



**ATSU**

National Center for Osteopathic  
Principles and Practice Education

# Muscle Energy Technique: Rib Cage

By Eric Snider, DO, C-AOBNMM

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# Topics

- Define Muscle Energy
- Describe Some of the Different Principles of Muscle Energy Technique
- Demonstrate & Practice Muscle Energy Technique to the Rib Cage



# Muscle Energy Technique

- A form of osteopathic manipulative diagnosis and treatment in which the patient's muscles are actively used on request, from a precisely controlled position, in a specific direction, and against a distinctly executed physician counterforce
- First described in 1948 by Fred Mitchell, Sr, DO
- Most commonly used as a direct method technique



# 9 Different Physiologic Principles Of Muscle Energy Technique

## **Postisometric relaxation**

e.g. seated direct for **T8 FS<sub>R</sub>R<sub>R</sub>**

## **Joint mobilization using muscle force**

e.g. anterior innominate rotation, superior pubic shear, exhaled rib dysfunction

## **Respiratory assistance**

e.g. unilateral sacral flexion, diaphragm redoming, inhaled rib dysfunction

## **Oculocephalogyric (OCG) reflex**

e.g. occipital-atlantal (OA) joint

## **Reciprocal inhibition**

e.g. sometimes used in torticollis

## **Crossed extensor reflex**

e.g. sometimes in acute hamstring strain

## **Isokinetic strengthening**

e.g. hamstring shortening resulting in reflex quadriceps weakness

## **Isolytic lengthening**

e.g. hamstring contracture

## **Using muscle force to move one region of the body to achieve movement of another bone or region**

e.g. bilaterally extended sacrum

# Muscle Energy Relative Contraindications

1. Infection, hematoma, or tear in involved muscle.
2. Fracture or dislocation of involved joint.
3. Rheumatologic conditions causing instability of the cervical spine.
4. Undiagnosed joint swelling of involved joint.
5. Positioning that compromises vasculature.
6. Uncooperative or unresponsive patient

# The Purpose of Localization

- Localization is a critical component of effective osteopathic manipulative treatment (OMT). The body is a complex system of interconnected parts, and forces applied to one area can affect other, unintended regions. By localizing the force, the osteopathic physician ensures that the treatment is:
  - **Accurate:** The manipulative force is applied directly to the site of the somatic dysfunction, increasing the likelihood of a positive therapeutic outcome.
  - **Safe:** Focusing the force on the dysfunctional segment minimizes stress and potential injury to surrounding healthy joints, muscles, and ligaments.
  - **Efficient:** Precise localization allows for a more potent and focused treatment, which can lead to faster and more significant improvement.

# Localization, Continued

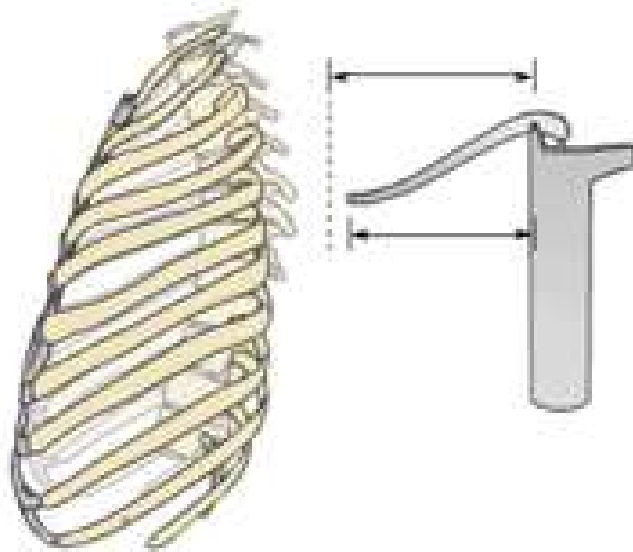
## Engaging the Barrier:

The physician applies a gentle, controlled force to "engage the barrier," which is the point of initial resistance to motion. This ensures that the subsequent therapeutic force is applied at the precise point where it is needed.



# Review Pump/Bucket Handle Mechanics

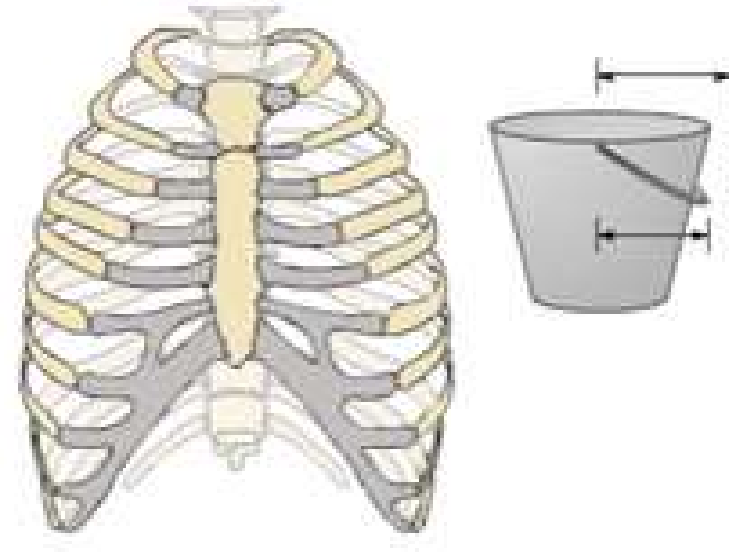
"Pump handle" motion



Transverse axis

Increased Anterior Chest Wall Movement via Sternum (upper rib cage)

