



VIRGINIA ORTHOPEDIC MANUAL PHYSICAL THERAPY INSTITUTE

TECHNIQUE MANUAL

Lumbar and Thoracic Spine

Lumbar AROM Assessment

-Patient Positioning: Standing, appropriately undressed so that the lumbar and thoracic spine can be viewed

-Therapist Positioning: Observation from the front, side, and back to help identify compensations in all planes

-Indications: Completed as part of the lumbar exam

-Contraindications: None

-Clinical Pearls:

- Assess quality and quantity of motion and look for asymmetries
- AROM assesses willingness to move and may determine whether overpressure is appropriate
- Utilize overpressure when appropriate to get a sense of end feel and to provoke symptoms

Lumbar Quadrant Assessment



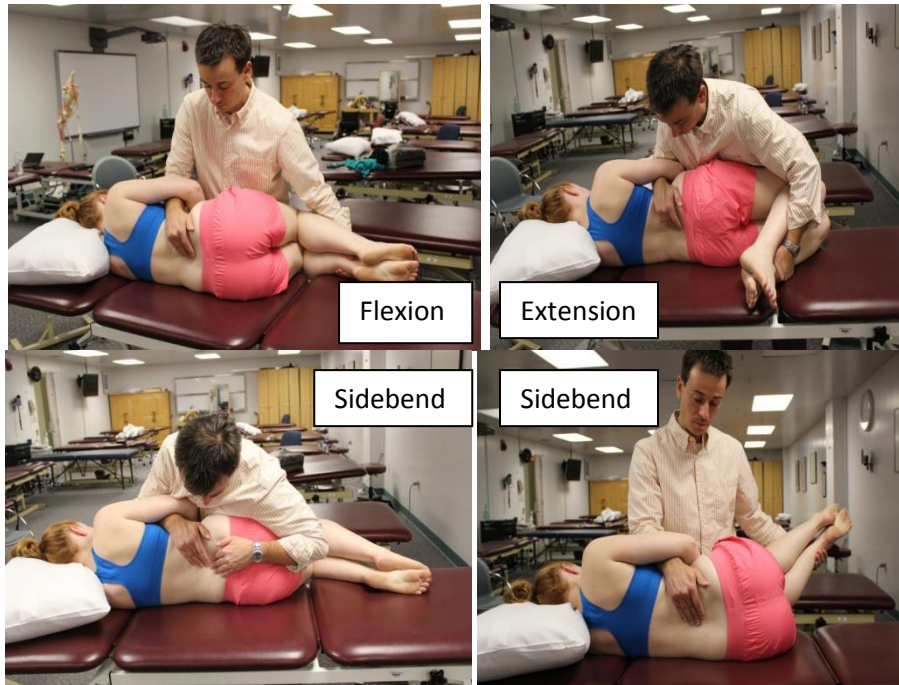
- **Patient Positioning:** Standing, appropriately undressed so that the lumbar and thoracic spine can be viewed
- **Therapist Positioning:** Positioned to the back and side where you can guide the motion as well as observe the quality of the motion

- **Indications:** Completed as part of the lumbar exam

- **Contraindications:** None

- **Clinical Pearls:** Assess for quality and willingness of motion as well as pt reports of symptoms
Can be used to further differentiate articular restrictions as well as soft tissue dysfunctions and/or neural restrictions

Lumbar PPIVM's



- **Patient Positioning:** Patient sidelying

- **Therapist Positioning:** Palpate interspinous space; grasp lower legs with other hand

Flexion: The therapist flexes the spine through the hips and pelvis palpating the inter-spinous spaces moving through full range each time and back to neutral

Extension: The therapist extends the spine through the hips and pelvis palpating the inter-spinous spaces moving through full range each time and back to neutral

Sidebending: The therapist SB's the spine ipsilaterally either through the legs by pulling up, or through the pelvis by pushing through the pelvis

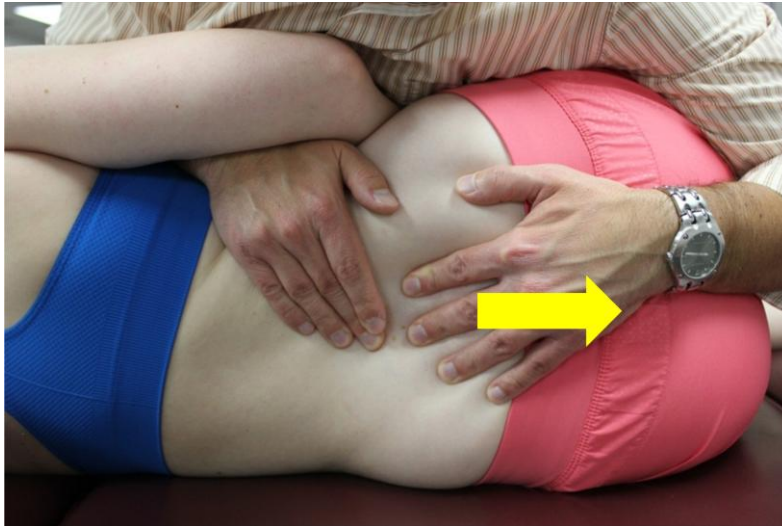
The therapist SB's the spine contralaterally either through the legs by lowering them down to the floor, or through the pelvis by pulling down on the pelvis

