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Cesarean Delivery on Maternal Request Versus Planned Vaginal Delivery: Impact on Development of Pelvic Organ Prolapse

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Pelvic floor disorders (PFDs) (ie, pelvic organ prolapse, urinary and fecal incontinence) are prevalent and impact quality of life as well as our health care system. It has been estimated that the demand for health care related to PFDs will increase at twice the rate of the population itself. This speaks to the fact that PFDs are an important women's and public health issue, warranting studies aimed at their prevention.
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Pelvic organ prolapse (POP) describes the abnormal location of the pelvic organs, including the bladder, uterus, rectum, or small intestine, into or outside of the vagina. The prevalence of POP has been shown to increase with age; thus, as the population ages, it has been estimated that the demand for health care services related to pelvic floor disorders and specifically prolapse will increase at twice the rate of the population itself.[1] The lifetime risk that a woman in the United States will have surgery for prolapse or urinary incontinence is 11%, with up to one-third of surgeries representing repeat procedures.[2] Approximately 200,000 women undergo inpatient surgery for POP each year in the United States at a cost of over $2 billion per year.[3,4] However, many women with POP are managed conservatively or never present for evaluation. Thus, surgically managed patients that are often described in the literature do not represent the full spectrum of disease in the population.

Pathophysiology

Risk factors identified in the development of POP include pregnancy, parity, episiotomy, instrumented delivery, increased second stage of labor, hysterectomy, chronic pulmonary disease, hypertension, and obesity.[5-8] These factors are thought to impact on the anatomy and physiology of the pelvic floor. The pelvic floor includes the levator ani muscles, the urethral and anal sphincter muscles, and endopelvic connective tissue. The first level of muscular support are the paired iliococcygeus muscles, which arise laterally from the arcus tendineus, a thickened band of obturator internus fascia extending from the pubic bone to the ischial spine, traveling medially and posteriorally meeting the contralateral muscle behind the rectum in a midline raphe which fuses with the coccyx. The second part of the levator ani is the pubovisceral muscle, which includes the puborectalis and pubococcygeus muscle. They form a U-shaped sling encircling the urogenital hiatus, the midline potential space through which the urethra, vagina, and anorectum pass.

The levator ani muscle groups have two important functions: to maintain a constant basal tone, keeping the urogenital hiatus closed and providing a muscular plate of support. If this basal tone is lost or decreased, the urogenital hiatus can widen, facilitating decent of the pelvic organs. The second function is to contract reflexively in response to certain actions that increase intraabdominal pressure, such as coughing or running. It is thought that this effect plays a role in maintaining continence with increases in intraabdominal pressure.[9] The levator ani muscles are innervated by anterior sacral nerve roots S2-S4, where motor branches of these nerve roots are susceptible to compression and stretching during vaginal delivery.

In addition to the muscles and nerves, the pelvic floor includes a complex system of ligamentous and connective tissue support known as the endopelvic fascia, which envelops the pelvic organs and attaches them to the pelvic side wall (Fig. 1).[10] Delancy[10] elegantly describes this supportive net-

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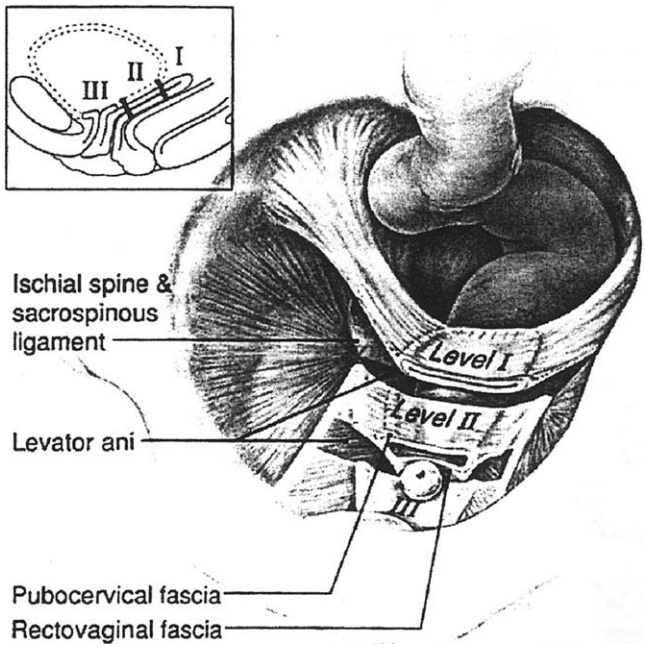

Figure 1 Levels of support. DeLancey's biomechanical levels: level I, proximal suspension; level II, lateral attachment; level III, distal fusion. (From DeLancey JOL: Anatomic aspects of vaginal eversion after hysterectomy. Am J Obstet Gynecol 166:1717-1728, 1992.)

work of the vagina as Levels I, II, and III. Level I describes apical vaginal support to the lateral pelvic sidewalls and also posteriorly toward the sacrum; Level II describes mid-vaginal support to the lateral sidewalls, stretching the vagina transversely between the rectum and bladder. Level III vaginal support describes distal attachment to the perineal membrane and muscles.

