What is the PT movement impairment diagnosis?

- **PT Dx**: Symptomatic hypermobile L5 motion segment with S1 radiculopathy & load sensitivity

Treatment

- **Objectives**
  - Create a healing environment to facilitate bony/fibrous healing of the fracture
  - Reduce symptoms
  - Improve overall movement patterns to optimize function
Dynamic Stability & Fine Control of The Lumbar Spine (LS)

- Deep abdominal muscles & lumbar multifidus responsible for dynamic stability & fine control of the LS
- Support for specific training of deep abdominals & co-activation of LS multifidus proximal to pars to decreasing pain & increasing function.

Progression
A. Specific contraction of deep abdominal & co-activation of LS multifidus proximal to pars without substitution from torque producing muscles (rectus, ext oblique)
B. Apply low load on muscles by adding leverage through limbs
C. Incorporate into previously aggravating static posture & functional tasks; Train with UE/LE strengthening/stability exercises.
D. Incorporate into light aerobic activity
E. Incorporate into simulated sport activities

General Parameters for LS Stability Training

- 3 P’s of Exercise
  – Pain Free, Perfect Form, Progressive
- Daily exercise
- 10-15 minutes
- Hold for co-contractions gradually increased
- Bias some flexion if neutral training is still symptomatic

Prime Stabilizers
### Transversus Abdominis

**Action**
- Together with the external oblique and internal oblique, transversus abdominis raises the pressure within the abdominal cavity and pelvis. When the thoracic cage and the diaphragm are fixed, this assists with bowel and bladder function. When the diaphragm is relaxed this group of muscles pulls down on the ribs, which forces the contents of the abdomen and the diaphragm upwards to produce forced expiration.

### External Oblique

**Action**
- External oblique rotates the trunk to the opposite side.
- Together with the internal oblique and transversus abdominis muscles, it raises the pressure within the abdominal cavity and pelvis.
- When the diaphragm is relaxed, this group of muscles pulls down on the ribs, which forces the contents of the abdomen and the diaphragm upwards to produce forced expiration.

### Internal Oblique

**Action**
- Compresses the organs of the abdomen, pushing them up into the diaphragm which intrudes back into the chest cavity reducing the volume of the air filled lungs, producing an exhalation.
- Rotates and side-bends the trunk by pulling the rib cage and midline towards the hip and lower back, of the same side. It acts with the external oblique muscle of the opposite side to achieve this torsional movement of the trunk.
Multifidi

**Action**
- The precise actions of multifidus as well as those of the other short muscles in the back are not fully understood. It is thought that its main role is as a stabilizer of the vertebral column, which is probably of greater functional significance than its role of producing movement.

Interspinales

**Action**
- They extend the cervical and lumbar spine, but are more significant in stabilizing the vertebral column during movement.

Intertransversarii: Anterior

**Action**
- They produce lateral flexion to the same side in the cervical and lumbar regions, however their main function is to act as extensible ligaments stabilizing adjacent vertebrae during movement.

Intertransversarii: Posterior

**Action**
- They produce lateral flexion to the same side in the cervical and lumbar regions, however their main function is to act as extensible ligaments stabilizing adjacent vertebrae during movement.
**Diaphragm**

Action:
- Increases the vertical diameter of the chest cavity by pulling its central tendon downwards. In this way, the lungs get extra space to expand and air rushes into them.

**Pelvic floor**

Action:
- Regulates the internal pressure in the abdominal cylinder along with the abdominal, back and breathing muscles.

**Lower Extremity Connection**

- Lower extremity musculature directly influences the lumbar spine.
- Iliopsoas directly attaches to vertebral bodies, while other muscles influence spinal position through their attachment on the pelvis.

**LS STABILIZATION**

*Phase 1*
Concepts

- Supported
- Biofeedback
- Neutral stabilization
- Progression through UE & LE
- Superimposed stress

**WHAT IS DIFFERENT ABOUT THIS PATIENT CASE?**

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**Transversus Abdominis Isometric**

1. Lay comfortably on your back with your knees bent.
2. Place your fingers on your abdominals just in and down from your pubic bones.
3. Slowly draw in your lower abdomen away from the elastic of your pants or try to simulate holding your urination mid-stream.
4. You should feel firmness gently develop under your finger tips (not a bulging out). The abdominals near your breast bone should stay relaxed.
5. Throughout the entire exercise breath in a relaxed and easy manner.