"Bucket handle" motion



AP axis

Lateral Chest Wall Movement  
More apparent in lower rib cage

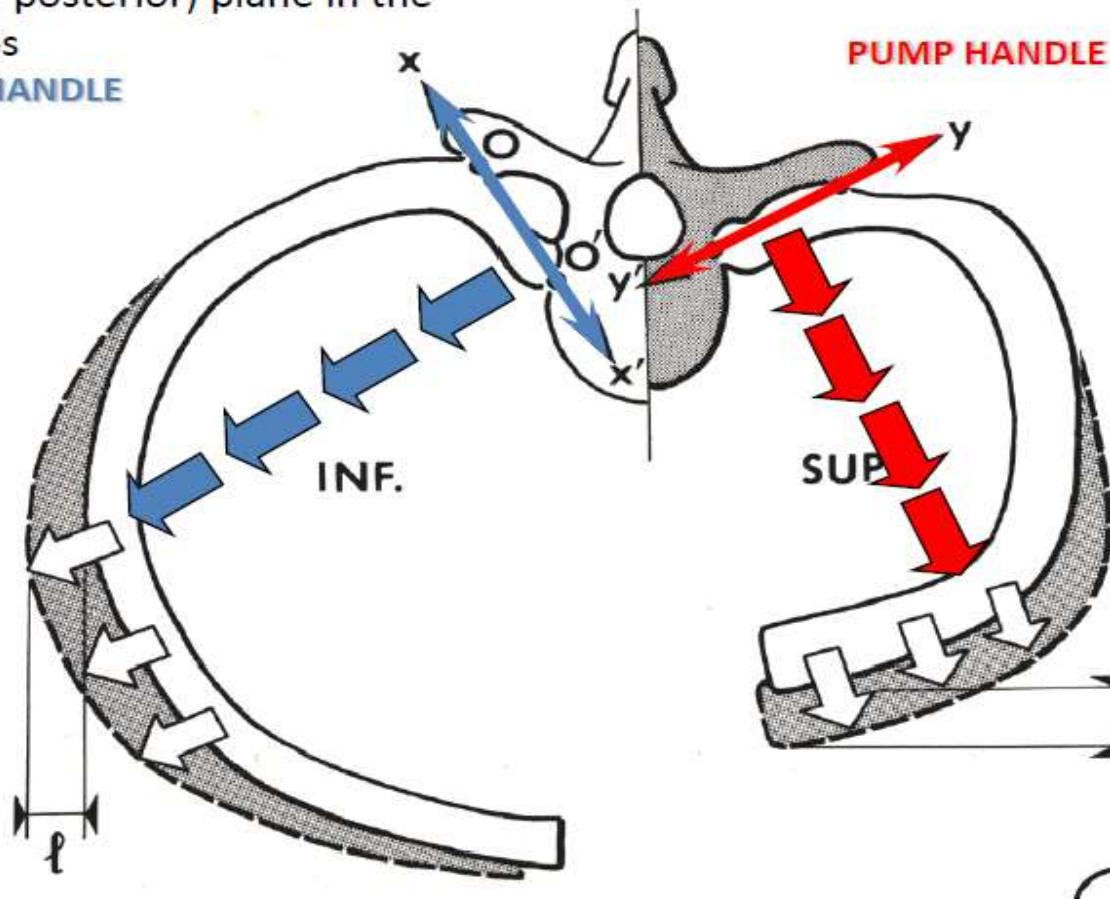
# Costo-vertebral to costo-transverse axis

The axis is in a more sagittal  
(anterior-posterior) plane in the  
lower ribs

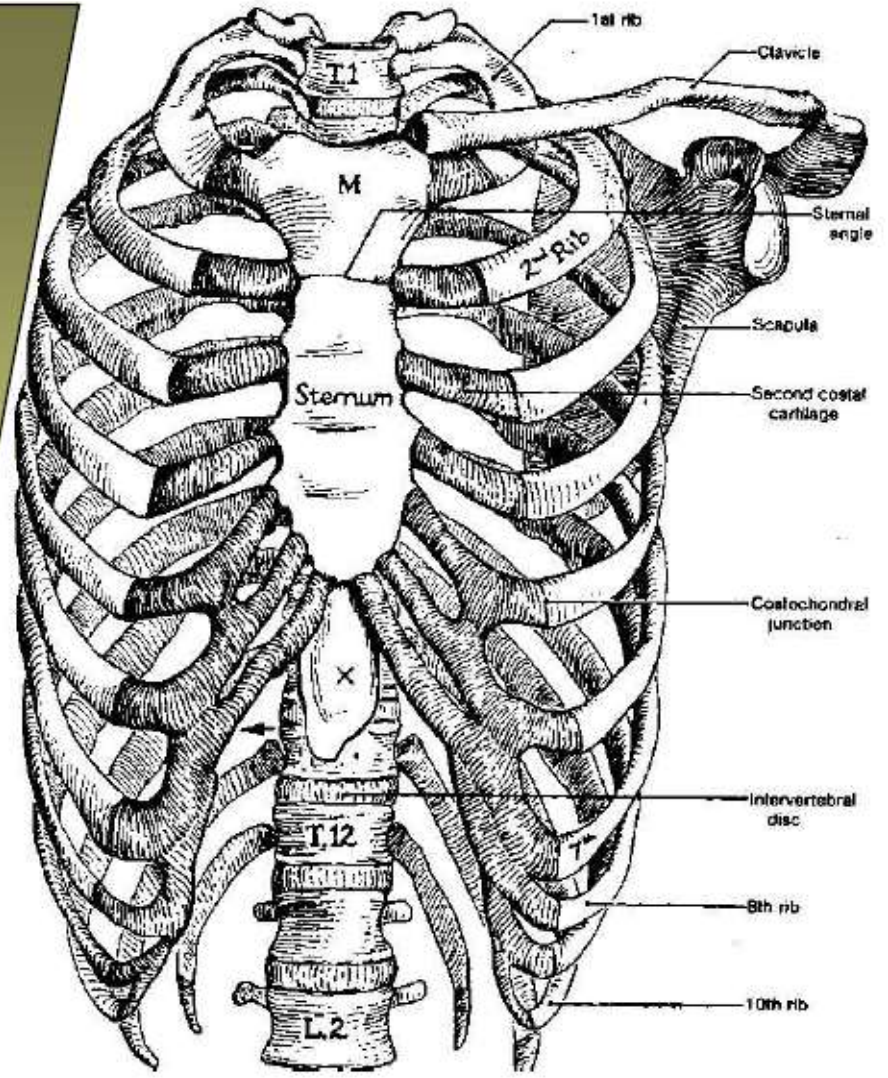
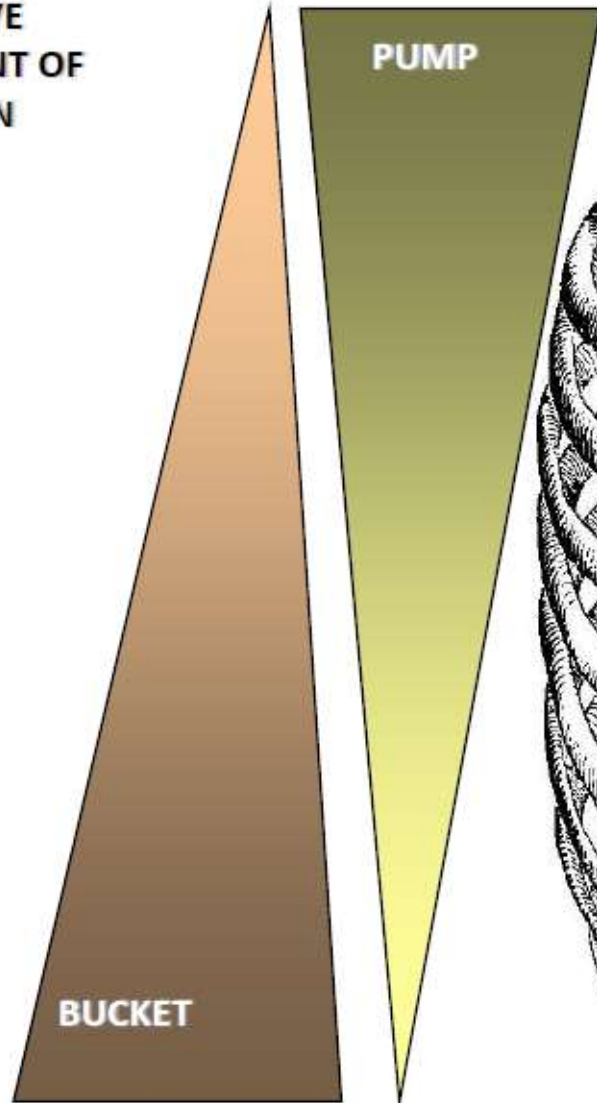
**BUCKET HANDLE**