- **Indications:** To assess intersegmental mobility of the lumbar spine

- **Contraindications:** None

- **Clinical Pearls:** Feel for movement at each segment, not how much movement at each level

Lumbar PAIVM: Flexion



- **Patient Positioning:** Sidelying
- **Therapist Positioning:** In front of patient
 - Test the arthrokinematic glide by moving the inferior vertebrae inferoposterior, fixating the other vertebrae
 - The therapist assists the glide by tilting the pelvis posteriorly with the forearm
 - Assess end feel
- **Indications:** To assess the flexion accessory glide of the lumbar spine
- **Contraindications:** None
- **Clinical Pearls:** Used if the PPIVM is found to be restricted to further identify restrictions
Can also be used as a treatment technique
Slow assessment observing amount of motion, neutral zone (movement prior to resistance), end feel, tissue response, pain provocation

Lumbar PAIVM: Extension



- **Patient Positioning:** Sidelying
- **Therapist Positioning:** In front of patient
 - Test the arthrokinematic glide by moving the inferior vertebrae superoanterior, fixating the superior vertebrae
 - The therapist assists the glide by tilting the pelvis anteriorly with the forearm
 - Assess end feel
- **Indications:** To assess the flexion accessory glide of the lumbar spine
- **Contraindications:** None
- **Clinical Pearls:** Used if the PPIVM is found to be restricted to further identify restriction
 - Can also be used as a treatment
 - Slow assessment observing amount of motion, neutral zone (movement prior to resistance), end feel, tissue response, pain provocation

Lumbar SIJ Screening



Fig. 3. Thigh thrust SIJ provocation test.



Fig. 2. Distraction provocation SIJ test.



Fig. 4. Gaenslen's provocation SIJ test (right sided test).



Fig. 5. Compression provocation SIJ test.



Fig. 6. Sacral thrust provocation SIJ test.

Table 6

Sensitivity, specificity, positive and negative predictive values and likelihood ratios for two positive tests of distraction, thigh thrust, compression and sacral thrust

Statistic	Estimate	95% confidence interval
Sensitivity	0.88	0.64, 0.97
Specificity	0.78	0.61, 0.89
PPV	0.67	0.45, 0.83
NPV	0.93	0.77, 0.98
+LR	4.00	2.13, 8.08
-LR	0.16	0.04, 0.47

Laslett et al, Manual Therapy 2005

- Clinical Pearls: 6 SIJ Tests

- Distraction, Compression, Thigh Thrust, Gaenslen's (left/right), Sacral Thrust
- 2 of the 4 (not including gaenslen's) best predictor of SIJ as pain source
- Distraction had highest PPV and most specific
- Compression, thigh thrust and sacral thrust tests added to diagnostic ability
- Thigh thrust most sensitive
- Gaenslen's little to no value

Lumbar Torsion Test



- **Patient Positioning:** Prone

- **Therapist Positioning:** Therapist stands to one side of the bed and stabilizes lower T-spine with cranial hand
Therapist caudal hand grasps opposite ilium and pulls superior

- **Indications:** may identify fractures, annular tears, joint capsule inflammation through rotation of the spine from below

- **Contraindications:** None

- **Clinical Pearls:**

Pain unilaterally indicates facet fracture on the compressed side (ipsilateral) or arthritis on the distracted side (contralateral)

Pain bilaterally indicates segmental instability if chronic, end plate lesion/disc if acute, or fractured neural arch

