

MSDW  
MANIPULATION SKILL  
DEVELOPMENT WORKSHOP  
LUMBAR SPINE L/S JUNCTION  
NICK BURATOVICH, NMD

## Ideal Posture

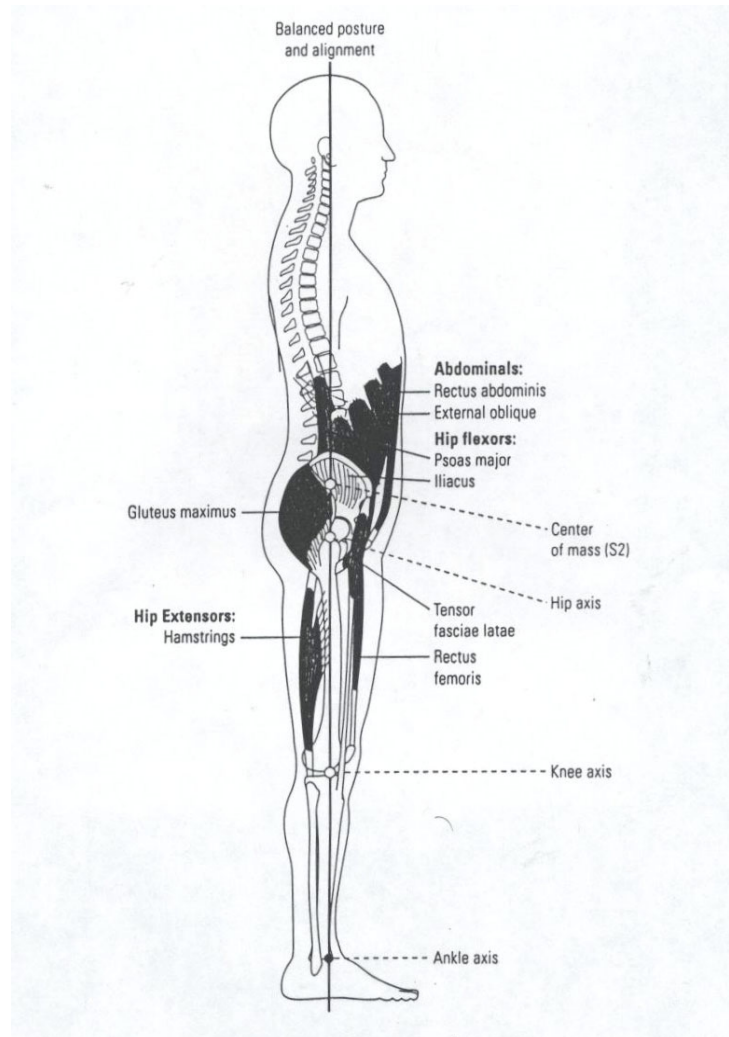
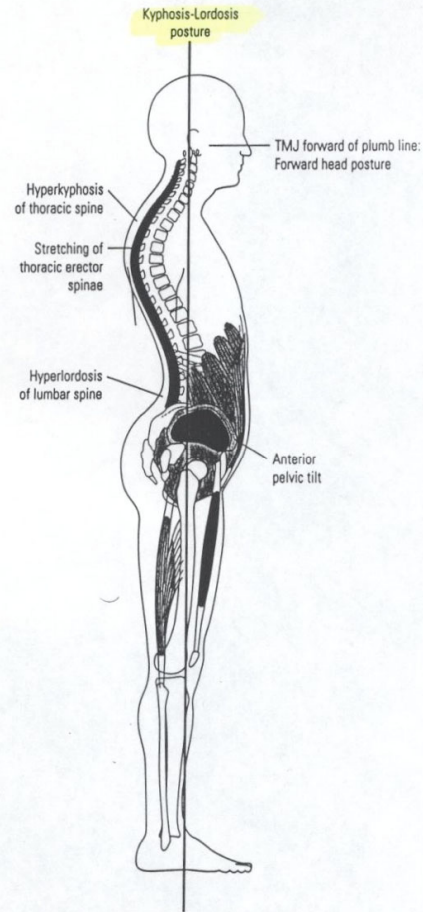


FIG. 59-17 *Ideal posture* referenced to a plumb line alignment on side view that corresponds to the gravitational force line. In this postural alignment, the pelvis is balanced anteriorly and posteriorly because of a muscular balance among the various muscles affecting the pelvis. Anteriorly, the abdominal muscles exert an upward pull that is balanced by the downward pull of the hip flexors. Posteriorly, the back muscles exert an upward pull that is counterbalanced by the downward pull of the hip extensors.

