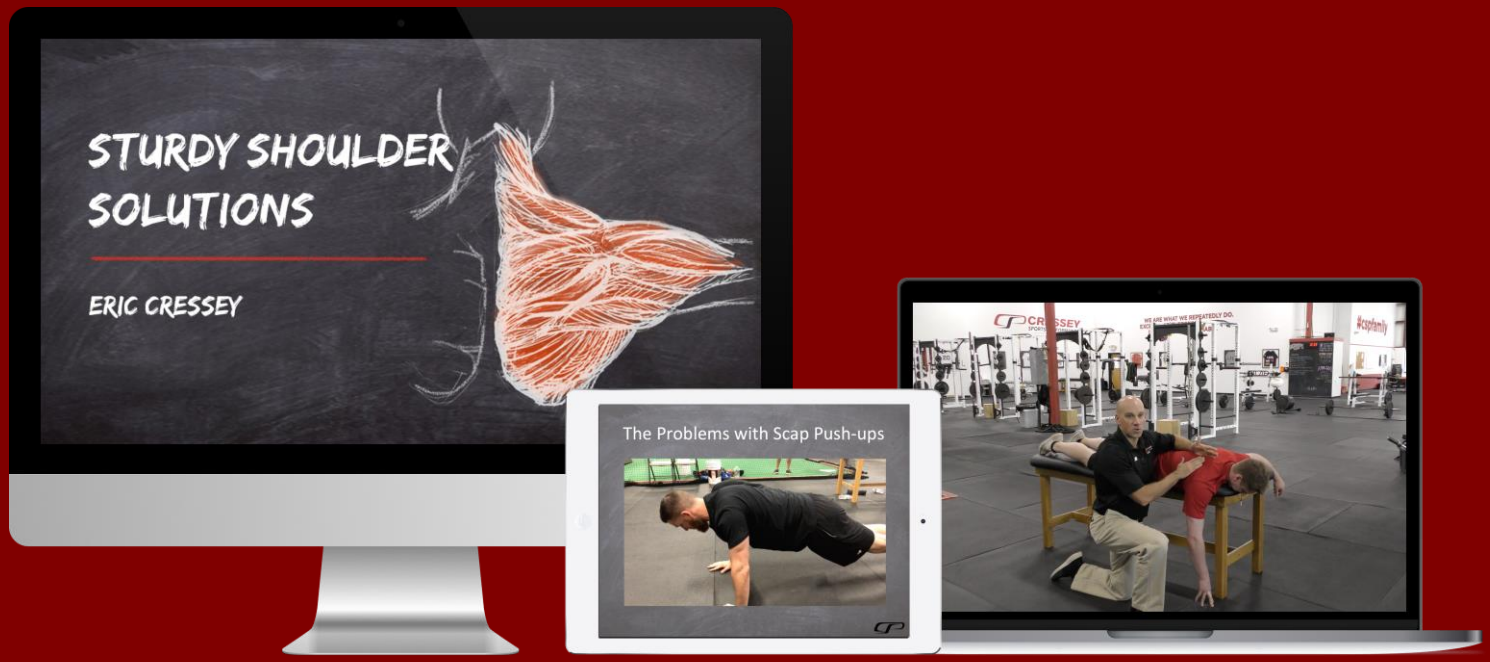
- Half-Kneeling Anti-Rotation Shotput
- Split-Stance Anti-Rotation Scoop Toss
- Figure 8 Rotational Shotput
- Receive & Release Rotational Scoop Toss
- Side to Side Overhead Med Ball Stomp
- Figure 8 Rollover Stomp

Strength Work

- 1-arm Cable Rotational Rows
- Kettlebell Turkish Get-up
- Kettlebell Windmill
- Wide Stance Anti-Rotation Chop (and all other chops and lifts)

For More Information….

- Sturdy Shoulder Solutions
- 25% off with coupon code PITCH



Thank you!

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