


Sacroiliac Joint dysfunction, Coccydynia, and altered Pelvic Floor function: is there a link?



Presented by
Dr Barbara Hungerford PhD B.App.Sci (Physio)
 Director - Sydney Spine & Pelvis Centre, Australia
 - Advances Manual Therapy Associates

Dynamic stability of the lumbo-pelvic region

Stability of inter-segmental lumbar motion is reliant on **appropriate control of muscle activation by the central nervous system**



TrA, lower transverse fibres
 Internal oblique (OI), deep lumbar multifidus & pelvic floor activate **prior to motion**

Co-contrast } Increase segmental stiffness and limit inter-segmental motion in lumbar spine

(Hodges & Richardson, 1997; Moseley et al., 2002; O'Sullivan et al., 1997)

Low back pain


Delayed recruitment of deep local muscles
 -Lumbar multifidus
 -Transversus abdominus
 -Pelvic floor

Increased activity of superficial global muscles
 -EO / IO
 -Erector spinae
 -Iliopsoas
 -biceps femoris

Compensation due to decreased segmental stability

Hides, 94; Hodges & Richardson, 96; Hodges 2003; Radebold 200

Lumbo-pelvic Stability and optimal load transfer




Lumbo-pelvic region is always interacting with gravity

65% body weight transferred across L5/S1 in standing

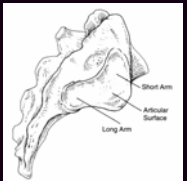
Pelvis is the stable platform or hub of the skeleton

Anatomy of the pubic symphysis

- * Fibrocartilaginous joint
- * interposed by fibrocartilaginous disc
- * most stable joint in pelvis

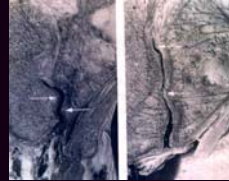


Sacroiliac joint articular surface



The SIJ is classified as a
 *diarthroidal synovial joint
 *hyaline articular cartilage
 *synovial capsule
 *6 degrees of freedom


Developmental changes of the SIJ articular surface & joint cartilage occurs by the 2nd decade (i.e ridges & grooves) (Vleeming et al., 1990)



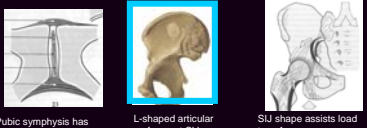
Factors assisting articular stability at the SIJ

- * Wedge shape of the sacrum
- * shape of articular surfaces-
 planar & L-shaped
- * collagen structure of iliac articular cartilage -
 increased friction co-efficient
- * complimentary ridges & grooves
- * passive constraints of surrounding ligaments

*** SIJ is susceptible to vertical shear loads**



Stability of the Pelvic articulations




Public symphysis has strong ligamentous support

L-shaped articular surfaces at SU

SIJ shape assists load transfer

Pelvis requires external tensile & compressive forces to stabilise its articulations during weight bearing.....

(Snijders et al., 1995; Vleeming et al., 1995)



Stability of the Pelvic articulations

TrA and pubococcygeus assist stability of pubic symphysis
 TrA activation increases stiffness across SIJ (Richardson et al 2002)

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Lumbosacral multifidus crosses from L5 to PSIS and sacrum, and attaches into posterior SI ligaments (Willard, 2007)

Gluteus maximus increases tension across SIJ via attachments into sacrotuberous ligament and posterior layer of thoraco-lumbar fascia (Barker et al, 2004)

Tonic co-contraction of TrA, pubococcygeus and lumbosacral multifidus

therefore assists stabilisation of intra-pelvic motion for load transfer during weight bearing movements

Pelvic Girdle Dysfunction

- Articular dysfunction:** at the pubic symphysis or sacroiliac joint (SIJ) causes altered joint glide, inability to maintain closed pack position of SIJ, & altered motor control (Hungerford et al, 2003,2004)
- Ligament injury** at either pubic symphysis or SIJ causes true instability

Pelvic Girdle Dysfunction

- Myo-fascial dysfunction:** Loss of functional stability to maintain pubic symphysis & SIJ alignment during weight bearing due to altered motor control
- Internal derangement of pelvic fascia and organs** alters ability to activate pelvic floor muscles

Effect of articular dysfunction at SIJ

- Delay in recruitment of TrA, lumbosacral multifidus, and gluteus maximus

Mean EMG onset for PPGP subjects: **symptomatic side** $p < 0.01$, $p < 0.05$

EMG amplitude during 50ms epochs before & after initiation of motion

Effect of Pelvic Girdle Dysfunction

- Delay in recruitment of TrA and lumbosacral multifidus & gluteus maximus (Hungerford et al, 2003)
- Bracing of EO/IO associated with decent of pelvic floor (O'Sullivan et al, 2002)
 - increases IAP
 - Downward pressure onto the bladder makes it more difficult for pubococcygeus to create the lift required to close the bladder neck

Effect of Pelvic Girdle Dysfunction

- Delay in recruitment of TrA and lumbosacral multifidus (Hungerford et al, 2003)
- Bracing of EO/IO associated with decent of pelvic floor (O'Sullivan et al, 2002)
- Altered activation of pubococcygeus & puborectalis

What do we see clinically with articular dysfunction?