Although patients with postural pain are often pain free after a good night's rest, maintaining faulty posture throughout the day may lead to backache.

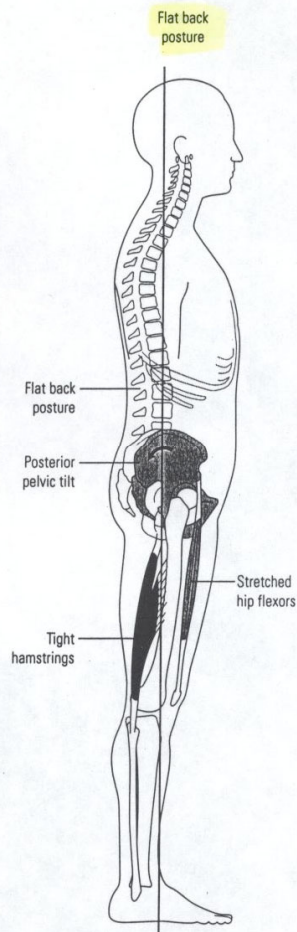


## Kypholordotic Posture

**Hyperlordotic posture.** Also known as the *kypholordotic posture*,<sup>45</sup> is characterized by an increase in lumbar lordosis that is accompanied by anterior pelvic tilt, and hip flexor tightness (Fig. 59-18). This posture, typical in the last trimester of pregnancy, may also occur in obese persons, or those having weak abdominal muscles. Radiographically, the patient will demonstrate an increase in the *lumbosacral angle*.<sup>43</sup> This posture stresses the anterior longitudinal ligament, approximates the articular facets, and narrows the posterior disk space and intervertebral foramina.<sup>26</sup> Muscle imbalances observed include tight hip flexors and erector spinae, as well as stretched abdominal muscles and hamstrings, the latter noted by a good angle during straight leg raising. Clinically, the patient demonstrates a positive *Thomas test*.

FIG. 59-18 The *kypholordotic posture* is characterized by an increase in lumbar lordosis that is accompanied by anterior pelvic tilt, and hip flexor tightness, stretching of the abdominal and hamstring muscles, and forward head posture.

Although patients with postural pain are often pain free after a good night's rest, maintaining faulty posture throughout the day may lead to backache.



• **Flat back posture.** This is characterized by decreased lumbosacral angle and consequently lumbar lordosis (hypolordosis) and posterior pelvic tilt (Fig. 59-20). The lack of the normal physiologic shock-absorbing lordosis predisposes the low back to injury, while stressing the posterior longitudinal ligament. Muscle imbalances observed include tightness of the trunk flexors, namely the rectus abdominis and intercostals and hip extensor muscles, as well as stretched and weakened lumbar extensor and hip flexor musculature,<sup>78</sup> although tight hamstrings and weak hip flexors are the most consistent findings. Slight knee flexion may also occur because of excessive hamstring tightness.<sup>20</sup>

FIG. 59-20 *Flat back posture* is characterized by hamstring tightness that pull the pelvis into posterior tilt and accompanying flat lumbar back, as well as weakness of the hip flexors.

## Flat Back Posture

Although patients with postural pain are often pain free after a good night's rest, maintaining faulty posture throughout the day may lead to backache.

