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NERVE-PRESERVING SACROPEXY: ANATOMICAL STUDY AND SURGICAL APPROACH

Hypothesis / aims of study
Abdominal sacrocolpopexy is considered the gold standard for pelvic organ prolapse repair. After sacrocolpopexy, de novo bowel, urinary and sexual dysfunctions are described. These dysfunctions could be caused by injury of the autonomous nerves of the presacral space which supply the pelvic organs. Even if nerve protection is an indisputable objective in surgery, protection of the autonomous nerves during urogynaecologycal surgery has not been discussed so far. The aim of our study is to describe the course of the autonomous nerves of the presacral space for a better understanding of postsurgical morbidity after sacrocolpopexy, and to find the best nerve preserving approach for sacropexy.

Study design, materials and methods
The autonomous nerves of the presacral space are dissected on six specially, with alcohol–glycerol, preserved female cadavers. Specimens with previous abdominal surgery were excluded from the study, as well as cadavers with evidence of previous spine or presacral space surgery. The dissected specimens had neither undergone hysterectomy or adnexectomy nor did they have signs of pelvic organ prolapse. Our analysis of the autonomic innervation focused on the following parameters: the exposition of the superior hypogastric plexus with the right and left hypogastric nerves; the dissection of the right sympathetic trunk, paying particular attention to the sacral splanchnic nerves; and the exposition of the ventral rami of the sacral spinal nerves S1-S4 with identification of the origin of the pelvic splanchnic nerves.

Results
The superior hypogastric plexus is located in front of the abdominal aorta and its bifurcation and deviates to the left of the midsagittal plane. At the level of the promontory, or just below, the superior hypogastric plexus branches into two hypogastric nerves that run in front of the sacrum. In the presacral space the parasympathetic pelvic splanchnic nerves from the ventral rami of the sacral spinal nerves (S2-S3) join the hypogastric nerves, forming the inferior hypogastric plexus on both sides. From the inferior hypogastric plexus, nerve fibres spread out bilaterally to the pelvic organs. In 2 of 6 cadavers sacral splanchnic nerves could be identified leading from the sacral sympathetic ganglion S1 of the sympathetic trunk to the inferior hypogastric plexus.

Interpretation of results
The longitudinal incision of the peritoneum along the right common iliac artery and above the promontory allowed for a safe approach for sacropexy. After exposing the vascular structure (e.g. medial sacral vessels) above the promontory, the anterior longitudinal ligament becomes visible and can be prepared for the fixation of the mesh for vaginal suspension. By protecting the superior hypogastric plexus and the part of the presacral area below the promontory we can preserve the hypogastric nerves, the sacral and pelvic splanchnic nerves and thus the autonomous innervation of the pelvic organs.

Concluding message
Today, in an era when therapeutic interventions are increasingly assessed by the resulting quality of life, every effort should be made to minimize postoperative morbidity.
The anterior longitudinal ligament above the promontory is a safe area for sacopexy. Taking into account our findings regarding the neural anatomy of the presacral space, the best suspension area for sacrocolpopexy is the anterior longitudinal ligament just above the promontory. Making the peritoneal incision longitudinally medial to the right common iliac vessels, first, the superior hypogastric plexus can be visualized and meticulously protected, second, the anterior longitudinal ligament can be prepared and third the sacral vessels can be exposed. Thus awareness of the autonomous nerves in the presacral space may significantly improve functional outcomes of sacrocolpopexy.

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Is this a clinical trial?	**No**
What were the subjects in the study?	**HUMAN**
Was this study approved by an ethics committee?	**No**
This study did not require ethics committee approval because	**The study was performed on cadavers. The subjects were donated to the Institute of Anatomy for research and had given the informed consent during their lifetimes.**
Was the Declaration of Helsinki followed?	**Yes**

Was informed consent obtained from the patients?	**Yes**