

Sigma's VIRTUAL 31st International Nursing Research Congress (Wednesday, 22 July - Friday, 24 July)

A Review of Methods for Assessing Female Pubovisceral Muscle Tear and Strength

Ying Sheng, PhD

Indiana University, Indianapolis, IN, USA

Purpose:

As many as 13 – 71% of women suffer from urinary incontinence, a significant and life altering problem.¹ Stress urinary incontinence is the most common subtype defined as urine leakage occurring upon exertion that causes an increase in intra-abdominal pressure, such as occurs with coughing or sneezing.² Stress urinary incontinence may result from a tear in the Kegel muscle (levator ani muscle), which occurs in 13% to 36% of vaginal births, or from muscle weakness.³⁻⁵ A common treatment of stress urinary incontinence is pelvic muscle exercises,^{6,7} but the correlation between increased muscle strength and reduced leakage have been reported as mild or none.^{8,9} This lack of a significant correlation between muscle tears or strength and leakage may be due to a lack of validity or reliability in measures. Thus, the purpose of this report is to review measures of pubovisceral muscle tear or strength.

Methods:

Literature reporting validity and reliability of measures of either female pubovisceral muscle tear or strength, published in English from 1948 to 2018 were included, using the following databases: PubMed, CINAHL and EMBASE. We also performed hand searches of available reference lists.

Results:

A total of 17 measures were found, three for pubovisceral muscle tear (1 objective, 2 subjective) and 14 for strength (11 objective, 3 subjective). Measures for tear focused on assessment of the wholeness and continuity of muscle fibers, while measures for strength focused on pressure or force that the muscle generates against examining devices or finger(s). Objective measures were based on technologies whereas subjective measures used finger(s) to touch the muscle or feel pressure during a muscle contraction. Reliability was measured by test-retest and inter-rater reliability (e.g., intra-class correlation coefficients and kappa) and varied greatly across the different methods.

Objective measures based on technology (e.g., magnetic resonance imaging and one-billed speculum) are more precise and valid, but expensive, complex, less accessible, and require high-level training and experience. Subjective measures using finger palpation (i.e., index finger palpatory assessment, Brink and modified Oxford scale) are simple, low-cost and highly accessible, but easily influenced by examiner, with a wide range of inter-rater reliability.

The most effective means for identifying tears in the pubovisceral muscle are magnetic resonance imaging, ultrasound and index finger palpatory assessment, in that order. The most accurate means for measuring muscle strength is the one-billed speculum. All other speculums (i.e., two-billed, Dumoulin, and Verelst) and perineometers were

influenced by an increase in intra-abdominal pressure which naturally accompanies a pelvic muscle contraction.

Conclusion:

Multiple measures of pubovisceral muscle tear and strength are available with almost no identified gold standard. Choice of measures for research and clinical practice should be based on careful assessment of advantages and disadvantages as well as reliability and validity. Based on this review, there is a need to develop inexpensive and easily accessible/easily used measures of muscle tear and strength that are validated by objective measures (magnetic resonance imaging and one-billed speculum).

Title:

A Review of Methods for Assessing Female Pubovisceral Muscle Tear and Strength

Keywords:

Instrument, Pelvic floor muscles and stress urinary incontinence

Abstract Summary:

This abstract reviewed measures of structural integrity and strength of pubovisceral muscle. Pubovisceral muscle is the most vulnerable portion of pelvic muscles to be torn from pubic bone during vaginal births and related to treat stress urinary incontinence.

References:

- Cerruto MA, D'Elia C, Aloisi A, Fabrello M, Artibani W. Prevalence, incidence and obstetric factors' impact on female urinary incontinence in Europe: a systematic review. *Urol Int.* 2013;90:1–9.
- Haylen BT, de Ridder D, Freeman RM, Swift SE, Berghmans B, Lee J, et al. An International Urogynecological Association (IUGA)/International Continence Society (ICS) joint report on the terminology for female pelvic floor dysfunction. *Int Urogynecol J.* 2010;21:5–26.
- Dietz HP, Lanzarone V. Levator trauma after vaginal delivery. *Obstet Gynecol.* 2005;106:707-12.
- Shek K, Dietz HP. Intrapartum risk factors for levator trauma. *BJOG.* 2010;117:1485-92.
- Valsky DV, Lipschuetz M, Bord A, et al. Fetal head circumference and length of second stage of labor are risk factors for levator ani muscle injury, diagnosed by 3-dimensional transperineal ultrasound in primiparous women. *Am J Obstet Gynecol.* 2009;201:e1-7.
- DeLancey JOL, Kearney R, Chou Q, Speights S, Binno S. The appearance of levator ani muscle abnormalities in magnetic resonance images after vaginal delivery. *Obstet Gynecol.* 2003;101:46-53.
- Kim J, Betschart C, Ramanah R, Ashton-Miller JA, DeLancey JO. Anatomy of the pubovisceral muscle origin: macroscopic and microscopic findings within the injury zone. *Neurourol Urodyn.* 2015;34:774-80.
- Nyström E, Asklund I, Sjöström M, Stenlund H, Samuelsson E. Treatment of stress urinary incontinence with a mobile app: factors associated with success. *Int Urogynecol J.* 2018;29(9):1325-33.

- Sun ZJ, Zhu L, Liang ML, Xu T, Lang JH. Comparison of outcomes between postpartum and non-postpartum women with stress urinary incontinence treated with conservative therapy: a prospective cohort study. *Neurourol Urodyn*. 2018;37(4):1426-33.

First Primary Presenting Author

Primary Presenting Author

Ying Sheng, PhD

Indiana University

Postdoctoral Fellow

Indianapolis, Indiana

USA

Author Summary: Dr. Ying Sheng's research program focuses on pelvic floor disorders specific on self-management of urinary incontinence among women with and without cancer. She authored a book chapter on urinary incontinence in an award-winning textbook.