



بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ



# Laboratory

RHS 221

Manual Muscle Testing

Theory – 1 hour

practical – 2 hours

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# Testing the Muscles of the Trunk

1. **Trunk Flexion**
2. **Trunk Extension**
3. **Trunk Rotation**

# Definitions

- The **trunk**, or **torso**, is the body excluding the head, neck, and limbs. The **thorax** (rib cage), the **abdomen** (belly), the **pelvis** (hip bones), and the **low back** are all parts of the trunk.
- The abdomen is the region of the trunk located below the diaphragm.
- It consists of the:
  - Abdomen proper
  - Lesser pelvis
- Which are continuous with each other through the pelvic inlet.
- Trunk Muscles: consist of back extensors that bend the trunk backward, lateral flexors that bend it sideways, anterior abdominals that bend it forward or tilt posteriorly, and combinations of these muscles that rotate the trunk in a clockwise or a counter-clockwise manner.

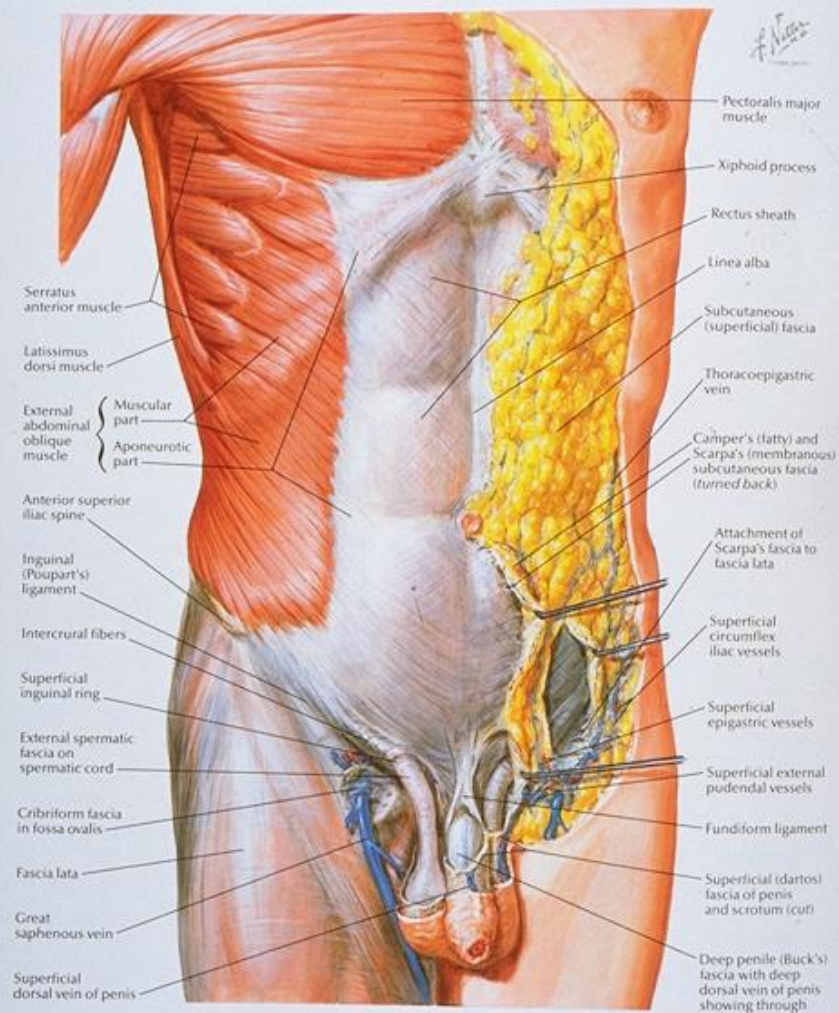


PLATE 232

ABDOMEN

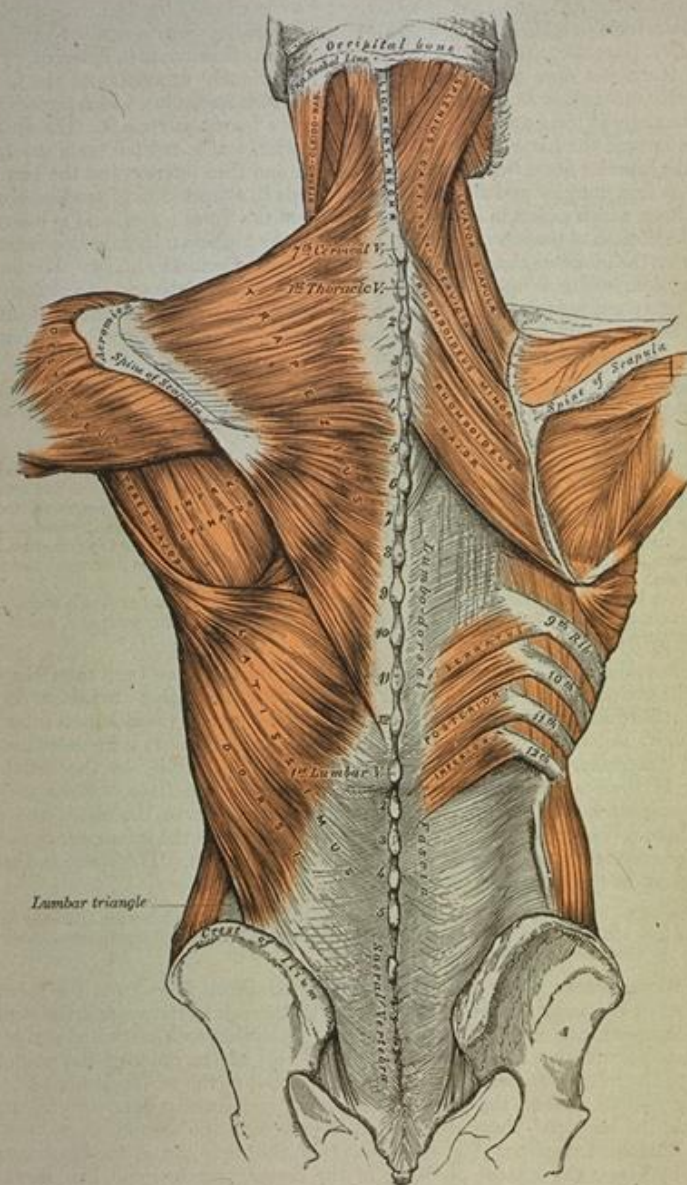
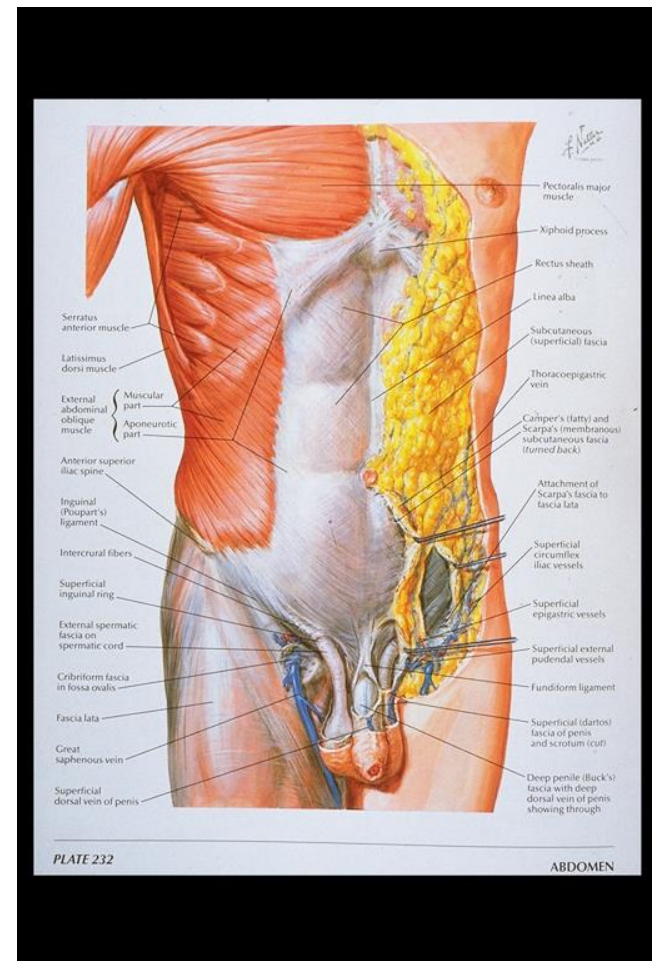


FIG. 409.—Muscles connecting the upper extremity to the vertebral column.