## Swayback Posture

**Swayback posture.** This is often mistaken for the hyperlordotic posture, but is uniquely characterized by posterior pelvic rotation, forward hip displacement, a flattened lower lumbar spine, a slight lordosis of the upper lumbar spine, increased thoracic kyphosis,<sup>33</sup> and is often accompanied by a forward head (Fig. 59-19). This posture is a relaxed one and causes stress to the iliofemoral ligaments, the anterior and posterior longitudinal ligaments of the upper lumbar and thoracic spine, narrowing of the intervertebral foramina and facet approximation in the lower lumbar spine. The strong *iliofemoral ligament*, also known as the "Y" ligament of Bigelow because it resembles an inverted Y at its stem, courses from the lower aspect of the anterior inferior iliac spine with divergent bands attaching along the length of the intertrochanteric line of the femur. Because it lies on the anterior side of the hip joint, it passively limits hyperextension of the hip joint<sup>43</sup> and one may literally stand in such a posture so as to balance themselves by passive stretch of these ligaments.<sup>78</sup> In this position, the body's weight tends to roll the pelvis backward on the femoral heads. The posterior pelvic tilt accompanying the swayback posture places this ligament on stretch. Muscle imbalances accompanying the swayback posture include tightness of the upper abdominal muscles and upper segments of the rectus abdominis and obliques, internal intercostal, hip extensors, lower lumbar extensor musculature, and the hamstrings; as well as stretched lower abdominal muscles, extensor muscles of the lower thoracic region, and the hip flexor muscles. The cause of this posture may derive from muscle weakness and may also relate to emotional affect,<sup>5</sup> reflecting a defeated attitude.

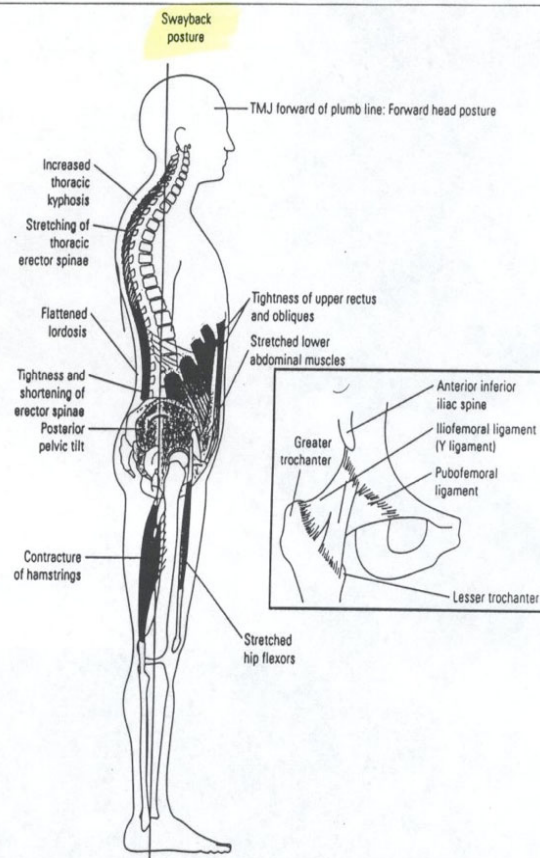


FIG. 59-19 Swayback posture is characterized by posterior pelvic rotation, forward hip displacement, a flattened lower lumbar spine, a slight lordosis of the upper lumbar spine, increased thoracic kyphosis, hamstring, erector spinae and upper abdominal tightness, stretching of the lower abdominal and hip flexors, and forward head posture.

# Pelvic Blocking

- There are two contact points used on the prone patient. The contact points are:
  1. The inguinal fold (the femoral head of one side)
  2. The ASIS (of the other side)
- The choice of contacts are dependent on the position of the ilium. The blocks are positioned to “push” the ilium in a opposite direction of its listing. So if the ilium is extended (anterior) on the lesion side the blocks are positioned to “force” flexion on that side. If the ilium is flexed (posterior) on the lesion side the blocks are positioned to “force” extension on that side. The side that is PI (posterior/inferior) is the most common lesion and the side on which the block is set initially. The listing is determined by assessing the positions of the PSIS’ through static palpation.