Lumbar PA Shear Testing



- **Patient Positioning:** Prone

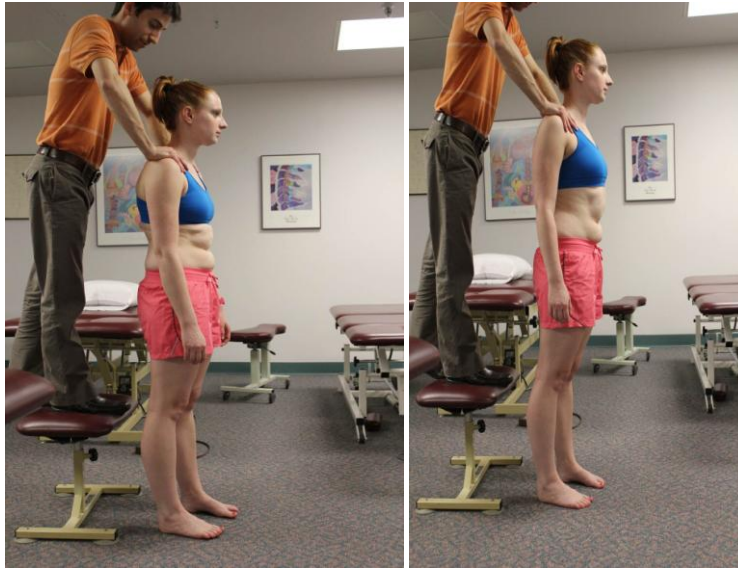
- **Therapist Positioning:** On one side of the patient, provide a low amplitude rapid pa force, assess response. Provide a large amplitude slow pa force, assess response.

- **Indications:** testing for segmental inflammation or instability

- **Contraindications:** Fracture, spondylolesthesis, osteoporosis

- **Clinical Pearls:** Pain and spasm with the low amplitude rapid thrust indicates inflammation
Pain and soft end feel with large amplitude slow pressure may indicate segmental instability
Helps to localize segmental dysfunction
Pain provoking
Can get a sense of segmental mobility

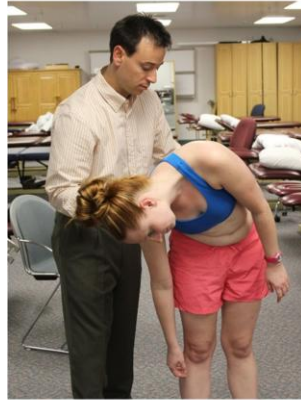
Vertical Compression Test



- **Patient Positioning:** Standing in normal posture
- **Therapist Positioning:** Behind patient on stool or chair. Therapist provides a inferior loading force through the patients shoulders observing for where the patient “gives” or buckles. Ask the patient to engage their core and repeat noting the difference in stability.
- **Indications:** Functional test for gross lumbar stability
- **Contraindications:** None
- **Clinical Pearls:** Provides immediate patient “buy-in” for core stability training and/or postural retraining

Lumbar Biomechanical Exam: H & I Testing

“I” Test

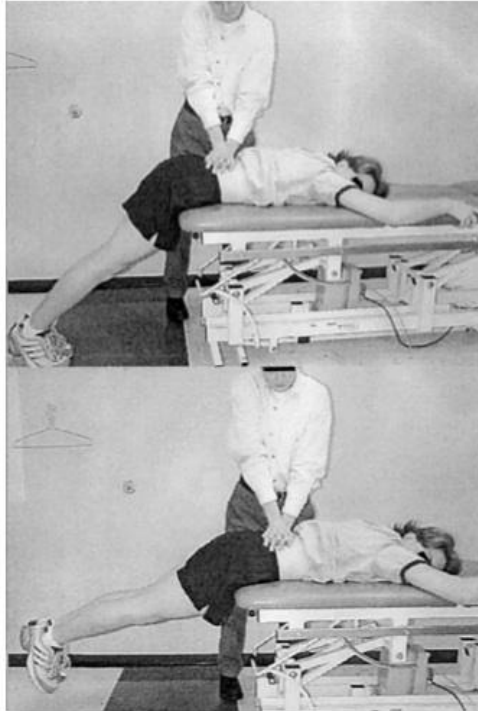


“H” Test



- **Patient Positioning:** Standing
- **Therapist Positioning:** Standing beside patient in a position that can guide motion
 - “H” test
 - Start with SB to one side then flexion, followed by extension
 - “I” test
 - Start with flexion or extension, then SB to either side
 - Interpretation
 - True hypomobility
 - Patient cannot achieve a quadrant regardless of which movement is initiated
 - Lateral instability
 - Positive “H” test
 - Patient subluxes in SB and then is unable to flex or extend
 - Anterior or posterior instability
 - Positive “I” test
 - Patient subluxes in flexion/extension and is unable SB
- **Indications:** helps to differentiate between hypomobilities and instabilities.
- **Contraindications:** None
- **Clinical Pearls:** Takes the patient in each quadrant using different movement orders. Inconsistent hypomobilities indicate an instability, consistent hypomobilities indicate true hypomobility.

