Lumbo-pelvic stability and back pain: what’s the link?

Presented by Dr Barbara Hungerford PhD
B.App.Sci (Physiotherapy)  Member APA, SMA
Advanced Manual Therapy Associates

Lumbar spine pain
Radiating leg pain
Pelvic pain
Coccyx pain
Posterior hip pain
Groin pain

80% of people in western communities will suffer low back pain
20% acute LBP will progress to being diagnosed as chronic (pain > 3 months)
A patho-anatomic injury is found in 15% of people with LBP (disc herniation, spondylolisthesis, arthritis)
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20% of chronic LBP patients have a symptomatic sacroiliac joint (SIJ)
The other 65% are classified as non-specific LBP: i.e no anatomical structure can be radiographically identified as causing the pain mechanism

Exercise helps chronic low back pain sufferers!

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* To lose weight?

What are your clients expectations as they embark on an exercise program?
* To lose weight?
* To improve body shape?
* To get fit?
* Improve flexibility?
* Relieve back pain!
Aims:
• Consider how the research can assist you to be specific about retraining lumbar and pelvic stability
• Identify different reasons for Low Back Pain & when a team approach is best to provide appropriate treatment and exercise rehabilitation
• What exercise might put you at risk of causing a back injury
• Identify clients who need immediate referral to a doctor

Optimal function:
we always move under the effects of gravity

• 65% body weight transferred across L5 vertebra onto the sacrum in standing
• Pelvis is the stable platform or hub of the skeleton
• 35 muscles attach onto the pelvis

The Integrated Model of Body Function

Models of lumbar stability

Our muscles and fascia enhance stability
- global & core muscles work together to create stability
- Fascial connections between muscles & bones transmit forces & decrease load on a single structure

- Euler Model
  - strength
  - endurance
  - bracing & co-contraction of global muscles
- Control Model
  - coordination
  - control
  - timing
  - right muscle, right time, optimal force
Active stabilisation strategies

Optimal function

Choices in movement

Movement control & stabilisation

• We activate our “core” muscles prior to movement
• “core” muscle activation is small & controlled by subconscious …..we don’t feel them turn on!
• “core” remains activated throughout activity at a low % MVC (5-10%)
• “core” muscles create tension across individual lumbar segments, the sacroiliac joints & pubic symphysis

* Creates lumbar spine & pelvic stability so that global muscle force is more efficient

“The Core” or “Cannister”

“The Core”

Transversus abdominis (TA)

Multifidus

Transversus abdominis

Pelvic floor

Intra-abdominal pressure (IAP) is increased to help lumbar spine cope with loading


Pubococygeus

Diaphragm
Modulation of the Diaphragm

Electrical activity

Breathing (no limb movement)

Breathing (repetitive limb movement)

Hodges et al 2000

Optimal activation of core muscles must occur to allow effective load transfer

• Co-activation of core muscles prior to, and during movement
• Co-ordination of core with global muscles to ensure sufficient intra-abdominal pressure (IAP) during quick OR sustained loading

Optimal core activation must occur to allow effective load transfer

• Provides just enough joint compression to create lumbo-pelvic stability WITHOUT too much pressure on the organs
• Leaves the hips and rib cage free to move

Why do we get back pain?

Lumbar spine pain
Radiating leg pain
Pelvic pain
Coccyx pain
Posterior hip pain
Groin pain

Causes of low back & pelvic pain:

Cancer or other bone diseases
Pathology of organs e.g. bowel, kidneys, ovaries, intestines
disc bulge or herniation

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Nerve root compression
Degenerative changes / arthritis, spondylolisthesis
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- Nerve root compression
- Degenerative changes / arthritis
- Facet joint inflammation or stiffness
- Sacroiliac or pubic symphysis injuries

Lumbar spine injury
* Constant, severe back pain
* Pain worse at night
* Leg pain, numbness, weakness
* Pain with weight bearing
* Pain with movement
* "Catching" pain
* Muscle aches in back & buttocks occur regularly
* Back ache after exercise or standing long periods
* Poor posture