# Pelvic Blocking

- LEFT PI ILIUM:
  - In this listing the left ilium is posterior and inferior. It is flexed. The blocks are placed:
    1. One block is placed at the left inguinal fold area at the femoral head. This is to facilitate extension of the left ilium.
    2. The second block is placed at the ASIS of the right ilium (the side opposite posterior torsion) to facilitate right ilium flexion.

# Pelvic Blocking

- RIGHT PI ILIUM
  - In this listing the right ilium is posterior and inferior. It is flexed. The blocks are placed:
    1. One block is placed at the right inguinal fold area at the femoral head. This is to facilitate extension of the right ilium.
    2. The second block is placed at the ASIS of the left ilium (the side opposite posterior torsion) to facilitate left ilium flexion.

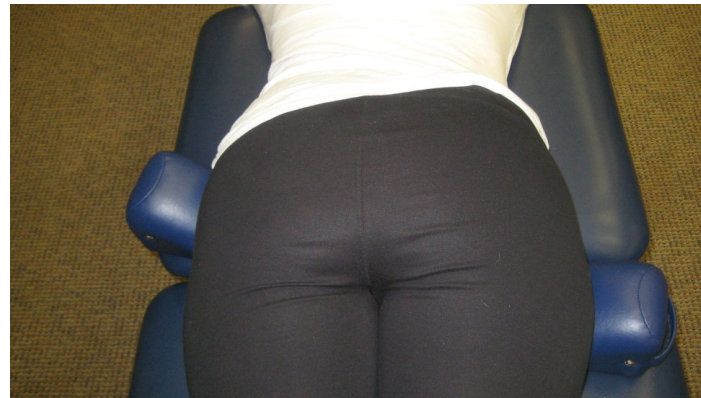


# PELVIC BLOCKING

**LEFT PI**



**RIGHT PI**



# LS MANIPULATION

- When the ilium is rotated posterior on one side the contralateral L5 is rotated posterior. There may also be a fixation of L5 on the sacrum.
- L: Posterior TP of L5 or motion restriction
- PP: Basic position
- DP: Basic LS position facing cephalad
- CH: Caudad hand (table side) hand using palmar surface of the first knuckle on the TP/MP of L5
- IH: Patient's upside shoulder ball, apply cephalad traction through trunk rotation

# LS MANIPULATION

- TT: Slack is taken in a superior/lateral direction
- PTM: While in position rock the patients body back and forth feeling for relaxation. Includes varying degrees of rotation traction with trunk torsion and rocking the L/S region back and forth maintaining the tension between the contact and indifferent hands.
- TM: (Lunge) The doctor's lateral thigh creates rotational (downward) torsion through traction on the long lever of the lateral femur. Thrust by body drop as contact hand (palmar aspect of first knuckle) pushes L5 in a direction so as to rotate/mobilize the L5/sacrum complex

# LS MANIPULATION - LUNGE



# LS MANIP - THIGH CONTACT



# LS MANIPULATION - LUNGE



# LS MANIPULATION

- TM: (Kick) The doctor's anterior knee contacts the patient's proximal lateral knee. Thrust by a kicking motion, like starting a motorcycle or kicking a ball as the contact hand (middle finger) pulls the TP/MP complex in a rotation direction so as to rotate/mobilize L5
- CH: In this contact, instead of the palmar index, the middle finger contacts the downside SP of L5 and with the thrust 'pulls' the vertebra into rotation to restore position or motion

# LS MANIP - KICK





# LS MANIP - KICK



# LS/HIP Orthopedic Tests

- **TRENDELENBURG'S TEST:** Standing pt flexes each hip/leg. Indicates weak glut medius or hip lesion/path on stance side when iliac crest on swing side drops lower than stance side. May also indicate S/I lesion on stance side if local pain.
- **THOMAS' TEST:** Supine pt flexes knee to chest. Positive if opposite thigh flexes off table = flexion contracture on extended leg side. If pain on flexed side is localized to L or L/S area or hip may be a S/S.
- **PATERICK - FABERE (FIGURE 4):** In supine pt flex, abduct, externally rotate and extend leg by putting ankle on opposite knee. Contact opposite ASIS and press down on knee. The localization of pain may indicate a hip, S/I, or groin lesion.

