Pelvic girdle pain

OBSTETRIC PUBIC SYMPHYSEAL DIASTASIS: IMAGING SUPPORT OF A NOVEL BIOMECHANICAL MODEL

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Introduction
In pregnancy pelvic joint and pelvic outlet widening occurs in response to ligamentous softening, fetal growth, and parturition. Obstetric pubic symphyseal diastasis (OPSD) is widening of the symphysis at mid-joint of 10mm or more. Progressive widening can provoke severe pain and functional impairment. Most recover with conservative care; surgical stabilization is typical for 25mm or greater. Chronic painful pubic dysfunction due to OPSD is a poorly understood disability. MRI and CT images undergird novel biomechanical interpretation, suggesting treatment modification.

Purpose
To present a novel hypothesis that OPSD involves a distinctly different biomechanical trajectory rather than simply a traumatic escalation of peripartum pelvic mechanics.

Materials and Methods
Articles gathered from www.PubMed.org and general web searches using key words symphyseal diastasis, pubic joint instability, obstetric instability, and symphysis pubis instability, covering 1997-2012. MRI and CT images were evaluated in cases of acute OPSD with gapping of anterior-superior sacroiliac joint (SIJ).

Results
Several images demonstrated SIJ gapping with a peculiar previously unreported inferior-posterior retroarticular approximation, provoking further inquiry. Testing with ligamented pelvis and flexible anatomical models was performed to simulate obstetric joint and outlet widening. This included sacral nutation, medial infolding of the ilia and spreading of the ischial bones, as literature describes. A distinct end-point was encountered where no further expansion could occur, due to upper-anterior SIJ and pubic joint compression. Pubic diastasis was introduced by cutting and separating the joint.

Relevance
Replicating the gapping of the superior SIJ, congruent with MRI and CT images, actually reduced pelvic outlet dimension. Only by moving the pubes and ilia in a cam-like manner, coupled with posteromedial glide at the SIJ's, primarily in the transverse plane, was pelvic outlet maximized. No other trajectory was able to enhance outlet dimension.

Conclusions
Imaging and mechanical testing support the hypothesis of novel biomechanics with OPSD. Research using this hypothesis may identify optimal intervention for acute and chronic cases.

Discussion
Unique properties of the axial ligament; size, location and decreased elastin, suggest that in the presence of OPSD it may function as a mechanical stop during parturition, maintaining optimal pelvic outlet dimension. In chronic cases, muscular and ligamentous recoil may be absent or insufficient, preventing form-closure. The chronic pubic dysfunction and OPSD populations are especially in need of improved care. In vivo biomechanical research during parturition is improbable. Computer modeling and pre/post intervention imaging seems reasonable.

Implications
If the model has validity a diagnostic tool may already exist in the form of CT or MRI images in the medical record and can be used to determine if the described pathomechanics are at play. If this model has utility, then passive external forces directed at reducing the unique cam-like movement of the ilia prior to or during application of a pelvic binder at the trochanters, (a standard of care) may have merit.

Keywords: obstetric pubic symphyseal diastasis, SIJ, axial ligament, pelvic binder.