Anatomy of Pelvic floor support

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There is no doubt that recent anatomical studies of pelvic floor support and understanding of pelvic dynamics will eventually lead us beyond the current management of pelvic floor defects. As we are now able to identify the specific defect (or defects) responsible for genital prolapse, it is possible specific procedures may be developed and used to address these individual defects.

DeLancey’s anatomical cadaver studies have shown that pelvic organs are suspended by the pelvic ligament and supported by the levator ani muscle. Breaks in the connective tissue and neuromuscular damage affecting the pelvic floor muscle cause pelvic organ prolapse. MRI and ultrasonography have begun to define the dynamics of the pelvic floor and document specific tissue lesions involved in this process.

The structures that support the vagina and the uterus are divided into three levels which correspond to differing areas of support.

Level 1 (Suspension)

The upper part of the vagina and the cervix are suspended from above. The suspending structure that is attached to the uterus is called the parametrium and that attached to the vagina is the known as the paracolpium. The parametrium is made up of what is clinically referred to as the cardinal and uterosacral ligaments, and continues down the vagina as the paracolpium. The upper portion of the paracolpium is responsible for suspending the apex of the vagina after hysterectomy.

Level 2 (Attachment)
In the middle portion of the vagina, the paracolpium becomes shorter and is attached medially to the vaginal wall and laterally to the pelvic side walls.

**Level 3 (Fusion)**

This corresponds to the region of the vagina that extends 2–3 cm above the hymenal ring; the vagina is fused laterally to the levator muscle and posteriorly to the perineal body while anteriorly it blends with the urethra.

Damage to the upper suspensory fibres of the parametrium and paracolpium causes a different type of prolapse from damage to the midlevel support of the vagina, Therefore, while the loss of the upper suspensory fibre of the paracolpium and the parametrium is responsible for the development of uterine prolapse and vault prolapse; the defects in the support provided by mid-level vaginal support (pubocervical and rectovaginal fasciae) result in a cystocele and/or rectocele. The support under the urethra has special importance for urinary incontinence. These defects usually occur in varying combinations.

As these specific defects will lead to certain types of prolapse, specific surgical procedures will be needed, e.g. if there is a defect at level 2 with detachment of the pubocervical fascia, it will result in the presence of a cystocele; it would be a mistake to believe that the attachment of the vaginal vault to the sacrospinous ligament would correct the anatomical defect of the anterior vaginal wall at level 2. On the other hand, if the parametrium or paracolpium is over-stretched resulting in second-degree uterine prolapse or vault prolapse, anterior vaginal repair will not correct this type of prolapse and only suspension of the vagina vault will correct such a defect.

**Vaginal Axis**
A study using demonstrated the function and actual shape of the levator ani. This study showed that the levator ani muscle was dome-shaped at rest. Not only does the tone of the levator muscle increase during increased intra-abdominal pressure, but the configuration of the muscle is also altered – it is straightened and made more horizontal to support the vagina.

**Sacrospinous Ligament**

The sacrospinous ligament is a fibromuscular structure arising from the ischial spine, which fans out and inserts into the lower lateral aspect of the sacrum. The ligament has very distinctive characteristics on palpation; the superior margin of the ligament is hard like bone and the surface of the ligament is corrugated. The inferior margin of the ligament is soft and can be flicked with the finger. There are important anatomical structures in relation to the ligament. The pudendal nerve and vessels run just behind the ischial spine. The inferior gluteal vessels run about a centimetre above the superior margin of the ligament. The sacral plexus and sciatic nerve are located above the superior margin of the ligament. The rectal venous plexus runs at the medial border of the ligament and surrounds the rectum.