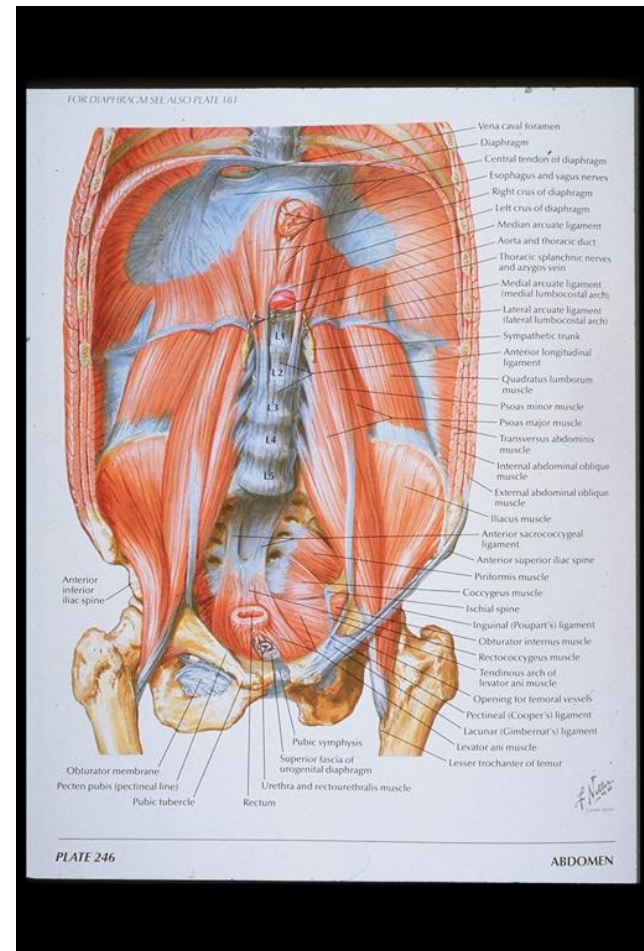
# Musculo- Aponeurotic Wall of Abdomen

- Anterior wall
  - Rectus abdominis
  - Pyramidalis
  - Rectus sheath
- Lateral wall
  - Transversus abdominis
  - Internal oblique
  - External oblique
  - Iliacus



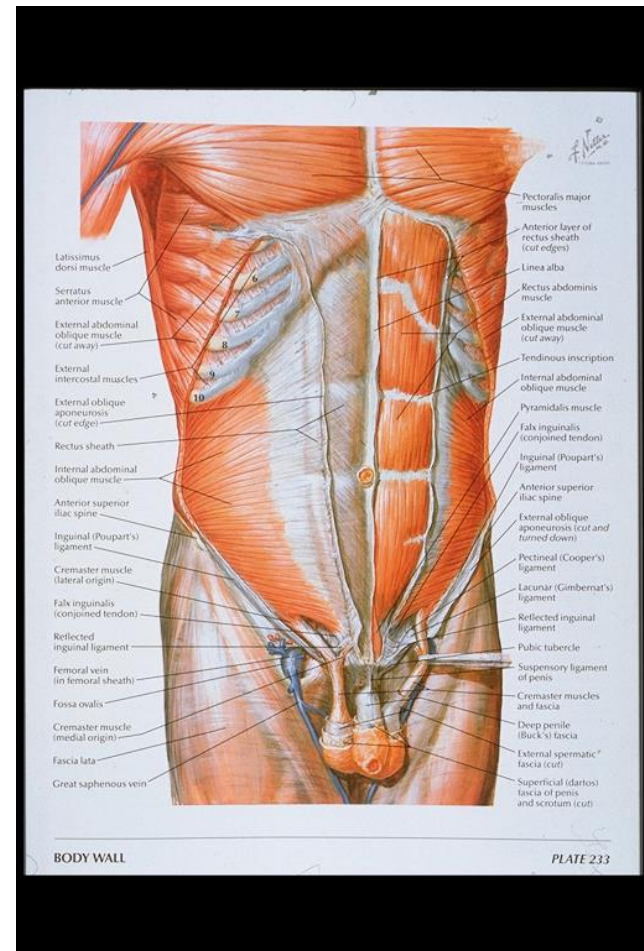
# Musculo-Aponeurotic Wall of Abdomen

- Posterior wall
  - Psoas muscles
  - Quadratus lumborum
  - Piriformis
- Superior wall
  - Diaphragm
- Inferior wall
  - Muscles of pelvic floor



# Rectus Abdominis

- Origin:
  - Pubic crest and symphysis
- Insertion
  - Costal cartilages of ribs 5-7 and xiphoid
- Action
  - Flexes vert. column
  - With thorax fixed, can post'ly rotate pelvis