# LS/HIP Orthopedic Tests

- ELY'S TEST: Prone pt flexes leg ,ankle to opposite buttock. If has hip flexion contracture the hip will flex off table. Local pain may indicate a L/S or S/I S/S lesion.
- NACHLA'S TEST: Prone pt brings ipsilateral ankle to buttock. A radiating pain to the ant thigh indicates a disc or nerve root (L2,L3,L4) lesion as the femoral nerve is stretched. Local pain may indicate a S/I or L/S S/S lesion.
- HIBBS TEST: A prone pt flexes knee to 90\* and move leg outward (int rot of hip). Localize pain to hip or a S/I S/S lesion or piriformis spasm.
- YEOMAN'S TEST: Prone pt flexes knee to 90\* and extends thigh, downward pressure is place on ipsilateral S/I . Localize pain to hip, or to ant ligaments of the S/I, facets or L/S lesion. Radiating pain = nerve or disc.
- HOOVER'S TEST: A test for symptom magnification or amplification ie. malingering. The supine pt raises the involved leg while the Dr. places a hand under the opposite heel and downward pressure should be felt if the pt is trying to lift the opposite leg.

WADDELL'S SIGNS +  
 FUNCTIONAL OVERLAY  
 "AMPLIFIER" "MAGNIFIER" Back pain

**Detecting the symptom amplifier**

Use these tests to elicit nonorganic physical signs\* in someone who amplifies symptoms:

- *Simulation of spine loading or rotation* While the patient is standing, lightly press down on the top of his or her head, or rotate his hips and pelvis in the same plane. Neither causes lumbar discomfort in someone with acute low-back pain (see Figure 1).
- *Nonorganic tenderness* Lightly touch the paraspinal muscles; pronouncements of pain suggest amplification of symptoms (see Figure 2).
- *Distraction straight-leg raising* Straighten the patient's leg while he is seated; this produces the anatomic equivalent of the straight-leg-raising test, but if the patient is amplifying symptoms, the results of the two tests will not match (see Figure 3).
- *Inappropriate sensory findings* Perform pinprick sensory evaluation of several dermatomes; if differences or inaccuracies in perception cannot be explained by neuroanatomic principles, suspect psychogenic pain.
- *Overreaction during examination* Assess the patient's overall cooperation and response during the examination, bearing in mind the patient's effort and inappropriate grimacing or groaning during simple tests. Although completely subjective, this judgment may be the single most important clue to possible psychological problems. If the patient

\*Waddell G, McCulloch JA, Kummel E, et al: Nonorganic physical signs in low back pain. *Spine* 1980;5:117-125.

gives three—or even two—positive responses, it is very likely that he amplifies symptoms and management will be difficult.

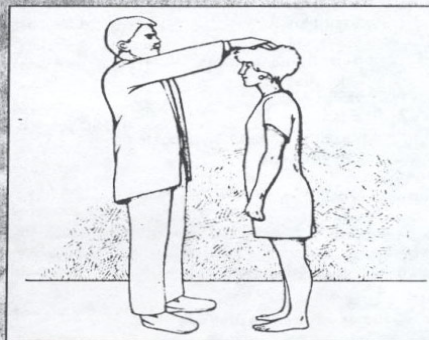


FIGURE 1: **Simulation** should cause no pain whatsoever in the lumbar spine. With the patient standing, apply very gentle downward pressure on the top of the head. If the patient collapses or complains of severe lumbar pain, consider the response inappropriate.



FIGURE 2: **Nonorganic tenderness** can be assessed by gently palpating the soft tissues of the paraspinal region. Complaints of severe pain represent an inappropriate response. Some patients will even react by falling to the floor.