• HOLD: 5-10 sec
• REPEAT: 10 Times
• SETS: 3 Sets
• FREQUENCY: 1-2 x Day

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**Transversus Abdominis Isometric w/ Leg Lift**

1. Start with a successful contraction and hold of the deep abdominal muscle as indicated in SLIDE 1.
2. While holding, gently lift one of your legs a few inches off the bed without losing the abdominal contraction.
3. Throughout the entire exercise breath in a relaxed and easy manner.
4. Repeat with the other leg.

• REPEAT: 10 Times
• SETS: 3 Sets
• FREQUENCY: 1-2 x Day

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**Transversus Abdominis Isometric w/ Heel Slide**

1. Start with a successful contraction and hold of the deep abdominal muscle as indicated in SLIDE 1.
2. While holding, gently slide one of your legs a few inches straight on the bed without losing the abdominal contraction.
3. Throughout the entire exercise breath in a relaxed and easy manner.
4. Repeat with the other leg.

• REPEAT: 10 Times
• SETS: 3 Sets
• FREQUENCY: 1-2 x Day
Transversus Abdominis Isometric w/ Hip Abd/Add

1. Start with a successful contraction and hold of the deep abdominal muscle as indicated in SLIDE 1.
2. While holding, gently open and close your thighs without losing the abdominal contraction. Can open one at a time for progression.
3. Throughout the entire exercise breath in a relaxed and easy manner.
   - REPEAT: 10 Times
   - SETS: 3 Sets
   - FREQUENCY: 1-2 x Day

Progression Ideas

- One hand near upper abdominal area to assess rectus not contracting
- Hip ER unilaterally
- Longer holds
- Increase reps/sets before resistance

OTHER IDEAS?

Transversus Abdominis & Hip Adduction Isometric

1. Start with a successful contraction and hold of the deep abdominal muscle as indicated in SLIDE 1.
2. While holding, gently squeeze a pillow between your knees without losing the abdominal contraction.
3. Throughout the entire exercise breath in a relaxed and easy manner.
   - HOLD: 5 -10 sec
   - REPEAT: 10 Times
   - SETS: 3 Sets
   - FREQUENCY: 1-2 x Day

STABILIZATION Phase 2
Concepts

- Contralateral stress
- Less support
- Integrating post chain

WHAT IS DIFFERENT ABOUT THIS PATIENT CASE?

Transversus Abdominis Isometric w/ Leg & Arm Lift

1. Start with a successful contraction and hold of the deep abdominal muscle as indicated in Slide 1/Phase 1.
2. While holding, gently lift one of your legs/opposite arm towards the ceiling and back down without losing the abdominal contraction.
3. Throughout the entire exercise breath in a relaxed and easy manner.
4. Repeat with the other leg.

- REPEAT: 10 Times
- SETS: 3 Sets
- FREQUENCY: 1-2 x Day

Multifidus Isometric w/ Leg Lift

1. Lay over a small pillow.
2. Start with a successful contraction and hold of the deep abdominal muscle as indicated in Slide 1/Phase 1.
3. Add a tightening of the muscles next to your spine by thinking about squeezing them together towards the center or try to bulge them out.
4. While holding, slightly lift one of your legs with NO lower back motion.
5. Hold: 5 sec
6. Repeat with the other leg.

- REPEAT: 10 Times
- SETS: 3 Sets
- FREQUENCY: 1-2 x Day

Semi-Prone Hip Ext with Core Isometric

1. Can be performed over edge of bed/counter. Lay over a pillow at the edge of a bed/counter. Let your thighs rest forward with knees bend to 90 degrees.
2. Start with a successful “Core Isometric” from Phase 2.
3. Slowly kick your leg backwards and tighten your buttock without arching your back.
4. Repeat on the other leg

- REPEAT: 10-15 Times
- SETS: 3 Sets
- FREQUENCY: 1-2 x Day
**Multifidus Isometric w/ Leg & Arm Lift**

1. Lay over a small pillow.
2. Start with a successful contraction and hold of the deep abdominal muscle as indicated in Slide1/Phase1.
3. Add a tightening of the muscles next to your spine by thinking about squeezing them together towards the center or try to bulge them out.
4. While holding, slightly lift one of your legs and opposite arm with NO lower back motion.
5. Hold: 5 sec
6. Repeat with the other leg.