Lumbar Biomechanical Exam: Prone Instability Test



- **Patient Positioning:** Patient prone, with the trunk supported on the examining table and the feet resting on the floor.
- **Therapist Positioning:** Standing beside patient
PT performs a PA pressure to each level of the lumbar spine.
- **Indications:** To diagnosis clinic hypermobility as part of the stability testing portion of the lumbar exam
- **Contraindications:** Unstable spondylothesis, fracture, osteoporosis
- **Clinical Pearls:** If pain is provoked at a certain level, the patient lifts their feet off the floor and the PA pressure is repeated.
 - Positive test if the pt's pain goes away
 - Can also perform prone with feet supported on plinth if symptoms are too irritable

Right Flexion/Gap Mobilization or Manipulation



- **Patient Positioning:** Sidelying with treatment side up
- **Therapist Positioning:** In front of patient, staggered stance, using cranial hand to palpate treatment segment. Use caudal hand at pt ankles to flex pt up to the treatment segment. Straighten bottom leg and hook top leg as shown. Switch hands at treatment segment. Use cranial hand on pt's bottom arm to rotate them down to the treatment segment. Weave cranial hand under the patients elbow to help maintain rotation component. Switch hands at treatment segment again and place caudal ulnar forearm over patients' posterior/lateral glut area as shown. Log roll patient toward you slightly. Apply mobilization or manipulation force.
- **Indications:** To treat a segmental dysfunction of the lumbar spine
- **Contraindications:** Fracture, spondylothesis at treatment level, anything causing ligamentous laxity
- **Clinical Pearls:** Can be used as a manipulation or mobilization position
During log roll at end of technique be sure to not lose the "lock out"

Lumbopelvic/SIJ Regional Manipulation



- **Patient Positioning:** Supine hands behind head

- **Therapist Positioning:** Beside patient contralateral to treatment side. Pull patient's hip toward you. Move legs toward treatment side until you see the hips move, sidebend patient toward the treatment side down to the pelvis. Passively rotate the patient toward through their trunk. Weave your cranial arm through the patients bent elbows or maintain trunk rotation by supporting their trunk as shown. Caudal hand on ASIS and supply force toward table.

- **Indications:** Treatment for lumbopelvic region

- **Contraindications:** Patient too large or unable to get into position

- **Clinical Pearls:** Be sure to not lose the components during the rotation
All components should be done passively

Lumbar Treatment: SB PPIVM/PAVIM



- **Patient Positioning:** Sidelying with treatment side up. Use table, pillows or bolsters to add to the technique
- **Therapist Positioning:** In front of patient. Patient locked out to treatment segment as in flexion/gap mobilization/manipulation technique. Cranial hand on superior segment elbow on anterior deltoid area, caudal hand on inferior segment forearm on lateral glut. Provide a sidebending force by moving hands away from each other along the plane of the body (in an arching motion)
- **Indications:** Treatment technique for a lumbar segmental hypomobility
- **Contraindications:** None
- **Clinical Pearls:** Use the table, pillows, etc to your advantage and to make the technique easier and more specific
Can also be performed for the opposite motion by lifting the end of the table and providing a closing or extension force

Thoracic Compression



Upper Thoracic



Mid/Lower Thoracic

- **Patient Positioning:** Patient seated
- **Therapist Positioning:** Standing behind patient
 - Upper Thoracic: pressure is applied through the top of the head
 - Mid/Lower: pressure is applied through the shoulders
- **Indications:** Part of the thoracic scan
- **Contraindications:** None
- **Clinical Pearls:** For additional information perform in flexion and extension
 - In flexion may indicate a disc, in extension may indicate articular surface pathology

Thoracic Distraction



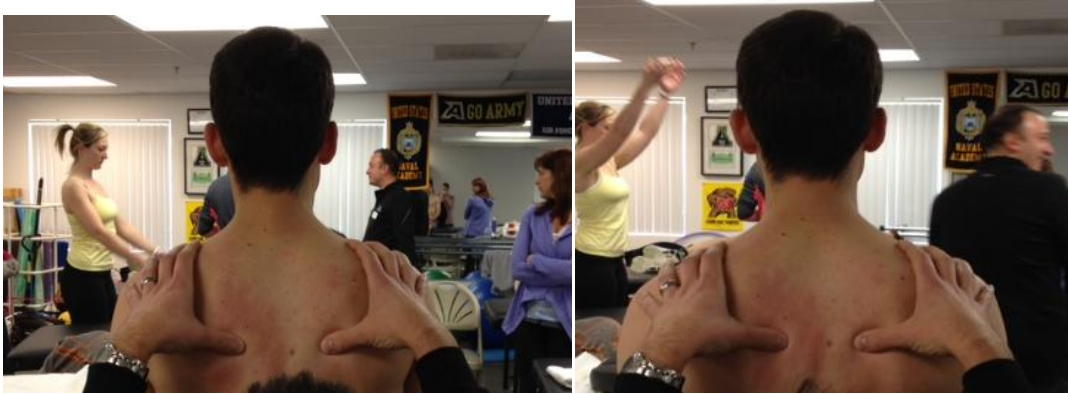
Upper Thoracic



Mid/Lower Thoracic

- **Patient Positioning:** Patient seated, for mid/lower thoracic arms are across chest
- **Therapist Positioning:** Standing behind patient
 - Upper Thoracic: gentle distraction through mastoid processes
 - Mid/Lower Thoracic: pt leans back and therapist distracts through the upper extremities
- **Indications:** Part of the thoracic scan
- **Contraindications:** None
- **Clinical Pearls:** For additional information perform in flexion and extension
If positive will guide your treatment position