The axis is in a more coronal  
(lateral) plane in the upper ribs

**PUMP HANDLE**



RELATIVE  
AMOUNT OF  
MOTION

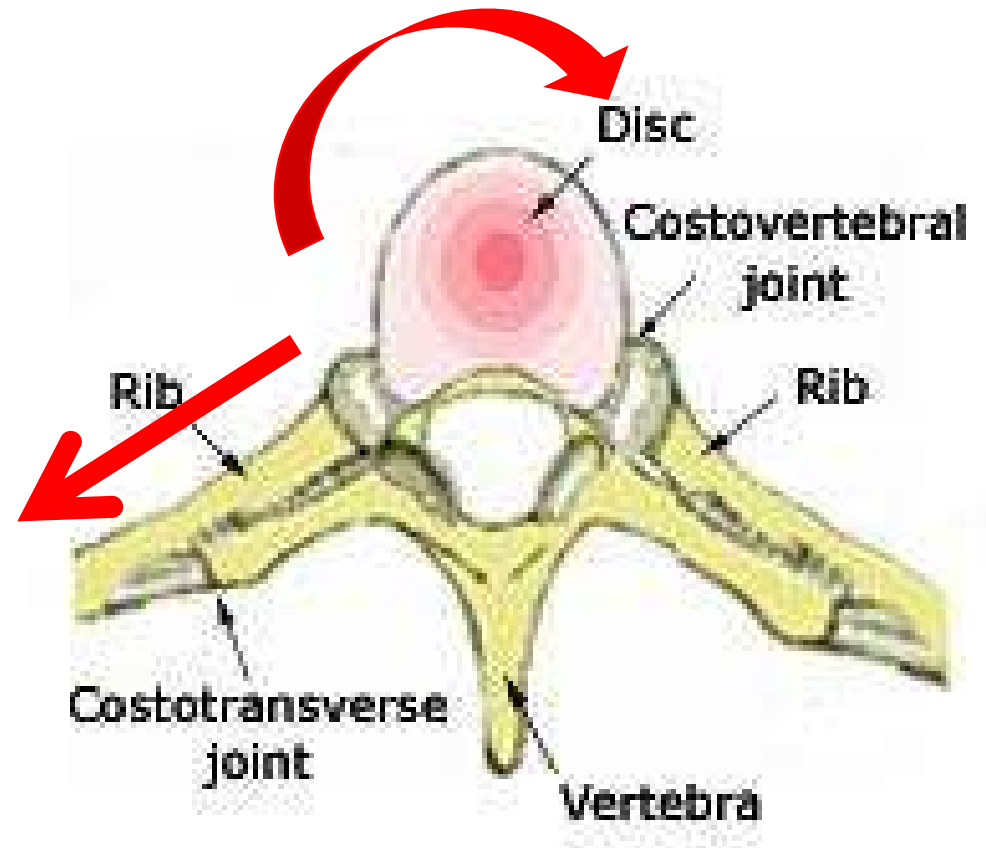


# Influence of Neck Rotation on Rib Articulations

Rotation of neck away from (to contralateral side of) dysfunctional rib

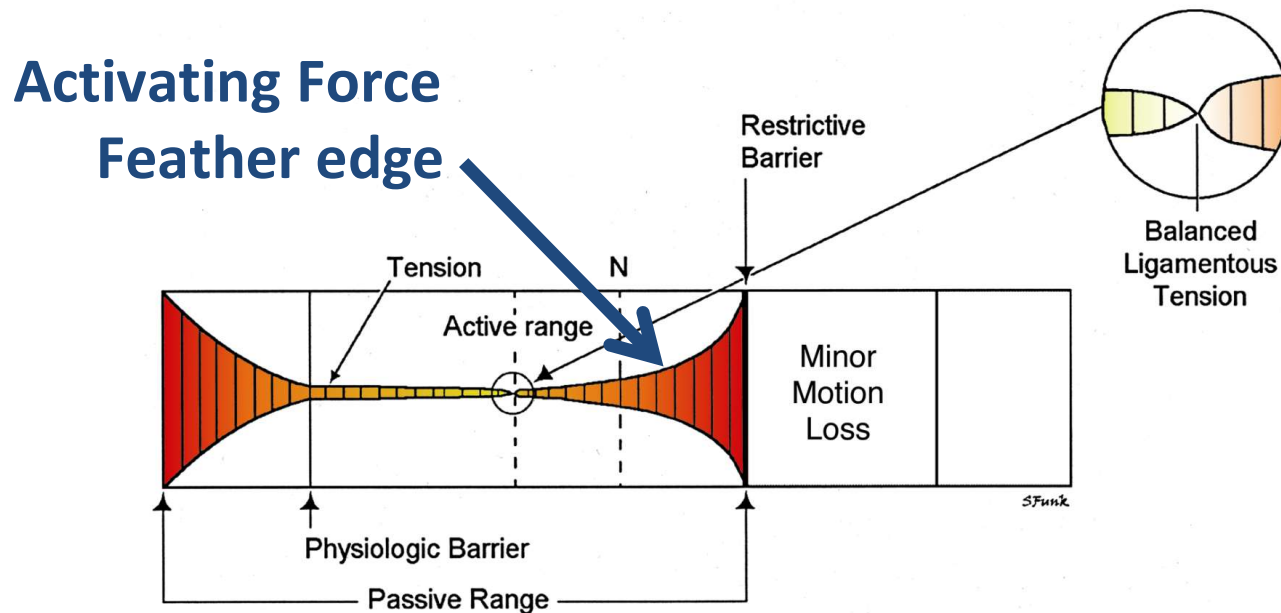
- Gaps costo-vertebral articulation
- Allows the rib to pivot at the costotransverse articulation
- Most useful closer to c-spine (upper ribs)