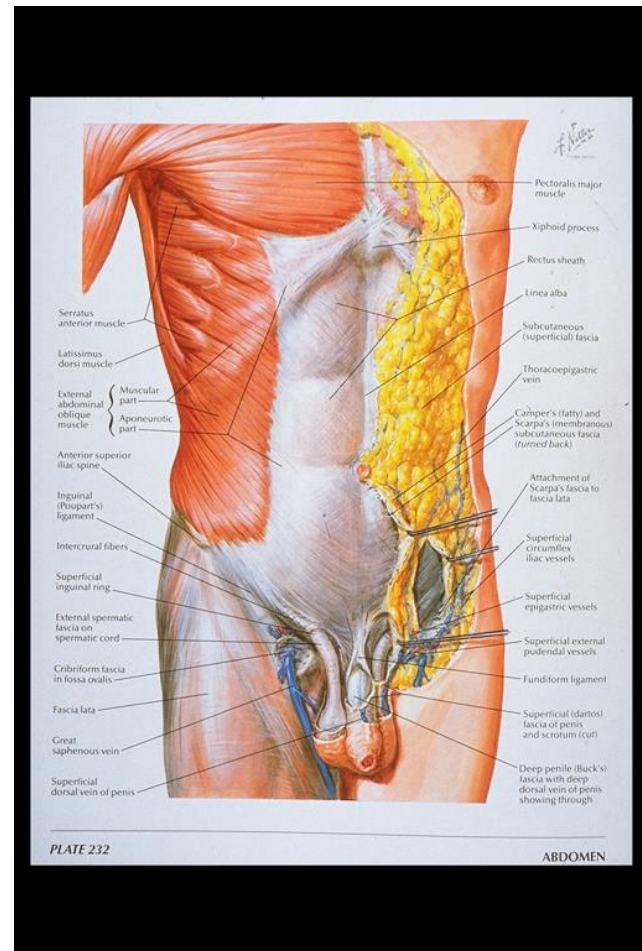


# Abdominal Muscles

- Lateral Muscles
  - External Abdominal Oblique
  - Internal Abdominal Oblique
  - Transversus Abdominis
- Anterior Muscle
  - Rectus Abdominis

# Attachments of External Abdominal Oblique

- Origin
  - Lower 8 ribs, interdigitating w/serratus ant. and latissimus dorsi
- Insertion:
  - From lower 2 ribs to ant. half of outer lip of iliac crest

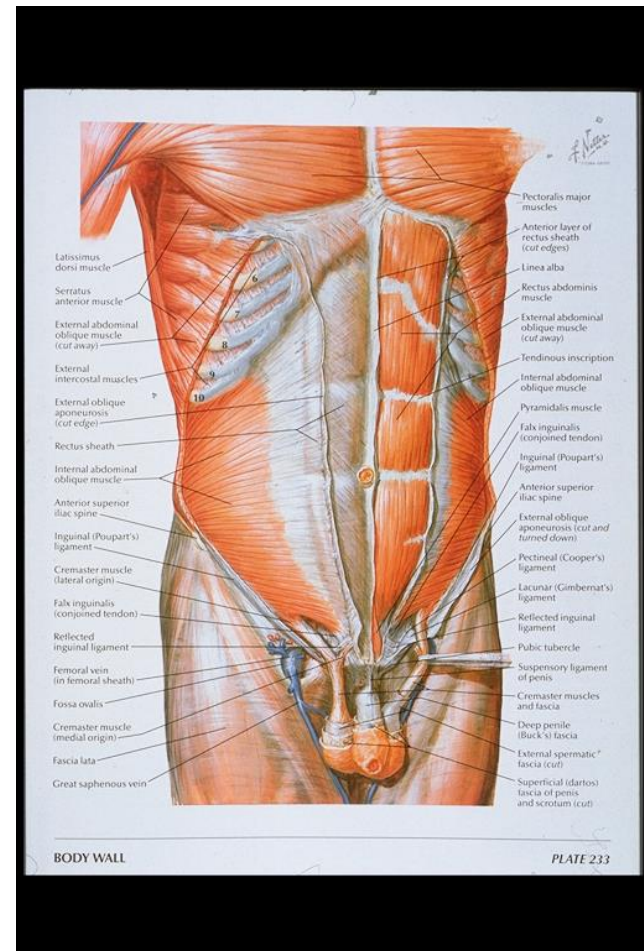


# Action of External Oblique

- Support and compress abdominal viscera
- Assist in forced expiration
- Acting bilaterally, flex vertebral column
- ***Lateral fibers***
  - Acting bilat'ly, post'ly rotate pelvis
  - Acting unilat'ly, lat'ly flex vertebral column
- ***Anterior fibers***
  - Acting unilat'ly, flex and contralat'ly rotate