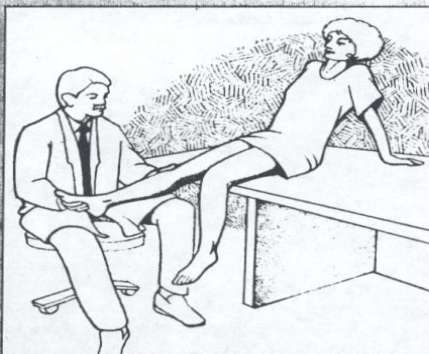


FIGURE 3: **Distraction straight-leg raising** tests for sciatic tension. With the patient seated, straighten the knee. Arching backward with both arms in extension—the tripod sign—suggests true sciatic tension. If both knees can be extended, the patient probably has no sciatic tension.

Waddell's Sign

# Lumbar Spine Orthopedic Tests

- VALSALVA: Hold breath and bear down. Increases intrathecal pressure, declaring a space occupying lesion, eg. disc, mass, or osteophyte.
- DEJERINES'S TRIAD: Strain / Cough / Sneeze.
- BECHTEREW'S TEST: Sitting with alternating legs extended, then extend both. Stretches sciatic nerve & lumbar nerve roots. Watch for leaning back with/or radiating pain = disc, sciatic nerve, nerve root.
- KEMP'S TEST: Compress dorsolumbar spine obliquely backwards (rotation, lat bend, extension) Local pain = S/S, radiating pain = disc.

# Lumbar Spine Orthopedic Tests

- **MINOR'S SIGN:** Seated pt stands using one hand to support back and one to support off leg to stand up to keep the involved leg side in flexion. Pos with sciatica, severe S/S.
- **LASEGUE'S TEST (STRAIGHT LEG RAISER, SLR ):** The Dr. raises the supine pt's leg . Local pain at 0-35 is S/I S/S or piriformis spasm, radiating pain 35-70 = stretching sciatic or spinal nerve roots (L5, S1, S2) or disc lesion. Local pain at 70-90 = L/S S/S. Tension with no pain = tight hamstrings.
- **BRAGGARD'S TEST:** With a + SLR lower leg to relief of symptom then dorsiflex foot. Pain = +disc lesion or sciatica.
- **KERNIG'S TEST:** Flex thigh to 90 with knee at 90 then extend knee to stretch sciatic nerve. Radiating pain = disc or sciatic lesion. Resistance without pain = tight hamstrings.

# Lumbar Spine Orthopedic Tests

- **LINDNER'S SIGN:** Flex the supine pts head to stretch dura and nerve roots. Local pain = S/S, radiating pain = discs lesion.
- **MILGRAM'S TEST:** Supine pt raises legs 6 " off table and holds for 30 secs. Radiating pain usu indicates space occupying lesison, eg. disc, mass, spur. If can't do but no pain may be weak abs or hip flexors (iliospoas)
- **BILATERAL LEG LOWERING:** Pt lowers raised legs. Local pain = L or L/S S/S. Radiating pain = disc lesion. If can't do but no pain = weak abds or hip flexors.

# Lumbar Spine Orthopedic Tests

- TOE WALK: S1 (gastroc)                      HEEL WALK: L4 (Tib ant)
- NERI'S TEST: Pt. forward flex to touch toes. Knee on involved side will flex to avoid sciatic nerve stretch.
- SPINAL PERCUSSION: Tap SP's with reflex hammer. Local pain may indicate fracture or sprain, radiating pain indicating disc lesion. Pain while tapping paraspinal muscles may indicate strain.



## TRACTION

During the acute phase the question of the value of traction is often raised as to eliminating any residual impairment that could result in recurrence of low back pain. Traction has been discussed in the previous chapter.

During the acute phase and for periodic use in convalescence or minor recurrence, a simple home traction position is possible until the low back muscles become adequately stretched (Fig. 9-12). Lying on one's back and using a chair to support the legs at a height elevates the low back from the floor. This reclining position decreases the lumbar lordosis and elongates the erector spinae muscles.

Gravity traction, which has also been discussed in a previous chapter, elongates the low back and increases flexibility. While in traction the pelvis can be tilted (flexed), which adds strengthening along with increasing flexibility.