Demifacet: tx vertebral dysfunctions first



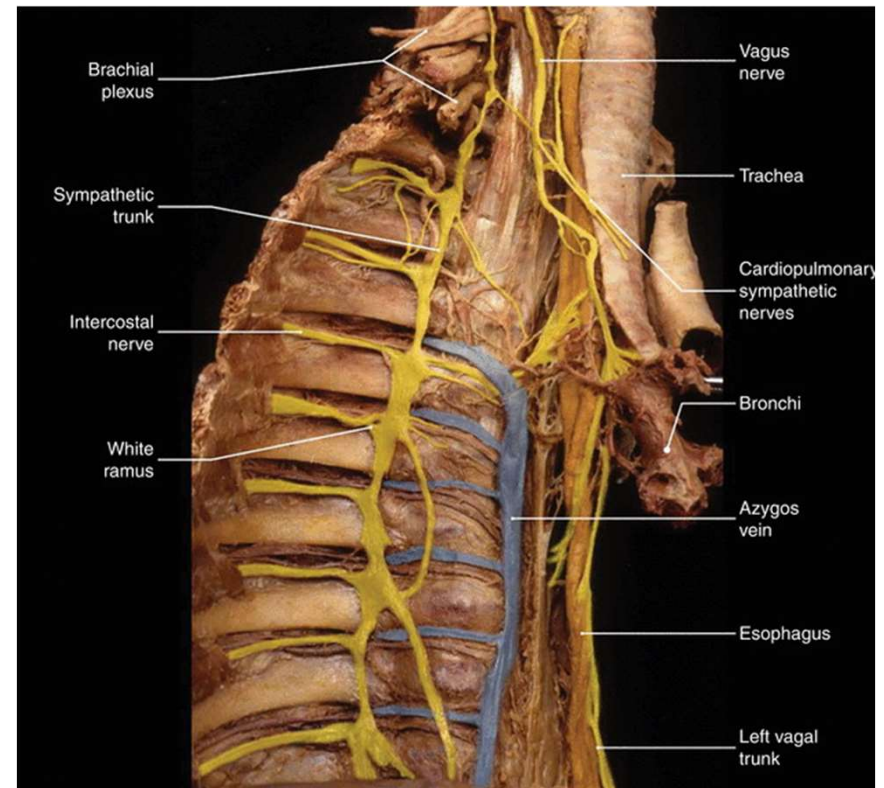
# Direct Muscle Energy Technique

- Direct treatment will engage the restrictive barrier
- Goal to increase motion in its restricted range



# Clinical Significance of Rib Cage Som. Dys.

- Maximize respiratory efficiency
  - Breathing 16x/min (23,000x/day)
  - Improve ventilation
- Inefficient rib cage mechanics impair lymph drainage (respiratory circulatory model)
- Neurologic consequences
  - Proximity of rib head and sympathetic ganglia
  - Facilitation & altered sympathetic tone



Sympathetic trunk in the upper thoracic region

This is a lateral view of the right side of the pleural cavity following the removal of the heart, lungs, and parietal pleural lining to expose the sympathetic trunk. The nervous system has been highlighted in yellow, the venous system in blue.

# Clinical Significance of Rib Cage Somatic Dysfunction

- Coughing is a sudden, forceful expulsion of air from the lungs.
- Coughing can cause exhalation rib somatic dysfunction
  - Exhalation motion preference
  - Inhalation motion restriction
    - $16 \times 60 \times 24 = 23,040$
- Exhaled rib dysfunction (named for motion preference)

is synonymous with:

caught in exhalation, exhalation rib dysfunction, inhalation rib restriction, depressed rib

# Rib Cage Dysfunction Assessment

- Screening
  - Palpate for soft tissue changes (TTA) at rib angles
  - Springing on ribs (motion restriction)
    - Anterior contact for pump handle ribs
    - Lateral contact for bucket handle ribs
- Definitive Diagnosis
  - Palpate inhalation and exhalation motion preference

# Ribs: Treatment Sequence

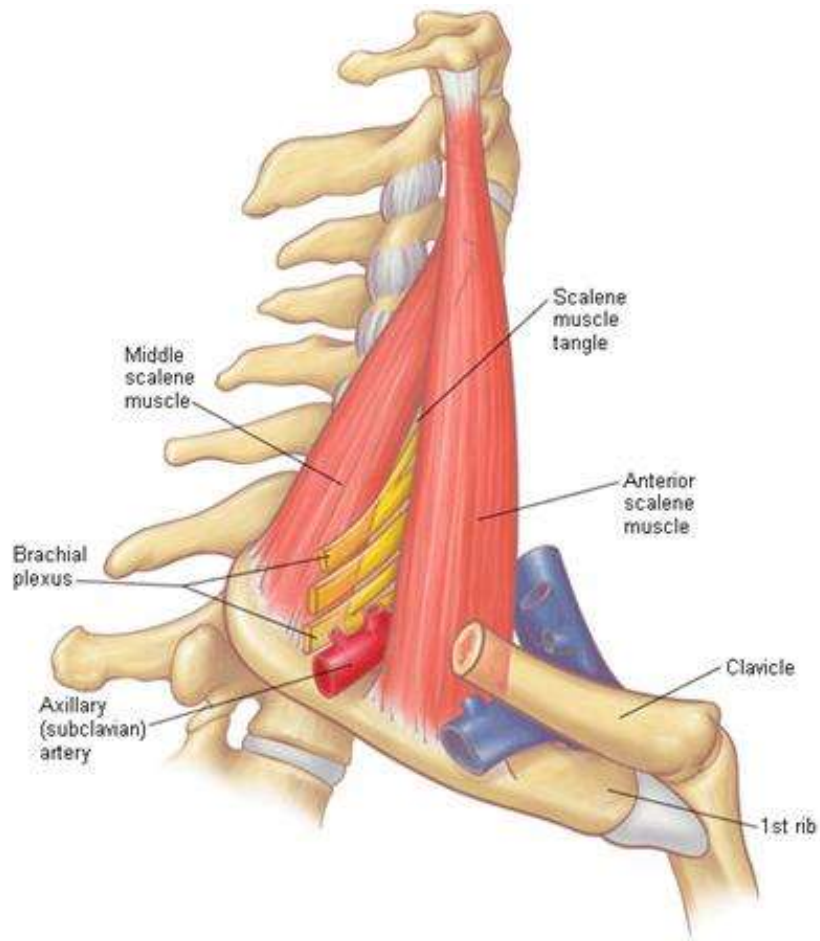
- First: Vertebral somatic dysfunction(s)
  - Aligns both of the demifacets
- Second: Rib somatic dysfunction
- Third: Sternum somatic dysfunction
  
- Treating a group of ribs
  - Inhalation rib somatic dysfunction: start with inferior rib of group first
  - Exhalation rib somatic dysfunction: start with superior rib of group first
  - **BITE**: Bottom-Inhalation Som. Dys.; Top-Exhalation Som. Dys.