Refer immediately to a medical practitioner

Refer to a physiotherapist or manual therapist, and discuss appropriate timing for integration of lumbo-pelvic stability and endurance exercise program

Specific exercise prescription for lumbo-pelvic stability and endurance

Mean EMG onset during a stork test on the support side

Sacroiliac joint injury
* Loss of normal joint glide
* Transverse abdominis & multifidus activity delayed
* gluteus maximus inhibited
* Pain with weight bearing e.g. walking, sitting
* Often compensate by using piriformis, hamstrings, and hip flexors as stabilising muscles
* Joint glide must be restored with specific manual therapy before retraining core and gluteal function

Lumbo-pelvic pain or injury
- Substitution of global muscles
- Too much or too little muscle force (rigid or floppy)
- Increases loading onto lumbar & pelvic joints

Poor postural habits or movement strategies

**p < 0.01
* P < 0.05

Mean EMG onset during a stork test on the support side

Hides et al., 1994; Hodges & Richardson, 1996; Hungerford et al., 2003
Retraining lumbo-pelvic stability

Practice makes PERMANENT

NOT ALWAYS PERFECT!

Therefore consider

- what is optimal?
- which muscles would the brain normally activate in a healthy body
- functional positions for retraining
- control & endurance before power

Retraining lumbo-pelvic stability

Posture

Unwind

Reboot

Retrain

“Posture”

- Neutral spine alignment facilitates core activation (O’Sullivan et al., 2006)
- Neutral spine alignment decreases loading onto facet joints

Postural Re-education

Neutral Spine

OPTIMAL

INCORRECT

MUSCLE

ACTIVATION

-loads facet joints in spine

Linda-Joy Lee

Poor technique:
Maintain neutral spine alignment as exercise into functional movement patterns

“Unwind”

* Create awareness of over active muscles
  - “Relax your bottom” (the butt gripper)
  - “relax your belly” (the tummy bracer)
  - “relax your neck” (the stressed apical breather)
  - Soft rib cage & breath gently into lower ribs
  - Hips and legs relaxed (psoas & hamstring dominant)

* Use specific stretches to unwind or unload muscle tension
  - Hip flexors
  - Piriformis
  - Erector spinae
  - Quadratus lumborum
  - hamstrings

Abdominal Bracing – substitution of external oblique abdominal muscle

Lower rib cage is constricted
Lower abdomen bulges
Limits freedom of thoracic & lumbar spine to move

The butt gripper

- Overactivity or tonicity in
  - Deep hip external rotators
  - Piriformis
  - Posterior pelvic floor
- Effects ability to bend forward in the lower back
- Hip pulled into external rotation, with increased posterior capsular tension
- Femoral head gets pushed forward, tension onto anterior hip capsule & hip ligaments
- Lumbar spine held in flexion so they can’t bend forward

“Reboot”

- Low grade tonic activation of ‘the core’
- Remember 10%MVC
- Images that facilitate co-contraction of
  - anterior pelvic floor
  - Transverse Abdominis
  - multifidus
- Neutral spine alignment
- Independent of breathing
- Watch for substitution patterns
- “activate your core prior to all exercises and maintain throughout activity”
Retrain
* Always start by rebooting core muscle activation
* Encourage neutral spine

Retrain
* Always start by rebooting core muscle activation
* Encourage neutral spine
* Add gluteus maximus & gluteus medius exercises once able to sustain tonic activity of core e.g. squats, single leg stance ex’s, step ups, lunges
* Progress exercises to increase endurance without poor substitution patterns
* Watch pelvic alignment and positioning of lower limb
* Progress to decreased base of support
  * Using the reformer
  * Using a gymball
  * Single leg weight bearing

Summary
1. Communicate with health professionals if clients low back pain is not changing or worse with exercise
   - or is suggestive of significant injury/ pathology
2. When retraining lumbo-pelvic stability
   Posture
   Unwind
   Reboot
   Retrain

Overactive internal oblique

Rectus abdominus
Internal oblique
Transverse abdominis

Internal oblique
Transverse abdominis
Rectus abdominus