# Attachments of Internal Abdominal Oblique

- Origin
  - Lat. 2/3 inguinal lig, ant. 2/3 iliac crest (intermeddle. lip)
- Insertion
  - Post. fibers to lower 3(4) ribs, fibers from inguinal lig. to pubic crest & remaining fibers end in aponeurosis of internal oblique





# Action of Internal Oblique

- Support and compress abdominal viscera
- Assist in forced expiration
- Acting bilaterally, flex vertebral column
- Acting unilaterally, upper fibers laterally flex and rotate vertebral column to same side

# Trunk Flexion

## 1. Prime mover/agonist: **Rectus Abdominus**

	origin	insertion
Rectus abdominis	pubis	ribs 5-7 (costal cartilages) sternum (xiphoid)
Obliquus externus	ribs 5-12	iliac crest (outer border) linea alba
Obliquus internus	iliac crest, inguinal ligament	ribs 9-12 inferior border ribs 7-9 cartilages

## 2. Synergist/ Accessory muscles:

Psoas major and Psoas minor

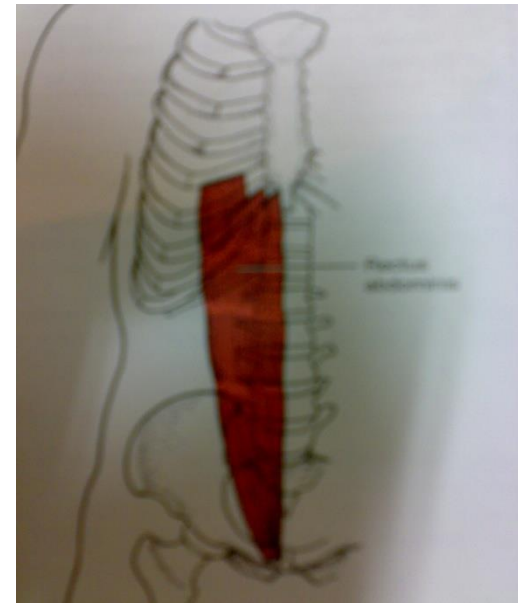
## 3. Nerve supply:

nerve roots from T7-T12

## 4. Range of motion:

0° to 80°

- Fingertips to floor.
- Measure the distance from C7 to L5.



# Trunk Flexion

## 5. Fixation:

- a. By Reverse action of hip flexor muscles.
- b. By weight of legs and pelvis.
- c. By stabilize the legs.

## 6. **Effect of weakness** and contracture:-**Video?**

effect of weakness: **anterior tilt** of pelvis by trunk extensor contraction.  
Decrease the ability to flex the vertebral column.

## 7. Factor limited range of motion:

- a. Tension of Posterior longitudinal ligament, ligamentum of flava, and interspinal and supraspinal ligaments.
- b. Tension of spinal extensor muscles.
- c. Contact of lateral ribs with abdomen

## 8. Substitution:

None.

# Trunk Flexion

## 9. Procedures:

**a- patient position (pt):**

**b- Therapist Position:**

inner hand:

Outer hand:

Direction of Resistance :

Instruction to patient:

**c- grading system:**

Normal(5), Good(4), Fair(3), Poor(2), Trace(1), Zero(0)

make sure patient tolerates maximal resistance plus hold 3 sec.

**e. Palpation site:**



# Trunk Extension

1. Prime mover/agonist: erector Spinalis (Para spinal muscles )

origin

insertion

Iliocostalis thoracis	ribs 12 up to 7	ribs 6 up to 1
Iliocostalis lumborum	tendon of erector spinae iliac crest (external lip)	ribs 6-12
Longissimus thoracis	tendon of erector spinae L1-L5 vert.(tp)	T1-T12 vert. (tp)
Spinalis thoracis	tendon of erector spinae T11-L2 vert.(sp)	T1-T4 vert.(sp)
Semispinalis thoracis	T6-T10 vert.(tp)	C6-T4 vert.(sp)
Multifidus	Sacrum (posterior) ilium (PSIS)	Spinous processes of higher vert.