## Exhalation Preference = Exhaled rib (= Inhalation Restriction)

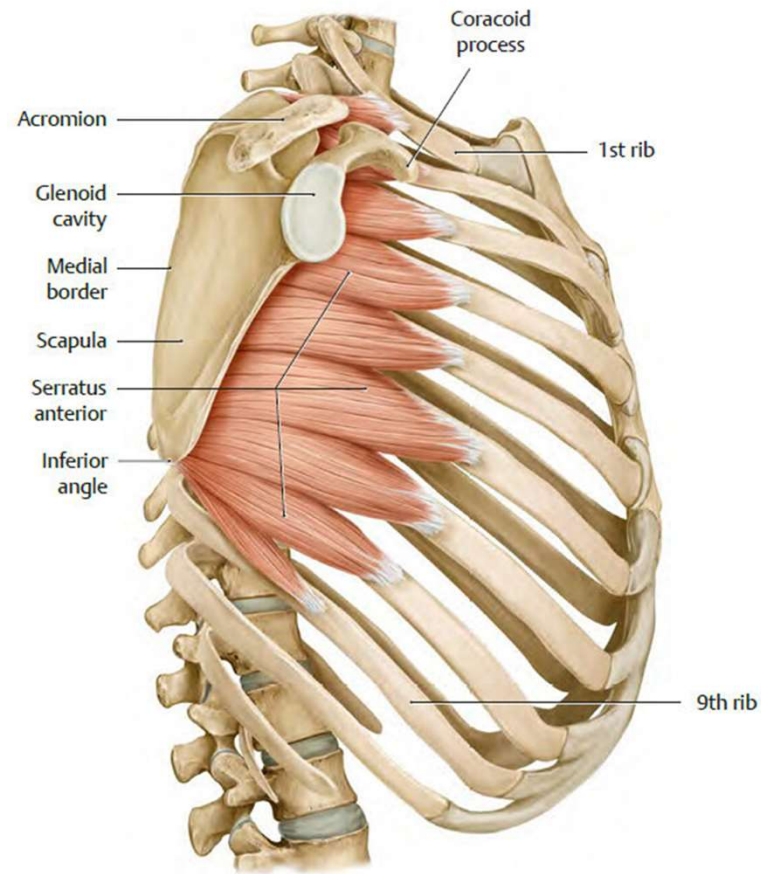
- Rib moves well during exhalation
- Rib motion is limited/decreased during inhalation
- Muscle energy treatment principle
  - Joint mobilization using muscle force
  - Rib is positioned at the restricted barrier
  - Origin of muscle is fixed/restricted by physician counterforce
  - Insertion of muscle on the rib pulls the rib into its inhalation position when the patient contracts the muscle

# Exhalation Preference Somatic Dysfunction Muscle Selection for Muscle Energy Technique

- Rib 1: Anterior scalene
- Rib 2: Anterior scalene & Serratus anterior
- Ribs 3, 4, 5: Pectoralis minor
- Ribs 6 – 8, (9): Serratus Anterior
- Ribs (9), 10 – 12: Latissimus Dorsi



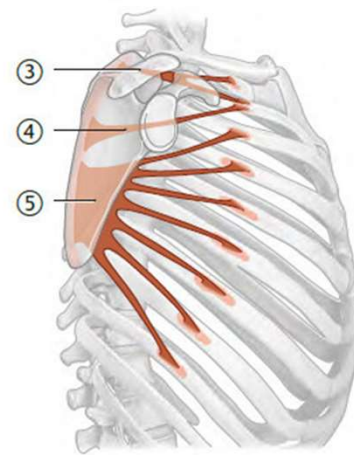
Anterior Scalene



A Serratus anterior.

Serratus Anterior

B Subclavius and pectoralis minor.



B Schematic.

## Direct Muscle Energy Technique: Joint mobilization using muscle force

Dx: Rib 1, (2) Exhaled (Depressed)

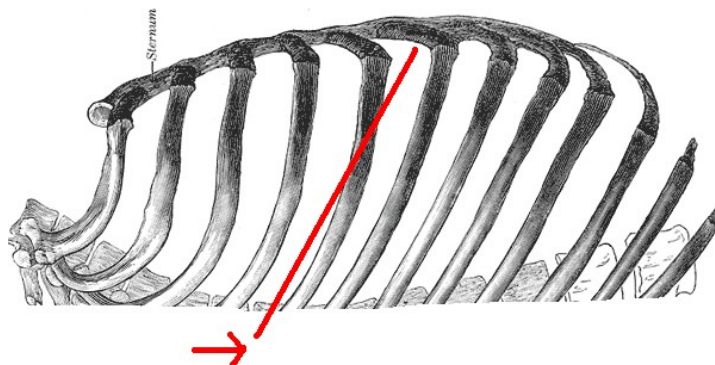
1. Patient is supine
2. Draw arm and shoulder off table; other hand hooks superior border of first rib near transverse process (to create a fulcrum)
3. Rotate head away to localize anterior scalene tension on 1<sup>st</sup> rib
4. Place patient's arm over forehead
5. Patient lifts head against physician counterforce; relax, move to new restrictive barrier, repeat until best results obtained
6. Recheck



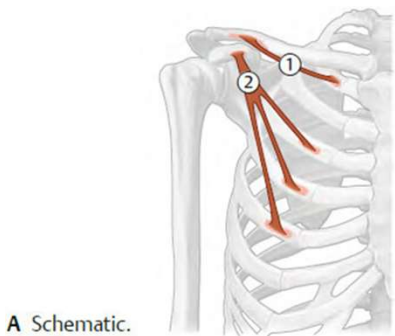
# Exhalation Rib Somatic Dysfunction (inhalation rib restriction)



