**PRINCIPLES of MUSCLE ENERGY TECHNIQUE**

*Definition, History, and Application*

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**Muscle Energy Technique**

*Definition*

– “... a form of osteopathic manipulative 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 counterforce.”

- Glossary of Osteopathic Terminology 2011
  Educational Council on Osteopathic Principles

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**Uses of Muscle Energy Technique**

- **Mobilize** joints in which movement is restricted
- **Stretch** tight muscles and fascia
- **Improve** local circulation
- **Balance** neuromuscular relationships to alter muscle tone
History

♦ T. J. Ruddy, D.O.
  – Osteopathic otolaryngologist & ophthalmologist
  – Developed a technique called:
    (Rapid) Resistive Duction
    – Asked patient to actively contract muscles quickly and repetitively (60x/s/min) against physician’s resistance
    • Increase blood flow to remove metabolic waste
    • To increase tone of weak/inactive muscles

History

♦ Fred Mitchell, Sr., D.O. ’41 CCOM
  – Recognized as the original developer of Muscle Energy Technique
    • 1948 - first described MET model in ‘Academy of Applied Osteopathy Yearbook’
    • 1958 AAO Yearbook ‘Structural Pelvic Function’
    • 1970 taught 1st muscle energy tutorial in Fort Dodge, Iowa attended by:
      J. Goodridge DO; P. Greenman DO; R. Miller DO;
      D. Nowland DO; E. Stiles DO; S. Sutton DO

History

♦ Original manual on muscle energy:
  • Authored by:
    – Fred Mitchell, Jr., D.O.
    – Peter Moran, D.O.
    – Neil Pruzzo, D.O.
Terminology

♦ Muscle Energy classically described as a:
  – ‘Direct’ technique
    • The physician directs the body part being treated toward the restrictive barrier
    • Best positioning is at “feather’s edge” of resistance/barrier
      – Two choices (between)
        • Which direction the physician has patient attempt to move.
        • While physician resists or applies a counter force

Mechanisms of Action

1. Post Isometric Relaxation
2. Reciprocal Inhibition (relaxation)
3. Joint Mobilization using Muscle Force
4. Respiratory Assistance (myofascial release phenomenon)
5. Oculocephalogyric (oculocervical) Reflex
6. Crossed Extensor Reflex

Muscle Energy Technique

♦ Indications: Clinically relevant somatic dysfunction

♦ Contraindications
  – Absolute: Absence of somatic dysfunction
    Lack of patient consent and/or cooperation
  – Relative
    • Infection, hematoma, or tear in involved muscle
    • Fracture or dislocation of involved joint
    • Rheumatologic conditions causing instability of the cervical spine
    • Undiagnosed joint swelling of involved joint
    • Positioning that compromises vasculature
Major Effects of MET

♦ Relaxation and stretching of spastic or inelastic myofascial elements
♦ Increasing trophic aspects of weak muscles
♦ Directly moving restricted joints
  – Remember!
    • Knowledge of muscle origins and insertions as well as functional anatomy is very important in the understanding the application of these techniques

Muscle Energy Technique

♦ Principles of Diagnosis
  – Identification of a specific motion restriction is critical. Specific findings of somatic dysfunction (A: asymmetry, R: restriction of motion, T: tissue texture changes/abnormalities, T: tenderness) are utilized in the muscle energy model.

  Accurate & specific diagnosis of somatic dysfunction is key for successful treatment

Muscle Energy Technique Treatment Sequence

Step # 1

♦ Physician positions the bone, joint, or body part to be treated to the “feather’s edge” (point of initial resistance) of the restrictive barrier (all three planes of motion)
### MET Treatment Sequence

**Step # 2**
- Physician instructs patient to contract specific muscles, in a specific direction against the physician’s unyielding counterforce for 3-5 seconds.

**Step # 3**
- The patient is instructed to STOP, cease the contraction (“Relax” or “go to sleep”).

**Step # 4**
- A pause of 1-2 seconds is necessary for neuromuscular adaptation (post-relaxation phase).
- After 1-2 seconds, the physician slowly repositions the patient to the “feather’s edge” of the new restrictive barrier in all three planes.
MET Treatment Sequence Step # 5

- Steps 1-4 are repeated until the best possible increase in motion and tissue texture change is obtained. This usually requires 3-5 contractions depending on the body region treated and patient tolerance.