• REPEAT: 10 Times
• SETS: 3 Sets
• FREQUENCY: 1-2 x Day

**Core Isometric**

1. Comfortably rest on your hands and knees. Maintain a small normal curve in your lower back.
2. Start with a successful contraction and hold of the deep abdominal muscle as indicated in Slide1/Phase1.
3. Add a tightening of the muscles next to your spine by thinking about squeezing them together towards the center or try to bulge them out.
4. Throughout the entire exercise breath in a relaxed and easy manner.

• HOLD: 5-10 sec
• REPEAT: 10 Times
• SETS: 3 Sets
• FREQUENCY: 1-2 x Day

**Core Isometric w/ Leg Lift**

1. Start with a successful “Core Isometric” from previous slide.
2. While holding, gently lift one of your legs a few inches off the bed without losing the abdominal contraction or arching you lower back.
3. Throughout the entire exercise breath in a relaxed and easy manner.
4. Repeat with the other leg.

• REPEAT: 10 Times
• SETS: 3 Sets
• FREQUENCY: 1-2 x Day

**Core Isometric w/ Arm Lift**

1. Start with a successful “Core Isometric” from previous slide.
2. While holding, gently lift one of your arms a few inches off the bed without losing the abdominal contraction or arching you lower back.
3. Throughout the entire exercise breath in a relaxed and easy manner.
4. Repeat with the other arm.

• REPEAT: 10 Times
• SETS: 3 Sets
• FREQUENCY: 1-2 x Day
Core Isometric w/ Leg & Arm Lift

1. Start with a successful “Core Isometric” from previous slide.
2. While holding, gently lift one of your legs and opposite arm a few inches off the bed without losing the abdominal contraction or arching your lower back.
3. Throughout the entire exercise breath in a relaxed and easy manner.
4. Repeat with the other leg.

- REPEAT: 10 Times
- SETS: 3 Sets
- FREQUENCY: 1-2 x Day

Progression Ideas

- Stick on back in 4 point
- Rhythmic stabilization with therapeutic ball in UE or resistance band
- Low range lifts of extremities to full range
- Slide toe to lifting entire leg

OTHER IDEAS?

STABILIZATION Phase 3

Concepts

- Stabilization with isolated LE strengthening
- Start to bias functional movements
- Short lever stress from LE

WHAT IS DIFFERENT ABOUT THIS PATIENT CASE?
**Semi-Prone Hip Ext with Core Isometric**

1. Can be performed over edge of bed/counter. Lay over a pillow at the edge of a bed/counter. Let your thighs rest forward with knees bend to 90 degrees.
2. Start with a successful “Core Isometric” from Phase 2.
3. Slowly kick your leg backwards and tighten your buttock without arching your back.
4. Repeat on the other leg

- REPEAT: 10-15 Times
- SETS: 3 Sets
- FREQUENCY: 1-2 x Day

**Bridge**

1. Lay on your back with your feet resting on the bed.
2. Start with a successful contraction and hold of the deep abdominal muscle as indicated in Slide 1/Phase 1.
3. While holding, gently squeeze your buttocks and lift your hips off the bed without arching your back.

- HOLD: 5 -10 sec
- REPEAT: 10-15 Times
- SETS: 3 Sets
- FREQUENCY: 1-2 x Day

**Side Plank**

1. Lay on your side with your knees bent.
2. Prop up on your forearm.
3. Tighten your core and squeeze your buttocks to get into a straight trunk position.
4. Hold. Then rest on your side with your arm over head.
5. Repeat on the other side.

- HOLD: 15-30 sec
- REPEAT: 5-10 Times
- SETS: 1-3 Sets
- FREQUENCY: 1-2 x Day

**Band Side Stepping**

1. Loop a resistance band around the outside of your lower legs.
2. Start with your legs shoulder width apart and a slight knee bend. Step to the side with one leg.
3. Then bring the other leg in the same directions but only to shoulder width again. Step with your shoulders slaying level
4. After stepping to one direction for 15 reps, switch & step to the other side.

