



How I do it: Nerve-sparing laparoscopic low anterior resection: Step by step nerve identification and preservation

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ABSTRACT

Advances in surgical techniques, together with the widespread use of neoadjuvant and adjuvant therapies, have markedly improved disease-free and overall survival in patients with rectal cancer. Nevertheless, urogenital dysfunction remains a significant source of postoperative morbidity, primarily due to the anatomical location of the rectum and its close relationship with the autonomic pelvic nerves. Although the incidence of urological complications has declined to below 10%, sexual dysfunction continues to affect approximately one-quarter of patients. Nerve-sparing total mesorectal excision, performed without compromising oncological principles, has therefore become a critical component of contemporary rectal cancer surgery. Minimally invasive video-assisted techniques, offering magnified visualization and enhanced precision during pelvic dissection, facilitate the accurate identification and preservation of autonomic nerve structures. However, current evidence indicates that awareness and consistent application of nerve-sparing principles remain suboptimal, even among experienced colorectal surgeons. This video systematically demonstrates the key anatomical landmarks and stepwise surgical maneuvers required for effective nerve preservation during total mesorectal excision, aiming to reduce urogenital functional morbidity.

Keywords: Colorectal cancer, laparoscopic surgery, minimal invasive surgery, rectum

INTRODUCTION

Although total mesorectal excision with pelvic autonomic nerve preservation decreased the rates of urinary dysfunction (0-12%) and sexual dysfunction (10-35%) (1), an international survey of high-volume laparoscopic colorectal surgeons demonstrated limited awareness of nerve-sparing anatomy, with reported recognition rates of 81.2% for the hypogastric nerves, 43.5% for the inferior hypogastric plexus, 31.8% for urogenital branches, and only 12.9% for the pelvic splanchnic nerves (2-4). This video aims to systematically demonstrate the key anatomical landmarks and the stepwise surgical maneuvers required for nerve-sparing rectal surgery (Video 1).

CASE REPORT

A 61-year-old female patient was diagnosed with rectal adenocarcinoma. Pelvic magnetic resonance imaging showed minimal rectal wall thickening and no lymphadenopathy. There was no history of neoadjuvant chemotherapy or radiotherapy. The patient underwent a laparoscopic low anterior resection. In the postoperative period, no urogenital dysfunction was observed. The patient maintained normal urinary function and reported no impairment in sexual function during follow-up, indicating successful preservation of autonomic pelvic nerves. Written informed consent was obtained from the patient for publication of the clinical data and accompanying images.

Surgical Technique

Posterior pelvic dissection was initiated by separating the mesorectum from the pelvic autonomic nerves along the proper rectal fascia, with preservation of the hypogastric nerves along the pelvic sidewalls. During the deep posterior pelvic dissection, the lateral ligaments, which are densely adherent to the pelvic plexus, were identified and carefully dissected. In the anterior pelvic dissection, following

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incision of the peritoneum at the level of the peritoneal reflection, Denonvilliers' fascia was identified and the dissection was continued along this plane. The dissection was extended laterally along the seminal vesicles in male patients and along the vaginal wall in female patients. To minimize the risk of nerve and thermal injury during dissection of Denonvilliers' fascia, sharp dissection was preferred, and an energy device was required, low-energy settings were applied. Neurovascular bundles originating from the pelvic plexus course adjacent to the apical region of the seminal vesicles, typically at the 2 o'clock and 10 o'clock positions, before extending toward the urogenital organs. Anterolateral dissection is advanced until it meets the previously established posterolateral plane at the pelvic sidewall, allowing safe separation of the lateral mesorectal fascia from the pelvic plexus.

In conclusion, awareness of pelvic nerve anatomy and identification of anatomically at-risk areas for nerve injury will reduce postoperative urogenital complications and improve patients' quality of life.

Video Link: https://drive.google.com/file/d/18TWwGWQSZvIded3Jc1Dffpvn_02Y02be/view?usp=sharing

Ethics

Informed Consent: Written informed consent was obtained from the patient for publication of the clinical data and accompanying images.

Footnotes

Author Contributions

Concept - K.D.B., A.E.A., A.V., Ş.F.D., A.C., Ş.C.Y.; Design - K.D.B., A.E.A., A.V., Ş.F.D., A.C., Ş.C.Y.; Data Collection or Processing - K.D.B., A.E.A., A.V., Ş.F.D.; Analysis or Interpretation - K.D.B., A.E.A., A.V., Ş.F.D., A.C., Ş.C.Y.; Literature Search - K.D.B., A.E.A., A.V., Ş.F.D., A.C., Ş.C.Y.; Writing - K.D.B., A.E.A., A.V., Ş.F.D.

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