MET Treatment Sequence Step # 6

- The physician re-evaluates the diagnostic components (ARTT) of the somatic dysfunction to determine the effectiveness of the technique.

Costal Muscle Energy Techniques

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**Palpatory Diagnosis: Costal Region (Ribs)**

Physiologic Motions of Ribs
- Pump Handle (Rib 1 > 2)
- Bucket Handle (7-10)
- Caliper / Scissors (11 & 12)
- Mixed or Combined Pump/Bucket
- 3-6

*NOTE: ALL Ribs (1-10) have some combination of pump handle & bucket handle motion*

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**Types of Rib/Costal Dysfunctions**

- Based on freedom of rib motion!
- Static palpation with costal springing
- Tested with respiratory movement
  - Inhalation: elevated
  - Exhalation: depressed

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**Costal Dysfunctions**

- **Inhalation**
  - Rib moves best in the inhalation direction
    - Cephalad (upward) and lateral in ribs 1-10
    - Posterior in ribs 11-12 (may move slightly down/inferior due to pull of Quadrartus Lumborum)
- **Exhalation**
  - Rib moves best in the exhalation direction
    - Caudal (downward) and medial in ribs 1-10
    - Anterior in ribs 11-12
### Respiratory/Physiologic Costal Motion Model

1st Rib - anterior

1st Rib - posterior

Ribs 3-6 anterior

Ribs 7-10 anterior

Ribs 11-12 posterior

### Exhalation Rib Dysfunctions
- Muscle contraction holding rib in exhalation direction (position or free/ease direction)
- Treatment may be directed to post-isometrically relax hypertonic muscle that is causing problem or..
- Reciprocally relax (inhibit) hypertonic muscle or..
- Most commonly effective for articular rib dysfunctions, use muscle action to mobilize restricted rib

### Scalene Muscles

**Anterior Scalene:**
- Origin: anterior tubercles of C3-6 transverse processes
- Insertion: superior surface of the first rib

**Middle Scalene:**
- Origin: posterior tubercles of C2-7 transverse processes
- Insertion: superior surface of the first rib, posterior to the groove for the subclavian artery

**Posterior Scalene:**
- Origin: posterior tubercles of C5-7 transverse processes
- Insertion: superior surface of the second rib
**Ribs 1 & 2 Exhalation Dysfunction**

*Use anterior & middle scalene muscles to pull rib cephalad!*

1. Physician places one hand on Pt’s wrist & other on posterior superior rib angle and pulls caudad and laterally.
2. Patient elevates/lifts head against physician’s resistance for 3-5 secs.
3. After 3-5 secs, Pt. instructed to relax & physician pulls caudad and laterally on superior angle of dysfunctional rib.

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**Ribs 3-5 Exhalation Dysfunction**

*Uses pectoralis minor muscle to pull rib cephalad!*

- Physician places one hand on Pt’s elbow & other on posterior superior rib angle and pulls caudad and laterally.
- Patient pushes/lifts elbow against physician’s resistance for 3-5 secs.
- After 3-5 secs, Pt. instructed to relax as physician pulls caudad and laterally on superior angle of dysfunctional rib.

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**Pectoralis Minor Muscle**

- [Image of Pectoralis Minor Muscle]
**Serratus Anterior Muscle**

- Physician places one hand on Pt's elbow & other on posterior superior rib angle and pulls caudad and laterally.
- Patient pushes/lifts elbow against physician's resistance for 3-5 seconds.
- After 3-5 secs. Pt. instructed to relax as physician pulls caudad and laterally on superior angle of dysfunctional rib.
- Repeat 5-7 times.

**Ribs 6-8 Exhalation Dysfunction**

Uses serratus anterior muscle to pull rib cephalad!

- Physician places one hand on Pt's elbow & other on posterior superior rib angle and pulls caudad and laterally.
- Patient pushes/lifts elbow against physician’s resistance for 3-5 seconds.
- After 3-5 secs. Pt. instructed to relax as physician pulls caudad and laterally on superior angle of dysfunctional rib.
- Repeat 5-7 times.

**Latissimus Dorsi Muscle**

This muscle is involved in the exhalation function and helps in pulling the ribs cephalad.
Ribs 9-10 Exhalation Dysfunction
Uses latissimus dorsi muscle to pull rib cephalad!