Ribs: Breathing Assessment



- **Patient Positioning:** Patient seated dressed appropriately to be able to assess ribs
- **Therapist Positioning:** Behind patient palpating the rib tubercles
 - Inspiration: Have pt take a short breath out and then a long deep breath in. The ribs should move posterior/lateral
 - Expiration: Have pt take a short breath in and a long breath out. The ribs should move anterior/medial
- **Indications:** Part of the thoracic complex assessment
- **Contraindications:** None
- **Clinical Pearls:** There will be more posterior motion with the upper ribs, more lateral motion with the lower ribs
Assessing for symmetry of motion as well as symptom reproduction

Sympathetic (Long Sit) Slump Test



Differentiation



- **Patient Positioning:** Patient is long sitting, upright, hands behind back
- **Therapist Positioning:** To the side of the patient
 - Have patient slump with neutral neck and assess symptoms
 - Flex neck and assess symptoms
 - Extend one knee at a time and assess symptoms
 - Ankle DF/PF and assess symptoms
 - If symptoms at any point, release cervical flexion and assess change
- **Indications:** To examine neural tissues in head, neck, thorax and lumbar spine
- **Contraindications:** None
- **Clinical Pearls:** Addition of thoracic SB and rotation away to increase thoracic sympathetic tension
 - Can be position of mobilization and treatment
 - Assessment tool and treatment with sympathetically maintained symptoms such as in CRPS II

Thoracic Provocation Tests



Rib Springing Unilaterally and Bilaterally

- **Patient Positioning:** Patient prone
- **Therapist Positioning:** Beside patient
 - Three different forces at thoracic facets: central pa, unilateral pa and transverse pa
 - Rib springing at rib angles unilaterally and bilaterally
 - Assessing for quality and symmetry of motion, pain provocation and tissue response
- **Indications:** Provocation testing of thoracic spine as part of the biomechanical exam
- **Contraindications:** Fractures, hardware, osteoporosis
- **Clinical Pearls:** Helps to localize segmental dysfunction
 - Pain provoking
 - General sense of segmental mobility

Thoracic Flexion PPIVM's



T1-3/4



T4-11/12

- **Patient Positioning:** Patient seated, arms across chest
- **Therapist Positioning:** Beside patient, one arm supporting patient's arms to control patient's trunk. Other hand palpating at the interspinous space
Flex the patient until you feel the interspinous space increase. Move to the next segment and repeat. As get lower in the thoracic spine will have to slump the patient
- **Indications:** Part of the biomechanical assessment of the thoracic spine
- **Contraindications:** None
- **Clinical Pearls:** Slow gradual motions
May help to support the patients feet on a stool and flex knees to 90 to help lock out lumbar spine

Thoracic Extension PPIVM's



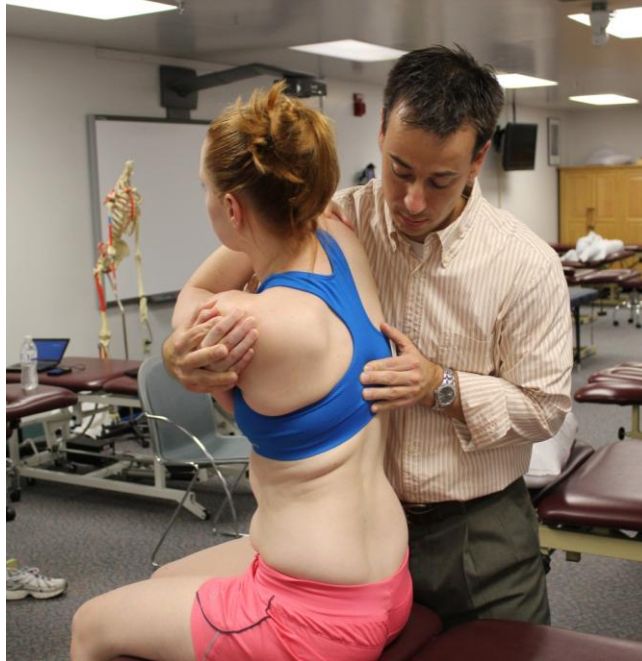
T1-3/4



T4-11/12

- **Patient Positioning:** Patient seated, arms across chest
- **Therapist Positioning:** Beside patient, one arm supporting patient's arms to control patient's trunk. Other hand palpating at the interspinous space
Extend the patient until you feel the interspinous space decrease. Move to the next segment and repeat. As get lower in the thoracic spine will have to lordose the patient
- **Indications:** Part of the biomechanical assessment of the thoracic spine
- **Contraindications:** None
- **Clinical Pearls:** Slow gradual motions
May help to support the patients feet on a stool and flex knees to 90 to help lock out lumbar spine