Traction

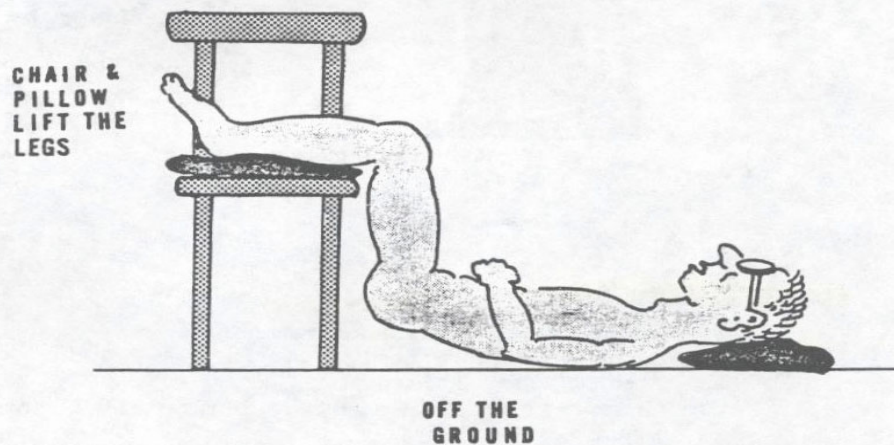


Figure 9-12. Pelvic traction. By placing legs on chair and sufficient pillows, the body is lifted from the floor. This flexes and stretches the low back. Remain in this position as long as possible. (From Cailliet, R: *Understand Your Backache*. FA Davis, Philadelphia, 1984, p 134, with permission.)

# PRONE EXAM

- Static palpation: Note any tenderness, swelling, lumps, tension, or muscle spasm over para-vertebral or vertebral structures. Check for alignment of vertebra, rotated SP/posterior TP, scoliosis.
- Motion palpation/joint play/springing challenge: P to A over facet joints. Bilateral to check F/E. Unilateral to check rotation. Lateral challenge to SP to check rotation. Looking for restriction/fixation

# SIDE POSTURE EXAM

- Position is the BASIC POSITION for side-posture manipulation. The patient's upside bent knee is placed between the doctor's knees. The doctor, facing the patient's pelvis, flexes and extends the patient's thigh while the contact hand's middle finger is placed between the lumbar SP's. The vertebrae are gapped (palpated at the SP's) at the level being tested. The more flexion that is created through the thighs the higher in the lumbar region flexion will occur.
- Rotation may be tested by pushing the thigh into rotation and feeling for rotation at the corresponding lumbar spinal level.

# SIDE POSTURE EXAM



# BASIC LUMBAR POSITION PULL TECHNIQUE

- **PP:** Patient lies on side. Superior arm in extension with elbow bent with hand resting on lower rib cage. Tabled arm is tractioned with rotational torsion traction of the trunk towards a supine position (may also ‘stack’ the shoulders) and resting the tabled hand on the opposite shoulder ball or on superior hand/elbow. Patient should look up to the ceiling. Tabled leg is straight. The top leg has the knee and hip flexed with the foot resting in the popliteal fossa of the tabled leg.
- The upside leg is flexed and extended by the doctor so that a gap appears between the SP’s of the vertebrae. If not the vertebra is exhibiting motion restriction (fixation).
- **DP:** Modified fencer’s position facing cephalad and into the table. Dr.’s cephalad hand contacts patient’s upward shoulder ball covering patient’s hand. Dr.’s tabled leg’s distal lateral thigh/knee is placed against the patient’s distal lateral thigh/knee applying torsional traction to the trunk and lumbar region. The Dr.’s caudad hand and forearm rests on the patient’s hip and ilium while the middle finger contacts the spinous process of the fixated/misaligned vertebra.

