



What Is Lumbo-Pelvic Dysfunction?

Josephine Key, APA Titled Musculoskeletal Physiotherapist www.edgecliffphysio.com.au

exploring pelvic myomechanics & fundamental patterns underlying functional control: applying the evidence toward clinical solutions

Relevance:

- In patients experiencing low back & pelvic pain disorders, there is evidence for both compromised and augmented neuromuscular activity:
 - Reduced, delayed and inconsistent activity in some deep muscles¹²³⁴⁵⁶⁷⁸
 - Earlier, more tonic and dominant activity in some more superficial 'global muscles'⁷⁸⁹¹⁰.
- The differing individual muscle timing & activity levels have been found principally in response to postural perturbation created by limb movement³⁴⁵⁷⁸ or under constrained experimental conditions⁹¹¹¹².
- **There has been limited examination of the co-active muscle synergies which initiate and dynamically control basic functional axio-pelvic posturo-movement patterns.**

Proposal:

- Imbalanced neuromuscular activity compromises spinal & proximal girdle alignment & control¹³¹⁴¹⁵¹⁶¹⁷¹⁸, patterns of movement response¹³¹⁴¹⁵¹⁶¹⁷¹⁸, & important physiological mechanisms such as breathing⁸ and equilibrium control¹⁹.
- There is increasing interest in the relationship between pain syndromes & the preferred & potentially provocative posturo-movement strategies habitually adopted by subjects¹⁵¹⁸²⁰²¹²²²³, & the kinematics involved in everyday activities¹³¹⁴¹⁸²⁴. Associations have been found between pain states & altered control of standing²⁵²⁶ & sitting postures¹⁵²²²⁷, altered kinematic patterns of movement in forward bending/reach²⁸²⁹³⁰ & lifting³¹³². **Both research & clinical evidence demonstrate that compromised control of the pelvis is always a significant feature.**
- The pelvic myomechanics which underpin healthy posturo-movement control of the axial spine & pelvis have been little explored, yet understanding them helps comprehend the impairments seen in patient populations
- As the sacrum/coccyx forms both the base of the spinal column and part of the pelvic ring, the quality of pelvic movement control plays a highly significant role in healthy movement.
- From a functional movement perspective, physiological control of the pelvis can essentially be distilled into three interrelated components:
 - Intrapelvic control: includes
 - Control of pelvic ring 'distorsion'¹⁸ (torsion/rotation)
 - 'Inner unit' co-activation synergies to provide counter-support & stability against the actions of the large 'outer' pelvi-femoral muscles & during load transfer
 - Control of spatial pelvic 'shift': – particularly sagittal & frontal plane
 - Control of the pelvis on the femoral heads: Multiplanar movements via multi-axial rotations or 'tilts' – provide closed/open chain hip control

- Clinical practice suggests that this healthy control is subserved by four Fundamental Pelvic Patterns (FPP) of Movement - **they underlie our basic functional movement patterns**: standing, walking forward bending and sitting:

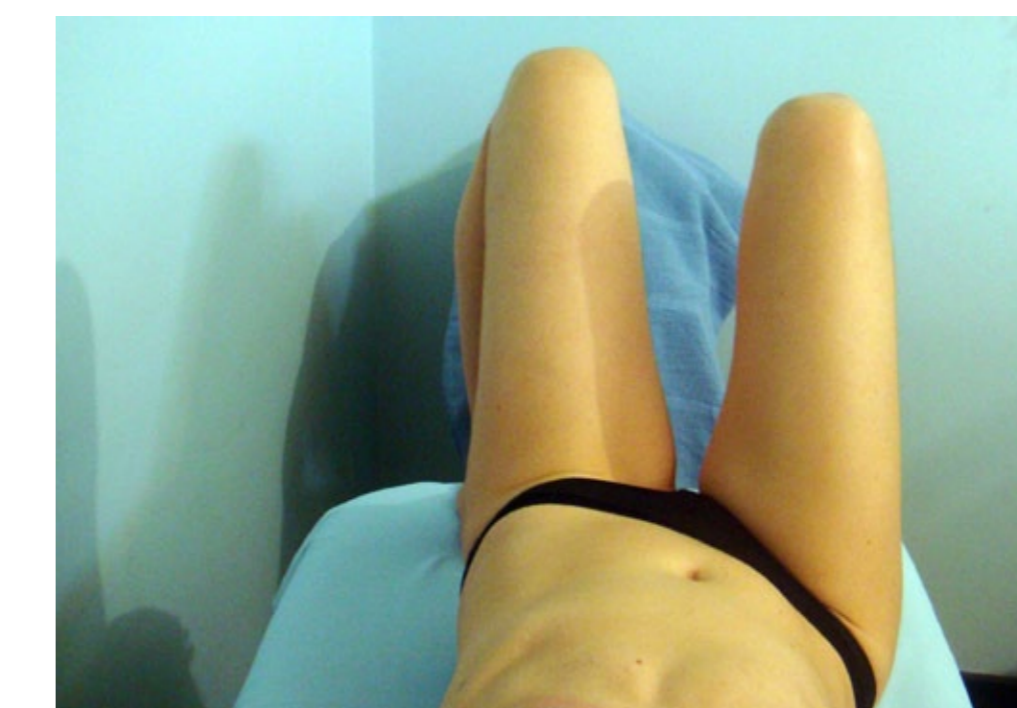
- FPP1: anterior pelvic rotation (sagittal) – coupled with ischial out-flare & posterior shift – ensures dynamic control of the lumbar lordosis and underlies all forward bending, sitting, hip flexion patterns
- FPP2: posterior pelvic rotation (sagittal) – coupled with ischial in-flare & anterior shift – underlies all dynamic closed chain hip extension patterns - sit to stand, return from forward bend
- FPP3: control of 'distorsion' or intrapelvic rotation – contra rotation of the innominates 'distorts' the pelvic ring & brings the sacrum into torsion ⇒ initiating rotation through the spine – underlies all axial rotation, transitions through level change & walking
- FPP4: controls frontal plane rotation on the femoral heads ensuring lateral pelvic stability during lateral weight transfer – underlies standing on one leg, walking



FPP1
forward rotation (sagittal plane)



FPP2
backward rotation (sagittal plane)



FPP3
intrapelvic torsion/rotation (transverse plane)



FPP4
side-bending (frontal plane)

- These fundamental patterns of axio-pelvic control **rely upon balanced co-activation and modulation from a deep, continuous inner myofascial sleeve – 'The Lower Pelvic Unit'** (LPU)¹⁸³³.
- Early pre-activation of the LPU provides **patterns of inner support and control through the pelvis** & control of the neuromuscular force couples necessary for effective control of weight shift & load transfer. Emerging evidence supports the role of some muscles in contributing to these important patterns of functional posturo-movement control³⁴³⁵³⁶³⁷³⁸³⁹⁴⁰⁴¹⁴²⁴³⁴⁴. **The LPU also marries breathing and postural control with pelvic control.**

Lumbo-pelvic dysfunction

- Clinically, patients with lumbo-pelvic pain symptoms consistently demonstrate defective control of the Fundamental Pelvic Patterns & so the initiation & control of posturo-movement **from** the base of the column is compromised. Common clinical patterns of impaired control emerge¹⁶¹⁷¹⁸²⁴ increasingly supported by translating the evidence³⁴⁵⁷¹⁹²¹²²²⁵²⁷²⁸²⁹.
- This creates the need for subsequent compensations throughout the spine which further jeopardize axial control mechanisms⁸⁹ – the breathing & postural control mechanisms including the generation of IAP³⁴⁵⁸¹⁹²⁴²⁵²⁷ with predictable physiological consequences.
- The diminished contribution by the pelvis as the initiator & controller of the centre of weight shift of the body during all functional activities is also associated with
 - ↓ control of the SIJ
 - ↓ control of the lumbar lordosis
 - ↓ control of the hips – closed & open chain movements
- **The joint dysfunctions & pain syndromes predictably relate to the movement pattern impairments**

Implications:

- Appreciating the Fundamental Pelvic Patterns of control provides insights into **how to build appropriate foundation patterns of posturo-movement control** in people with lumbo-pelvic dysfunction & associated axio-pelvic pain disorders