There is a dearth of literature ascribing direct attributable risk of the development of POP to vaginal delivery as compared with elective cesarean section. Data suggest that the connective tissue, muscular support, and innervation of this area may sustain pressure injury from pregnancy itself as well as during the process of parturition, where stretching, tearing, and even rupture or avulsion of the connective tissue, muscles, and nerves of these important support structures may be impacted. This may then manifest immediately, in the short term (that is less than 1 year from delivery) or in the long term with POP.

Evaluation

It has only been in the last 10 years that a measurement system has been developed to document progression or remission of prolapse of the vagina and the pelvic organs[11] (Fig. 2). It has also been in the last 5 to 10 years that we have had validated reliable questionnaires, demonstrating sensitivity to change, with which to assess POP symptoms in patients.[12] Before this time, grading systems describing prolapse with respect to presence within or outside the vagina were used.[13]

Parity and the Development of POP

Although increasing epidemiologic data[5-8] fuels an association between vaginal delivery and the development of pelvic floor dysfunction, the temporal delay between possible causative events and occurrence of symptoms of the disorder make elucidation of the direct pathophysiologic processes involved problematic. Population-based estimates of POP prevalence exist. Carley and coworkers performed a case control study on 480 women who underwent corrective surgery for urinary incontinence, POP, or both and whose obstetric history was obtainable through chart review.[14] The control group was composed of 150 women having routine screening mammography who completed a questionnaire regarding obstetric, gynecologic, and urologic history. Women who underwent surgery were of greater parity, less often nulliparous, less likely to have had a cesarean delivery, and more likely to have had a vaginal delivery than those with no surgery. Another recent case control study[15] identified demographics, obstetrics, and gynecology risk factors associated with the development of pelvic floor disorders in women who underwent surgical repairs for prolapse and urinary and fecal incontinence. In these surgical patients, with multivariate analyses to control for the effect of confounding, younger age at first delivery, higher BMI, forceps delivery, and history of gynecologic surgery were significantly associated with the subsequent development of pelvic floor disorders. Two other case control studies[16,17] showed an association between number of vaginal deliveries and increased risk of surgery for prolapse.

A cross-sectional analysis of women ages 50 to 79 years enrolled in the Women's Health Initiative reported that 41% of women with a uterus had some form of POP at baseline.[18] After controlling for age, body mass index, and other health/

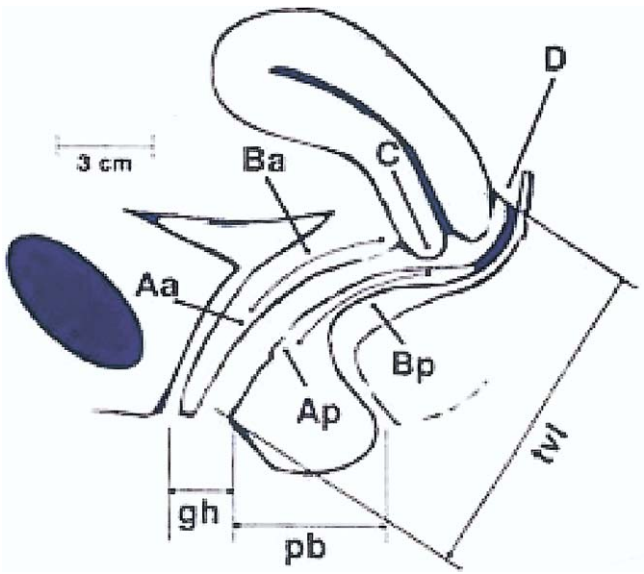

Figure 2 The nine specific sites of measurement used in the Pelvic Organ Prolapse–Quantification System (POP-Q).[11] Abbreviations: gh, genital hiatus; pb, perineal body; tvl, total vaginal length. (Color version of figure is available online.)