# BASIC LUMBAR POSITION PULL TECHNIQUE

- **THRUST:** Tissue slack is removed with thigh/knee, indifferent hand, and contact hand. Thrust is delivered with a body drop or a kick move. A “pull” is performed with the contacting forearm/hand/finger on the SP of the fixated vertebra and through the upside ilium.
- **NOTE:** Take care that the forearm on the hip/ilium does not cause pain. Also, strong rotational thrust is **CONTRAINDICATED** in acute disc syndromes as it may further rupture fibers. Instead, use the Bunyon technique

# L-SPINE: PULL TECHNIQUE



# BASIC LUMBAR POSITION PUSH TECHNIQUE

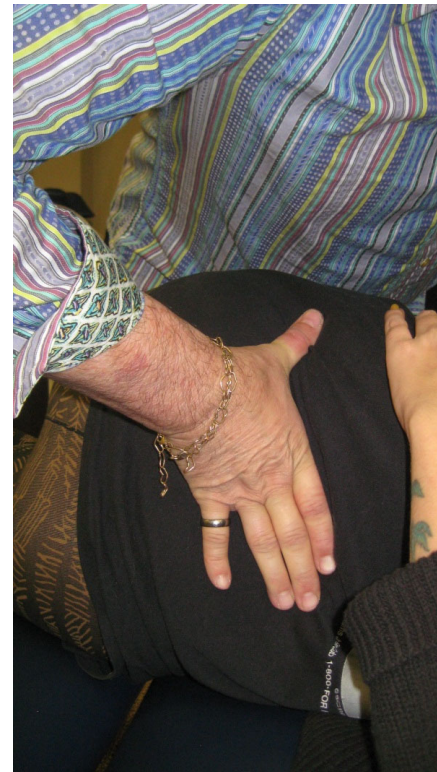
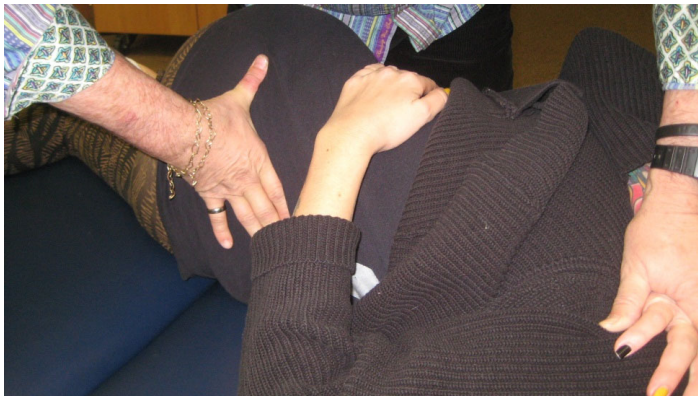
- **PP:** Patient lies on side. Superior arm in extension with elbow bent with hand resting on lower rib cage. Tabled arm is tractioned with rotational torsion traction of the trunk towards a supine position (may also 'stack' the shoulders) and resting the tabled hand on the opposite shoulder ball or on superior hand/elbow. Patient should look up to the ceiling. Tabled leg is straight. The top leg has the knee and hip flexed with the foot resting in the popliteal fossa of the tabled leg.
- The upside leg is flexed and extended by the doctor so that a gap appears between the SP's of the vertebrae. If not the vertebra is exhibiting motion restriction (fixation).
- **DP:** Modified fencer's position facing cephalad and into the table. Dr.'s cephalad hand contacts patient's upward shoulder ball covering patient's hand. Dr.'s tabled leg's distal lateral thigh/knee is placed against the patient's distal lateral thigh/knee applying torsional traction to the trunk and lumbar region. The Dr.'s caudad hand, using the palmar surface of the first knuckle, contacts the MP/TP complex of the vertebral lesion with a perpendicular vector.



# BASIC LUMBAR POSITION PUSH TECHNIQUE

- **THRUST:** Tissue slack is removed with thigh, indifferent hand, and contact hand. Thrust is delivered with a body drop. A “push” is applied with the contacting palmar surface of the first knuckle on the MP/TP complex of the fixated/misaligned vertebra with a perpendicular vector.
- **NOTE:** A strong rotational thrust is **CONTRAINDICATED** in acute disc syndromes as it may further rupture fibers or affect the nucleus. Instead, use the Bunyon technique

# L-SPINE: PUSH TECHNIQUE



# BONYUN TECHNIQUE