Thoracic Sidebending PPIVM's



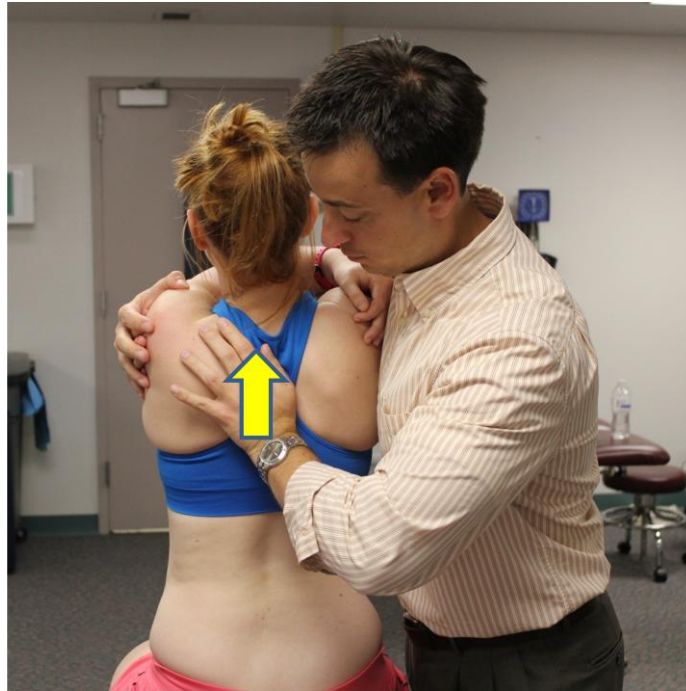
- **Patient Positioning:** Patient seated, arms across chest
- **Therapist Positioning:** Beside patient, one arm supporting patient's arms to control patient's trunk. Other hand palpating at the interspinous space
Sidebend the patient away from you and either feel for the interspinous space to decrease ipsilaterally or increase contralaterally. Move to the next segment and repeat.
- **Indications:** Part of the biomechanical assessment of the thoracic spine
- **Contraindications:** None
- **Clinical Pearls:** Slow gradual motions
May help to support the patients feet on a stool and flex knees to 90 to help lock out lumbar spine

Thoracic Symmetrical Flexion PAIVM



- **Patient Positioning:** Patient seated, arms across chest
- **Therapist Positioning:** Beside patient, one arm supporting patient's arms to control patient's trunk. Place the thenar eminence of your other hand over the SP of the superior vertebrae. Glide that segment in a superior/anterior direction
- **Indications:** Part of the biomechanical assessment of the thoracic spine
- **Contraindications:** None
- **Clinical Pearls:** Slow gradual motions
Assess for tissue response, endfeel, symmetry, pain provocation
May help to support the patients feet on a stool and flex knees to 90 to help lock out lumbar spine

Thoracic Symmetrical Extension PAIVM



- **Patient Positioning:** Patient seated, arms across chest
- **Therapist Positioning:** Beside patient, one arm supporting patient's arms to control patient's trunk. Place the thenar eminence of your other hand over the SP of the inferior vertebrae. Glide that segment in a superior/anterior direction
- **Indications:** Part of the biomechanical assessment of the thoracic spine
- **Contraindications:** None
- **Clinical Pearls:** Slow gradual motions
Assess for tissue response, endfeel, symmetry, pain provocation
May help to support the patients feet on a stool and flex knees to 90 to help lock out lumbar spine