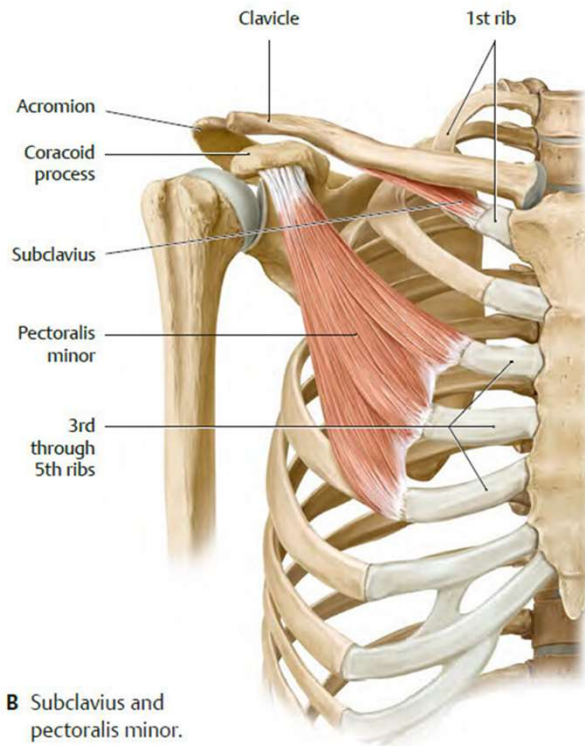
Treat TOP rib of group  
Rib 3-5 use Pec Minor (across chest)  
Ribs 6-9 use Serratus Anterior (to umbilicus)  
Rib 10-12 use Latissimus Dorsi (ipsilaterally to hip)



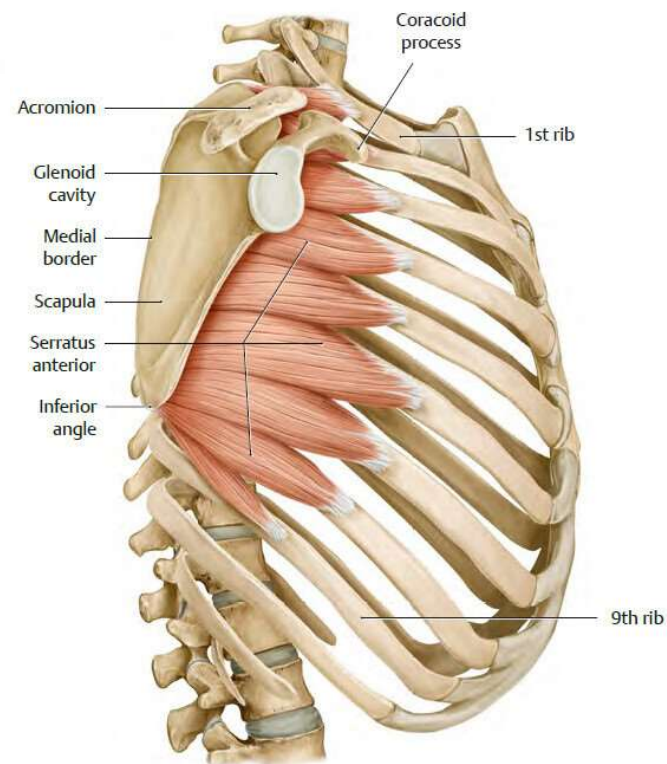
KM p129B, p133A



A Schematic.

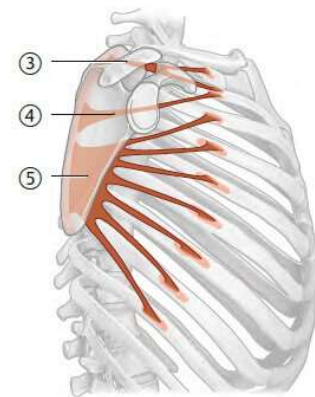


B Subclavius and pectoralis minor.



A Serratus anterior.

B Subclavius and pectoralis minor.



B Schematic.

## Pectoralis minor

Ribs 3 – 5

Pull elbow across chest

## Serratus anterior

Ribs 6-9

Pull elbow towards umbilicus

## Latissimus Dorsi

Ribs 10-12

Patient Pulls Elbow towards ipsilateral hip

## Origin

Ribs (9), 10, 11, 12

Iliac crest

Thoracolumbar fascia

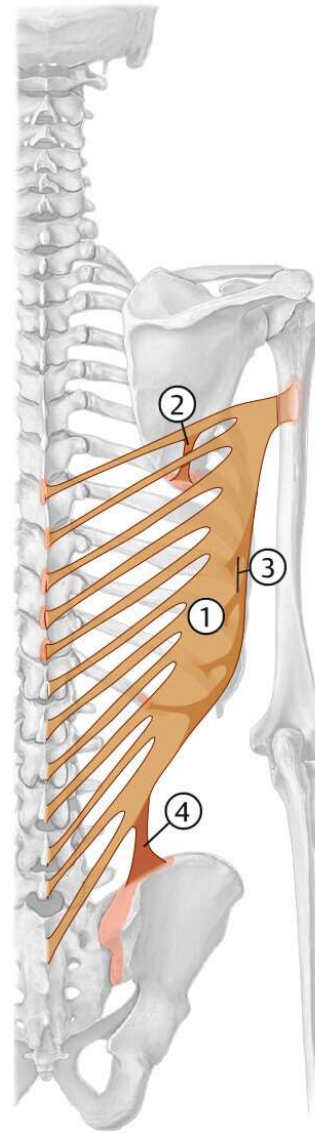
SPs of T7-S5

(inferior angle scapula)