1. Physician abducts the Pt’s shoulder 90 degrees
2. Physicians grasps posterior superior rib angle and pulls caudad and laterally
3. Patient instructed to push (adduct) against physician’s body/hip/thigh for 3-5 secs.
4. After 3-5 secs. Pt. instructed to relax & physician pulls caudad and laterally on superior angle of dysfunctional rib
5. Repeat 5-7 times

Quadratus Lumbarum Muscle

1. Physician positions Pt’s legs to put tension on QL
2. Physicians hypothenar eminence placed inferior to 11th rib
3. Physician grasps Pt’s iliac crest & pulls caudal (white arrow)
4. Patient instructed to inhale & raise iliac crest (black arrow) against physician resistance (white arrow)
5. After 3-5 secs. Pt. instructed to relax & physician pulls caudal on iliac crest while maintaining cephalad pressure on inferior aspect of 11th rib; Repeat 5-7 times

Rib 12 Exhalation Dysfunction
Uses quadratus lumborum muscle to pull rib posterior!

1. Physician positions Pt’s legs to put tension on QL
2. Physicians hypothenar eminence placed inferior to 11th rib
3. Physician grasps Pt’s iliac crest & pulls caudal (white arrow)
4. Patient instructed to inhale & raise iliac crest (black arrow) against physician resistance (white arrow)
5. After 3-5 secs. Pt. instructed to relax & physician pulls caudal on iliac crest while maintaining cephalad pressure on inferior aspect of 11th rib; Repeat 5-7 times
Etiology of 1st & 2nd Rib Inhalation Dysfunctions

Anterior Scalene  Middle Scalene  Posterior Scalene

1. Physician places MCP joint of index finger on posterior superior angle of rib, lateral to costotransverse process
2. Pt’s head is flexed, side bent toward & rotated away to take tension off scalenes on side of dysfunction
3. Patient inhales as physician resists inhalation motion of rib
4. As patient exhales, physician exaggerates exhalation
5. Repeat inhalation/exhalation cycle 5-7x’s

Rib 1 Inhalation Dysfunction
Respiratory Assist

Supine Variation

Resist Inhalation  Exaggerate Exhalation
1st Rib Dysfunctions

- Post-isometric relaxation method
  - How does this work if muscle is causing rib to be cephalad?
  1. Hold head neck away while holding rib down
  2. Make muscle contract
    - Don’t let muscle move rib!
  3. Patient relaxes
    - After contraction, pull head & neck away and push rib down to new barrier
  4. Repeat
  5. Eventually, this stretches tight muscle
    - Permitting normal motion and positioning

Rib 1 Inhalation Dysfunction
Post Isometric Relaxation

1. Physician places thumb over anterior medial aspect of rib
2. Pt’s head rotated away & adds slight extension to put tension on scalenes on side of dysfunction
3. Patient instructed to push head forward & down to the right against physician resistance for 3-5 secs; then STOP/Relax
4. While maintaining pressure over anterior medial aspect of rib, Physician gently extends head/neck to new barrier

Rib 1 Inhalation Dysfunction
Post Isometric Relaxation
Supine Variation

- Rotation /Extension barrier
- Pt. instructed to lift neck up & to the right against physician resistance: physician also resists inhalation motion of rib
- Extension barrier
**Ribs 2-6 Inhalation Dysfunction**

1. Flex, side bend T-sp/rib cage to side/level of dysfunction
2. Physician places index finger/thumb on anterior superior surface of dysfunctional rib
3. Patient inhales as physician resists bucket handle motion
4. As patient exhales, physician exaggerates exhalation
5. Repeat inhalation/exhalation cycle 5-7x’s

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**Ribs 7-10 Inhalation Dysfunction**

1. Side bend T-sp/rib cage to side/level of dysfunction
2. Physician places index finger/thumb on superior surface of dysfunctional rib
3. Patient inhales as physician resists bucket handle motion
4. As patient exhales, physician exaggerates exhalation
5. Repeat inhalation/exhalation cycle 5-7x’s

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**11th & 12th Ribs Inhalation Dysfunction**

Position Pt’s legs & Thoraco-lumbar spine toward side of dysfunction to take tension off Quadratus

Physician’s hypothenar eminence placed inferior to rib; exerts gentle pressure cephalad & lateral

Resist Inhalation  Exaggerate Exhalation