- REPEAT: 15 Times to ea side
- SETS: 3 Sets
- FREQUENCY: 3-5x week
Hip Hinge & Squat Training

1. Place a stick along the center of your back with contact on the buttocks & head.
2. Comfortably hold the stick with your hands & maintain a small normal curve in your lower back.
3. Start with a successful “Core Isometric” from Phase 2.
4. Slowly squat or bend forward using hip motion only. Attempt to not lose contact to the stick or move through the lower back.

- REPEAT: 10-15 Times
- SETS: 3 Sets
- FREQUENCY: 1-2 x Day

STABILIZATION
Final Phases

Progression Ideas

OTHER IDEAS?

Concepts

- LE & UE strength & stability with co-contraction
- Train towards functional limitations
- With aerobic activity
- Functional/sport specific

WHAT IS DIFFERENT ABOUT THIS PATIENT CASE?
FLEXIBILITY PROGRAM

Single Knee to Chest

1. While lying on your back.
2. Grab under the knee & slowly draw it towards your chest
3. Then repeat on the other side.
4. An alternative stretch for some individuals could be changed to include the opposite knee bent, instead of straight.

• HOLD: 60 sec
• REPEAT: 3 Times
• FREQUENCY: 1-2 x Day

Double Knee to Chest

1. While lying on your back.
2. Grab under both knees & slowly draw them towards your chest

• HOLD: 60 sec
• REPEAT: 3 Times
• FREQUENCY: 1-2 x Day

Left-sided Piriformis Stretch

1. While lying on your back.
2. Cross the outside of the left ankle over the opposite knee.
3. Then Grab under right knee & slowly draw it towards your chest until you feel a gentle stretch. Stretch sensation should be felt in the left buttock.
4. Then repeat on the other side.
5. An alternative stretch for some individuals could be changes to include the pull across technique.

• HOLD: 60 sec
• REPEAT: 3 Times
• FREQUENCY: 1-2 x Day
Hamstring Stretch

1. In kneeling, standing, or long sitting, place your leg out with a slight knee bend or fully straight.
2. Relax your foot and maintain a neutral spine in the lower back.
3. Hinge forward with a straight trunk (move your sitting bones backwards) until you feel a gentle stretch along the back of the thigh (not into the calf).

- HOLD: 60 sec
- REPEAT: 3 Times
- FREQUENCY: 1-2 x Day

Quad Stretch

1. While standing grab the ankle with the arm of the same side.
2. Maintain a neutral spine and tighten your buttocks.
3. Then slowly pull your knee into a bent position until you feel a stretch along the front of the thigh.
4. An alternative stretch for some individuals could be changed to include a stomach position with assistance from a sheet.

- HOLD: 60 sec
- REPEAT: 3 Times
- FREQUENCY: 1-2 x Day

Hip Flexor Stretch

1. While half-kneeling on a pillow, maintain a neutral spine and tighten your buttocks. Also try to tilt your pelvis up towards the ceiling.
2. While holding, slowly bend your forward knee to allow your trunk to move forward.
3. Note: the shoulder, hip and knee should be in a straight line if viewed from the side.
4. An alternative stretch for some individuals could be changed to include a standing position.

- HOLD: 60 sec
- REPEAT: 3 Times
- FREQUENCY: 1-2 x Day

Back Stretch Over Roll (Thoracic Spine Stretch)

1. Use a towel roll and place it under your mid back while lying on a firm surface.
2. Support your neck in a straight position and keep your abdominals tight.
3. Curl up slightly (small crunch), then relax straight down over the top of the roll. Avoid ARCHING backwards. You should feel a deep pain-free stretch near the roll under your back.
4. Once holding in the stretch position for 15 sec, move the roll up to the upper back and repeat. Do not perform this technique to the low back or neck areas.

- HOLD: 15 sec
- REPEAT: 5 Times at each level
- FREQUENCY: 1-2 x Day
Rotation Upper Back Stretch  
(Non-Coupled Rotation Thoracic Spine Stretch)

1. Lie on your side over a pillow rolled up. Bend your knees up and hold your leg with the bottom arm.
2. While looking at your hand, rotate back until you feel a gentle stretch in your back near the level of the roll. Hold.

- HOLD: 15 sec
- REPEAT: 5 Times
- FREQUENCY: 1-2 x Day

References


Addition references to be provided during presentation.