- Decreased ability to activate TrA, lumbosacral multifidus with substitution of global muscles such as external oblique, piriformis, iliopsoas, hamstrings
- Inability to activate pubococcygeus/ puborectalis with consequent effect on ability to create a lift of the pelvic floor under the bladder
- over activation of ischiococcygeus, tonically, is one possible compensation strategy

WHY???

Pelvic Girdle Dysfunction Ischiococcygeus activity

Articular dysfunction at the sacroiliac joint (SIJ) → Augments compression inferior to SIJ to limit vertical shear forces on SIJ & substitution pattern for normal PF activity

Ligament injury at either pubic symphysis or SIJ → Tonic activity to compress SIJ inferiorly and try to limit shearing forces across joints

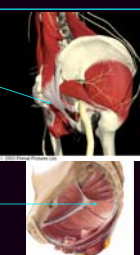
Loss of functional stability → Substitution pattern for normal activity of pubococcygeus?

Ischiococcygeus

Arises from ischeal spine and anterior aspect of sacrospinous ligament, and is directly connected to the ligament

Inserts onto the apex of the sacrum between S4 & S5, and the lateral border of the coccyx

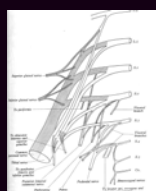
Forms the deep posterior wall of the pelvis, in conjunction with piriformis



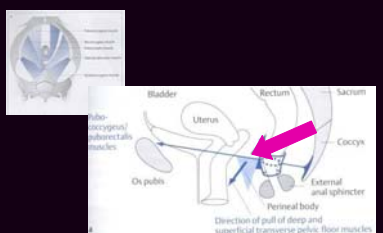
Ischiococcygeus

Supplied by ventral rami of the sacral plexus, S3 & S4.

Nerve supply to levator ani (pubococcygeus, puborectalis, and iliococcygeus) is perineal branch of pudendal nerve arising from S2-4. Posterolateral portion of levator ani may take some somatic supply from S3 & S4 sacral nerve plexus




Optimal pelvic floor contraction:



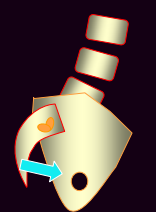
Effect of tonic Ischiococcygeus activity

- Ischiococcygeus lies in a different plane to levator ani
- Activation with piriformis may create an interface that impedes pudendal nerve mobility through the pudendal canal
- Pain referred to labia, internal vaginal walls, base of scrotum and penis



Effect of coccygeus activity on Pelvic Biomechanics

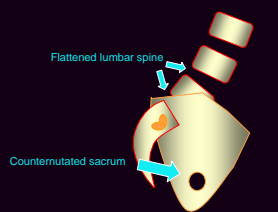
- Sacral apex is drawn into counternutation
- Coccyx flexed



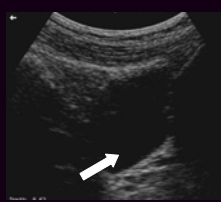
Pelvic Biomechanics

Flattened lumbar spine

Counternutated sacrum



Effect of ischiococcygeus overactivity



Effect of ischiococcygeus overactivity



Bone stress = "coccyx pain"

Coccydynia: the research

- Often associated with trauma such as a fall, or MVA
- 2nd most common cause is childbirth, rarely related to coccyx fracture (Maigne et al, 96; Peyton, 88)
- May also occur after lumbar disc prolapse, or following spinal surgery (Frazier, 1985)
- Pts usually describe sacrococcygeal pain that gets worse with sitting, sit to stand, and prolonged standing or bending

Clinical Implications & suggestions

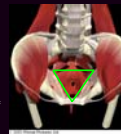
- Specificity in assessment of pelvic floor muscle activation will assist diagnosis of an over active ischiococcygeus

Clinical Implications & suggestions

- Specificity in assessment of pelvic floor muscle activation will assist diagnosis of an over active ischiococcygeus
- An articular dysfunction of the SIJ may create tonic activity of ischiococcygeus that is recalcitrant to muscle re-education. Manual Therapy to regain normal articular glide at the SIJ is required **prior** to retraining motor control.

Clinical Implications & suggestions

- Specificity in assessment of pelvic floor muscle activation will assist diagnosis of an over active ischiococcygeus
- An articular dysfunction of the SIJ may create tonic activity of ischiococcygeus that is recalcitrant to muscle re-education
- Be careful of images for pelvic floor that enhance butt gripping
- Instead, consider imagery to assist activation of pubococcygeus without ischiococcygeus e.g.
 - Melt your bottom
 - Imagine a triangle from pubic symphysis to ischial tuberosities. Imagine that back part of the triangle staying wide as you draw up the front part of the pelvic floor



*Thank you
to*

Stephanie Tang, Peta Gosbee, and
Shreya Ranganathan
Sydney Spine & Pelvis Physiotherapy Centre,

Dr James Linklater
Radiologist, Castleknock Imaging, North Sydney
Orthopaedic & Sports Medicine Centre, Crowe Nest



Illumination!