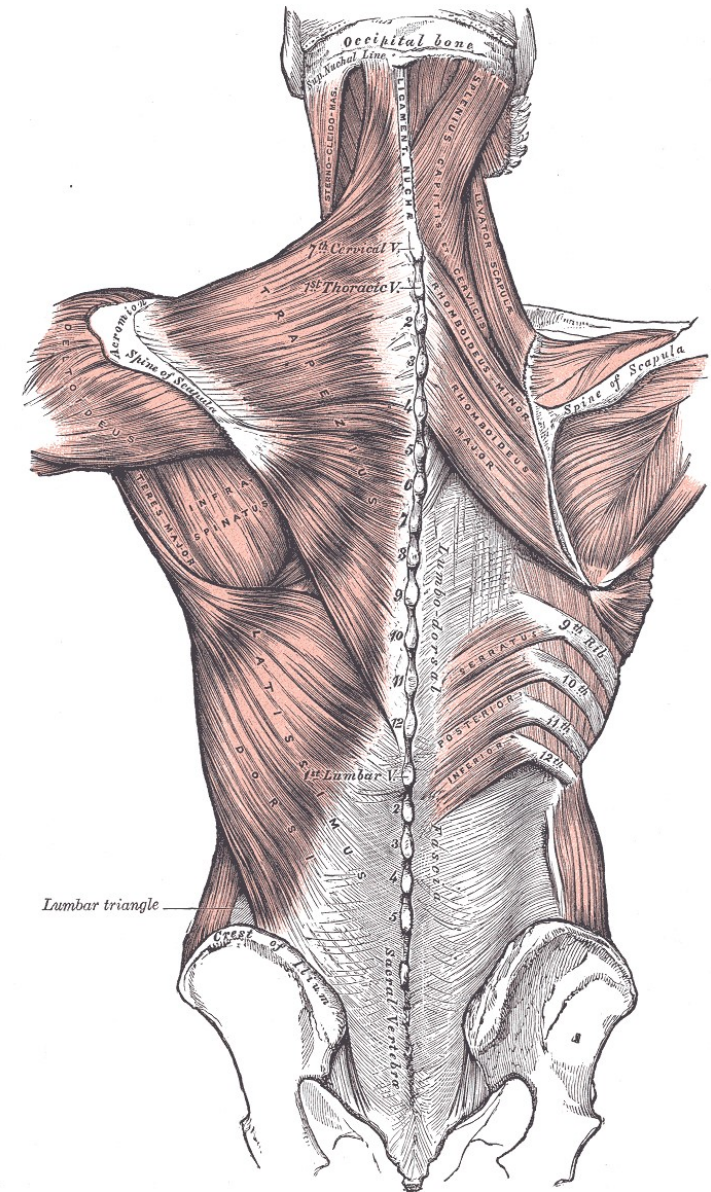
## Insertion

Humerus

Inferior to intertubercle groove



A



# Direct Muscle Energy Technique: Joint mobilization using muscle force

Dx: Ribs 2-10 exhaled

1. Patient is supine
2. Caudal hand hooks superior margin of dysfunctional rib angle
3. Patient turns head away; forearm of dysfunctional side placed on forehead
4. Patient pulls elbow toward opposite chest, umbilicus, or ipsilateral hip against physician counterforce.
  1. The gentle sustained contraction by the patient is pulling the rib through the barrier into its inhalation position.
  2. Maintain contraction by the patient longer than usual.
5. repeat until best rib motion obtained
6. Recheck



Kimberly Manual 2008, page 129B, 133A

# Direct Muscle Energy Technique: Traction with Respiratory Assistance

Dx: Rib 12 Exhaled

1. Patient is prone with arm extended on side of dysfunction
2. Physician moves lower extremities away from side of dysfunction
3. Place thumb along inferior margin of rib shaft to stabilize
4. Grasp ASIS and lift pelvis while other hand carries rib to restrictive barrier
5. Patient breathes in and out deeply while physician stabilizes rib and maintains quadratus lumborum tension
6. Repeat until quadratus releases rib
7. Recheck



Kimberly Manual 2008, page 141

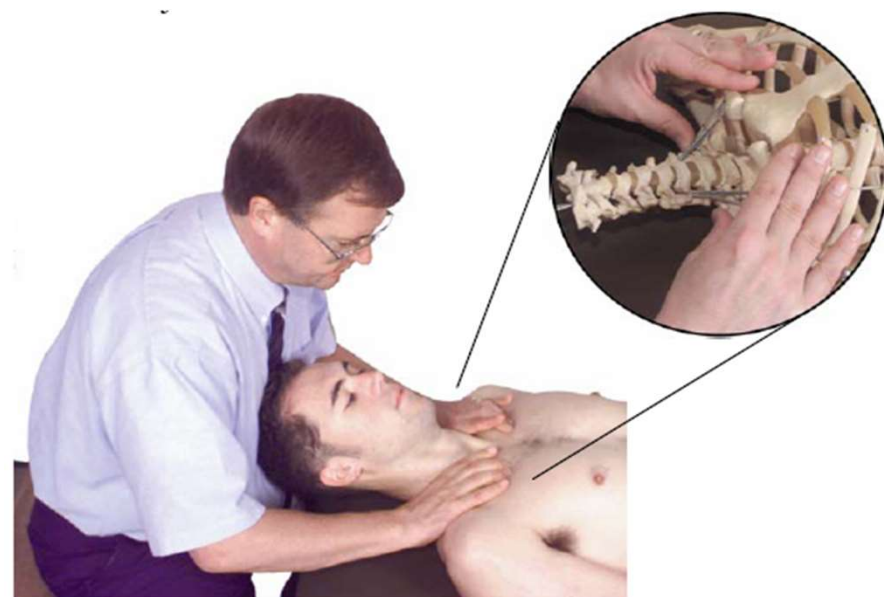
## Inhalation Preference = Inhaled rib (= Exhalation Restriction)

- Rib moves well during inhalation
- Rib motion is limited/decreased during exhalation
- Muscle energy treatment principle of Respiratory Assistance
  - Rib is positioned at the restricted barrier
  - Muscle force generated by simple act of breathing
  - A fulcrum is applied against which the respiratory forces can work

# Direct Muscle Energy Technique: Respiratory Assistance

Dx: Rib 1 Inhaled (Elevated)

1. Patient is supine
2. Contact superior aspect of the posterior margins of both first ribs with thumbs (anterior to trapezius); index fingers at costosternal joint
3. Patient shrugs shoulders up while inhaling, lets shoulders down while exhaling
4. Physician resists superior motion of ribs during inhalation, follows exhalation
5. Recheck



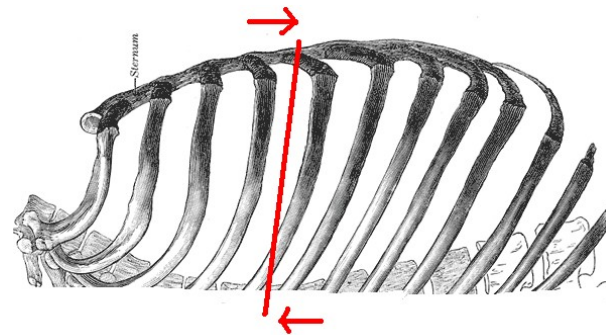
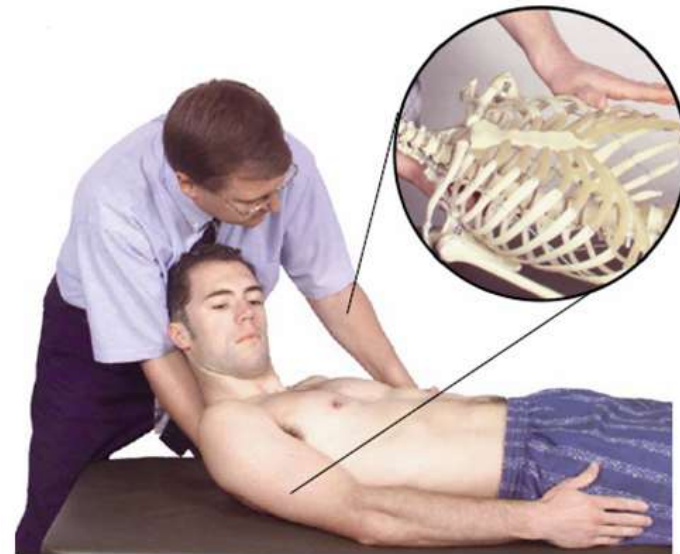
Kimberly Manual 2008, page 137