2. Synergist/ Accessory muscles:

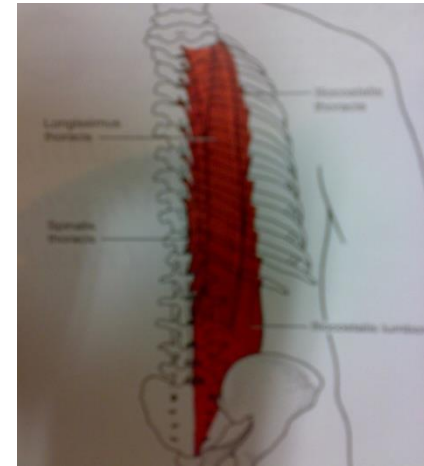
Gluteus maximus.

3. Nerve supply:

nerve roots from each vert. levels. (T1-L5)

4. Range of motion:

Lumbar Spine 0° to 25°



# Trunk Extension

## 5. Fixation:

- a. By contraction of gluteus maximus and hamstring muscles.
- b. Weight of pelvis and legs.

## 6. **Effect of weakness and contracture:-Video?**

- Decrease the ability to extend the trunk from lying.
- walk with flexion deformity.
- posterior tilt of pelvis by trunk flexors contraction

## 7. Factor limited range of motion:

- a. Tension of anterior longitudinal ligament of spine.
- b. Tension of anterior abdominal muscles.
- c. Contact of Spinous processes

## 8. Substitution:

None.

# Trunk Extension

## 9. Procedures:

### a- patient position (pt):

**Lumbar and Thoracic Spine: prone**

**Thoracic Spine : Half prone position**

### b- Therapist Position:

inner hand:

Outer hand:

Direction of Resistance :

Instruction to patient:

### c- grading system:

Normal(5), Good(4), Fair(3), Poor(2), Trace(1), Zero(0)

make sure patient tolerates maximal resistance plus hold 3 sec.

### e. Palpation site:

# Trunk Rotation

## 1. Prime mover/agonist:

	origin	insertion
Obliquus externus	ribs 5-12	iliac crest (outer border) linea alba
Obliquus internus	iliac crest, inguinal ligament	ribs 9-12 inferior border ribs 7-9 cartilages

## 2. Synergist/ Accessory muscles:

None.

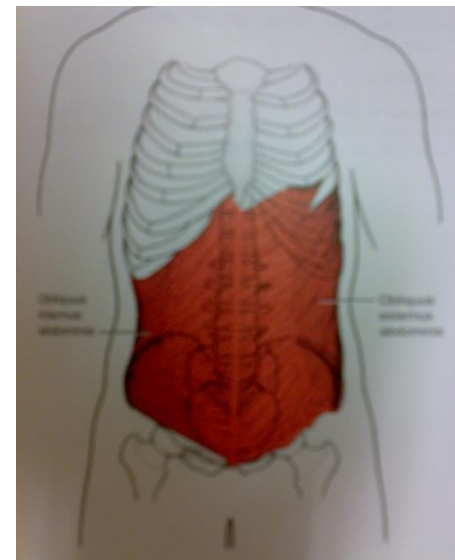
## 3. Nerve supply:

nerve root from T7-T12- L1

## 3. Range of motion:

0° to 45°

- Spinal Inclinator: Objective Measurement of Lumbar Spine.
- Linear Assessment of Lumbar Motion with Tape Measure





# Trunk Rotation

## 5. Fixation:

- a. By Reverse action of hip flexor muscles.

## 6. Effect of weakness/contracture/shortening:

effect of weakness: may results in:

Decrease the strength of trunk rotation.

## 7. Factor limited range of motion:

- a. Tension of annulus fibrosus between vertebrae.
- b. Tension of oblique abdominal muscles on side opposite those being tested.
- c. In thoracic area, tension of costovertebral ligaments.
- d. In lumbar area, interlocking of articular facets.

## 8. Substitution:

by Pectoralis major.

# Trunk Rotation

## 9. Procedures:

**a- patient position (pt):**

**b- Therapist Position:**

inner hand:

Outer hand:

Direction of Resistance :

Instruction to patient:

**c- grading system:**

Normal(5), Good(4), Fair(3), Poor(2), Trace(1), Zero(0)

make sure patient tolerates maximal resistance plus hold 3 sec.

**e. Palpation site:**



Thank You