Costovertebral Joint Inspiration (Lateral Glide) PAIVM



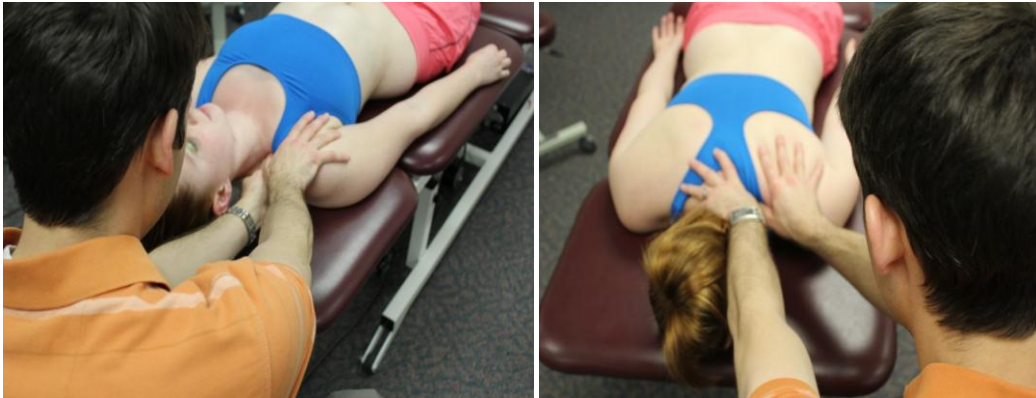
- **Patient Positioning:** Patient prone arms at side
- **Therapist Positioning:** Beside the patient on the opposite side to be tested
Place hypothenar eminence of caudal hand on rib angle to be tested, cranial hand is stabilizing the corresponding vertebrae
Perform a lateral glide of the rib
- **Indications:** Part of the biomechanical assessment of the thoracic spine
- **Contraindications:** Fractures, osteoporosis
- **Clinical Pearls:** Slow gradual motion
Assess for end feel, pain, tissue response
Make sure to apply force along joint line

Costovertebral Joint Expiration (Medial Glide) PAIVM



- **Patient Positioning:** Patient prone arms at side
- **Therapist Positioning:** Beside the patient on the same side to be tested
Place hypothenar eminence of cranial hand on rib angle to be tested, caudal hand is stabilizing the corresponding vertebrae
Perform an antero-medial glide of the rib
- **Indications:** Part of the biomechanical assessment of the thoracic spine
- **Contraindications:** Fractures, osteoporosis
- **Clinical Pearls:** Slow gradual motion
Assess for end feel, pain, tissue response
Make sure to apply force along joint line

First Rib Mobility Assessment



- **Patient Positioning:** Supine and Prone in same position as assessment. Ipsilateral cervical spine bending may be introduced to decrease soft tissue tension of scalenes, etc

- **Therapist Positioning:** Seated or standing at head end of plinth, towards the side to be treated. Appreciate the first rib through the supraclavicular soft tissue. Maintain contact with the first rib and have the patient breathe in through their nose and out through their mouth. Follow the rib inferiorly and medially and monitor the amount of excursion present. Compare to opposite side.

- **Indications:** Mobility testing of the first rib

- **Contraindications:** Musculoskeletal or non-musculoskeletal conditions that would preclude breathing assessment (COPD, severe asthma, untreated arterial or venous TOS, etc), fractures, osteoporosis

- **Clinical Pearls:**

- Often subluxed superiorly and limitation will be noted in inferior and medial direction
- 2nd rib dysfunction is often found in association with 1st rib dysfunction and treatment to both is often required. Additionally, treatment to T1 and T2 may also be necessary for symptom relief in this area

Cervical Rotation-Lateral Flexion Test



- **Patient Positioning:** Patient sitting

- **Therapist Positioning:** Behind Patient

Cervical spine passively and maximally rotated **AWAY** from side being tested

Gently flex as far as possible, moving ear toward the chest being sure to maintain rotation

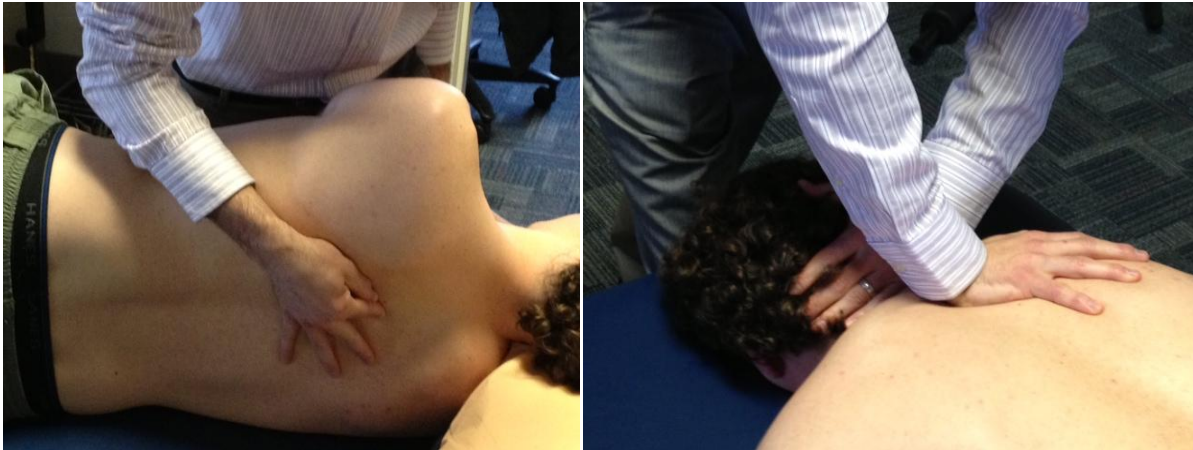
Positive if lateral flexion is limited or blocked