# Inhalation Rib Somatic Dysfunction (exhalation rib restriction)

Treat BOTTOM rib of group

RESPIRATORY Assistance

KM p126B

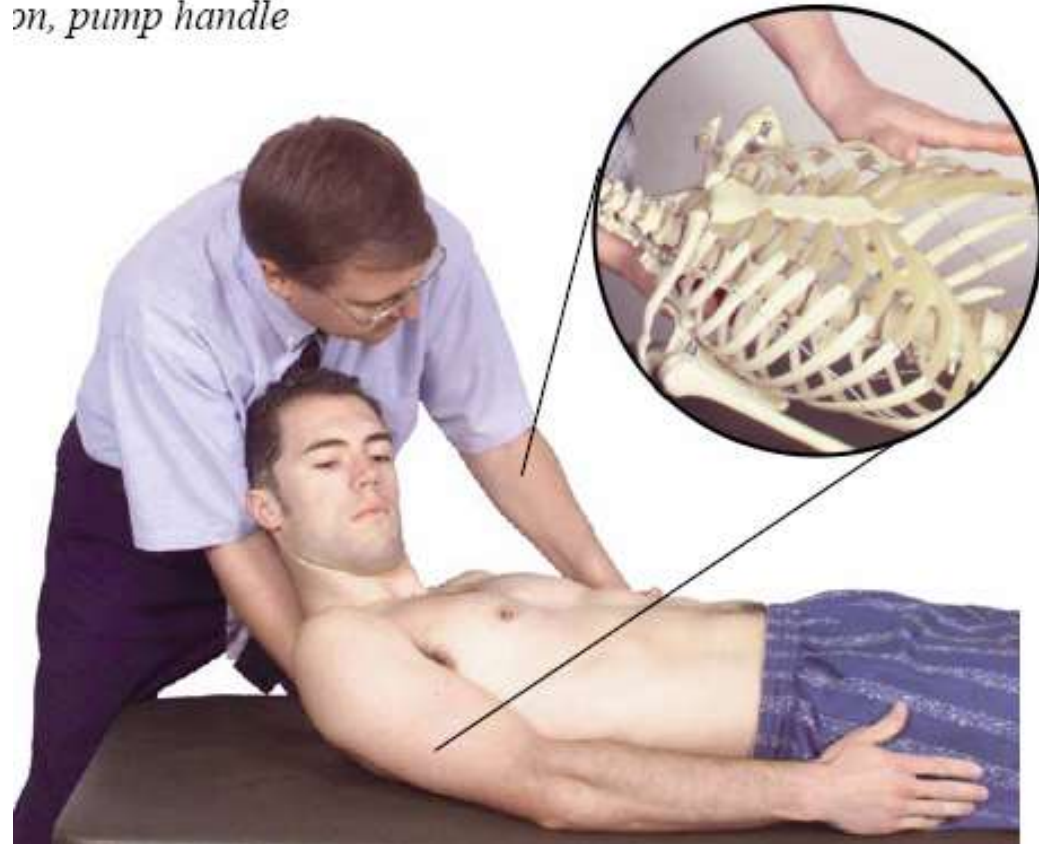


# Direct Muscle Energy Technique: Respiratory Assistance

Dx: Ribs 2-10 inhaled

*m, pump handle*

1. Patient is supine
2. Place thumb on superior margin of anterior aspect of dysfunctional rib
3. Place other hand under patient with fingers hooked under posterior angle of dysfunctional rib
4. Lift patient's head and thorax into flexion to barrier; have patient breathe forcibly and carry ribs to exhalation
  1. Posterior angle pulled superiorly
  2. Anterior aspect pushed inferiorly
5. Repeat until dysfunctional area releases
6. Recheck



Kimberly Manual 2008, page 126 B)

# Direct Muscle Energy Technique: Postisometric Relaxation

Dx: Ribs 2-10 Inhaled

1. Patient is supine
2. Place one hand under patient to mid-scapular region
3. Other hand contacts dysfunctional rib at mid-axillary line
4. Lift patient into forward bending to localize at dysfunctional rib
5. Patient gently/lightly sidebends away from rib, physician provides counter force for 3-5 seconds.
6. Physician carries rib further inferiorly at mid-axillary line.
7. Repeat until best rib motion is obtained.
8. Recheck



Kimberly Manual 2008, page 131A

# Direct Muscle Energy Technique: Traction with Respiratory Assistance

Dx: Rib 12 Inhaled

1. Patient is prone; arm on side of dysfunction is extended
2. Move lower extremities away from side of dysfunction
3. Pad of thumb at costovertebral joint serves as fulcrum (pivot point for rib 12)
4. Other hand grasps ASIS on side of dysfunction and lifts pelvis to point of tension
5. Patient breathes in; during exhalation, physician lifts hip so quadratus lumborum pulls rib into exhalation; repeat until best motion obtained
6. Recheck



Kimberly Manual 2008, page 140

# Direct Muscle Energy Technique: Respiratory Assistance

Dx: Abdominal Diaphragm Somatic  
Dysfunction

1. Grasp the lateral sides of the rib cage
2. Observe and palpate the patient's respiration to determine which hemi diaphragm is most restricted
3. Carry the rib cage to the direct fascial barrier in all three planes of motion
4. Have patient take deep breaths while resisting the motion of the rib cage on the side with the best motion
5. Recheck



Kimberly Manual 2008, page 55

# “Rib Raising”

## Direct Muscle Energy Technique: Respiratory Assistance

Dx: Restricted Rib Motion

1. Place pads of fingers on posterior angles of the inferior group of ribs
2. Lean back to lift the rib angles anteriorly and laterally as a group
3. Hold for several respiratory cycles until the tissues relax then let the ribs return posteriorly
4. Alternatively, lift/spring the rib angles in a slow, rhythmic motion for several resp. cycles
5. Move superiorly to the next group of ribs & repeat
6. After completing one side treat the other
7. Recheck rib motion



Kimberly Manual 2008, page 63

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