

AN ANATOMIC STUDY THE UTEROSACRAL LIGAMENT AND ITS RELATIONSHIP TO THE PUDENDAL NERVE AND SACRAL NERVE ROOTS

Hypothesis / aims of study

Uterosacral ligament suspension is an effective treatment for vaginal vault prolapse [1]. Anatomic studies [2] of the uterosacral ligament suggest that the optimal site for suture placement is in the intermediate portion of the ligament, close to the level of the ischial spine. However, the surgical anatomy of this site has not been described with respect to the pudendal nerve and sacral nerve roots. The aim of this anatomic study was to describe the anatomic relationships between the uterosacral ligament, the pudendal nerve, and the S1-S4 nerve roots.

Study design, materials and methods

This study was performed in six embalmed female cadavers. The rectosigmoid and its mesentery were removed and each specimen was bisected. The peritoneum was removed, starting from the pelvic brim and continuing to the lateral edge of the uterosacral ligament. The hypogastric artery and its branches were exposed and the accompanying veins were removed. We identified the S1-S4 nerve roots and the pudendal nerve, tracing the latter to its entrance into Alcock's canal. We used a flexible disposable tape measure to describe the anatomic relationship between the uterosacral ligament and the sacral nerve roots and pudendal nerve. Specifically, using the ischial spine as a landmark, we obtained measurements in centimetres (to the nearest 0.1 cm) along the length of the uterosacral ligament to describe the location at which each structure crossed the uterosacral ligament. We estimated the mean location for each point and calculated a 95% confidence interval (95% CI) for each distance.

Results

In all 6 specimens, we were able to trace the uterosacral ligament from the cervix to its origin at the sacrum. The uterosacral ligament was 8.7 cm in mean length (95% confidence interval (CI) 7.5, 10.0). The sacral nerve roots were easily identified. In all specimens, the pudendal nerve originated lateral to the uterosacral ligament and thus the pudendal nerve did not cross the ligament. However, the S2-4 roots of the sacral plexus consistently crossed under the uterosacral ligaments as they passed laterally through the pelvis. Specifically, the relationship between the uterosacral ligament and these nerve roots was as follows:

Nerve root	Intersection with uterosacral ligament
S2	2.6 cm cranial to the ischial spine (95% CI 1.5, 3.6)
S3	1.5 cm cranial to the ischial spine (95% CI 0.7, 2.4)
S4	0.9 cm cranial to the ischial spine (95% CI 0.3, 1.5 cm)

Interpretation of results

These results suggest a fairly consistent anatomic relationship between the uterosacral ligament and important neural structures. These relationships are highly relevant for surgeons. Specifically, in a uterosacral suspension of the vaginal vault, sutures are placed deeply into the ligament, with the most inferior suture at the level of the ischial spine and with additional sutures placed cephalad along the ligament [1,2]. At this location, there is a risk of injury to the S4 and S3 roots of the pudendal nerve. The S2 nerve root could be injured with sutures placed 2-3 cm cranial to the ischial spine. The risk of injury to these structures would be increased by more deeply-placed sutures.

Concluding message

Although uterosacral ligament suspension sutures are unlikely to entrap the pudendal nerve, the S2-S4 nerve roots are vulnerable to injury during placement of these sutures. Injury to the

sacral nerve roots could cause postoperative pain and numbness in the perineum and posterior lower extremity. Such symptoms could also be caused by a sciatic nerve stretch injury from positioning in lithotomy position. In patients manifesting signs and symptoms of sacral neuropathy, the possibility of sacral nerve root entrapment should be considered. Prompt recognition and removal of the sutures could resolve postoperative symptoms [3].

- [1] Anatomical correction of vaginal vault prolapse by uterosacral ligament fixation in women who also require a pubovaginal sling. *J Urol.* 2003 May;169(5):1770-4
- [2] Uterosacral ligament: description of anatomic relationships to optimize surgical safety. *Obstet Gynecol.* 2001 Jun;97(6):873-9.
- [3] Sacrospinous colpopexy: management of postoperative pudendal nerve entrapment. *Obstet Gynecol.* 1996 Oct;88(4 Pt 2):713-5