- **Indications:** Test for mobility of first rib

- **Contraindications:** None

- **Clinical Pearls:** Excellent interrater reliability $K = 1.0$ and good agreement with cineradiographic findings $K = .84$

Rib Manipulation



- **Patient Positioning:** Supine with arms across chest (lower ribs) or Prone (upper ribs)
- **Therapist Positioning:** *Prone:* at head of patient in staggered stance. Manipulation hand over rib angle, other hand over cervical spine to stabilize. Provide anterolateral directed force in line with CT joint.
Supine: Flat hand grip with rib angle in palm of your hand pull hand caudally to ensure a skin lock. Roll patient onto back and apply thrust through patients arms.
- **Indications:** To treat a rib dysfunction
- **Contraindications:** fracture, osteoporosis, hardware in thoracic spine
- **Clinical Pearls:** Literature suggests that movement at CV joint creates movement at CT joint and that dysfunctions are rarely specific
Several authors suggest adjacent thoracic facet, CV and CT joints are often restricted together
Even though restricted together, treatment directed towards one joint may not result in improvement to other joint
Empirical evidence suggests sustained restriction may perpetuate dysfunction if only Facet, CV or CT joint is addressed independently

First Rib Treatment



CV



CT

- **Patient Positioning:** Supine

- **Therapist Positioning:** At head of plinth towards the side being treated, either standing or sitting

- **Indications:** Treatment for a first rib dysfunction. 1st rib restriction will more often than not be subluxed superiorly and have lost its normal excursion inferiorly and medially.

CV: Pt head rotated away. MCP on proximal 1st rib. Force directed toward posteriorly toward their contralateral hip

CT: Patient head rotated slightly toward treatment side. MCP on distal 1st rib. Opposite hand on anterior shoulder for stabilization. Force directed in a ventral and ipsilateral direction.

- **Contraindications:** Musculoskeletal or non-musculoskeletal conditions that would preclude breathing assessment (COPD, severe asthma, untreated arterial or venous TOS, etc), fractures, osteoporosis

- **Clinical Pearls:**

- Often subluxed superiorly and limitation will be noted in inferior and medial direction

- Treatment to a subluxed 1st rib in the presence of a dysfunctional 2nd rib or upper thoracic spine will likely yield only short term change. Treatment to other adjacent structures (ribs and upper thoracic spine is often necessary).

First Rib Treatment: MET



- **Patient Positioning:** Seated

- **Therapist Positioning:** Stand behind patient with involved arm resting on your thigh. With ipsilateral 2nd MCP locate shaft of 1st rib. Slightly SB patient's head toward and sidebend away. Hold position and have patient gently push into contralateral sidebend. Hold x 6 sec and on relaxation take up slack

- **Indications:** Treatment for a first rib dysfunction.

- **Contraindications:** Musculoskeletal or non-musculoskeletal conditions that would preclude breathing assessment (COPD, severe asthma, untreated arterial or venous TOS, etc), fractures, osteoporosis

- **Clinical Pearls:**

- Often subluxed superiorly and limitation will be noted in inferior and medial direction
- Treatment to a subluxed 1st rib in the presence of a dysfunctional 2nd rib or upper thoracic spine will likely yield only short term change. Treatment to other adjacent structures (ribs and upper thoracic spine is often necessary).

Prone CT Junction (C7-T3) Lateral Flexion HVLAT



- **Patient Positioning:** Prone with head rotated away from therapist. Contralateral arm flexed/abducted and placed on corner of plinth and ipsilateral arm at side of patient on the table

- **Therapist Positioning:** At side of plinth, perpendicular to patient

Contact Points: Zygomatic arch or temporal bone, fingers pointing upward (to emphasize lateral flexion and not rotation). Other hand contacts T1 with proximal phalanx and metacarpal of index finger, first web space and thumb

Direction of Thrust: Simultaneous thrust of both hands, but more so from lower lever than upper lever (60/40). Lower lever thrusts into side-shift away while upper lever thrusts into lateral flexion.

- **Indications:** Treatment for upper thoracic articular restriction

- **Contraindications:** Fracture, osteoporosis, hardware in area

- **Clinical Pearls:** Place patients head on pillow for comfort and to assist with lock out position
Thrust should be into sidebend, not rotation