






# Nerve sparing systematic lymph node dissection (para-aortic region): a technique for enhanced functional outcomes after gynecological cancer surgeries

Mustafa Zelal Muallem , Sara Nasser , Andrea Miranda 



## Mustafa Zelal Muallem

<sup>1</sup>Department of Gynecology with Center for Oncological Surgery, Charité–Universitätsmedizin Berlin, Corporate Member of Freie Universität Berlin, Humboldt-Universität zu Berlin, and Berlin Institute of Health, Virchow Campus Clinic, Charité Medical University, Berlin, Germany

**Biography:** Professor Mustafa Zelal Muallem is the deputy director of department of Gynecology with center for Gynecological oncology at the Charité medical university of Berlin, Germany. Professor Mustafa Zelal Muallem is also actively involved in training and supervising medical students, residents and fellows in gynecological oncology. His clinical research focuses on surgical therapy and developing innovative surgical approaches to treating gynecologic cancers and to maintaining the best quality of life after surgery by improvement of minimally invasive techniques, establishment of nerve-sparing procedure in oncological surgery and implement the reconstruction procedures after radical cancer operation.

For numbered affiliations see end of article.

### Correspondence to

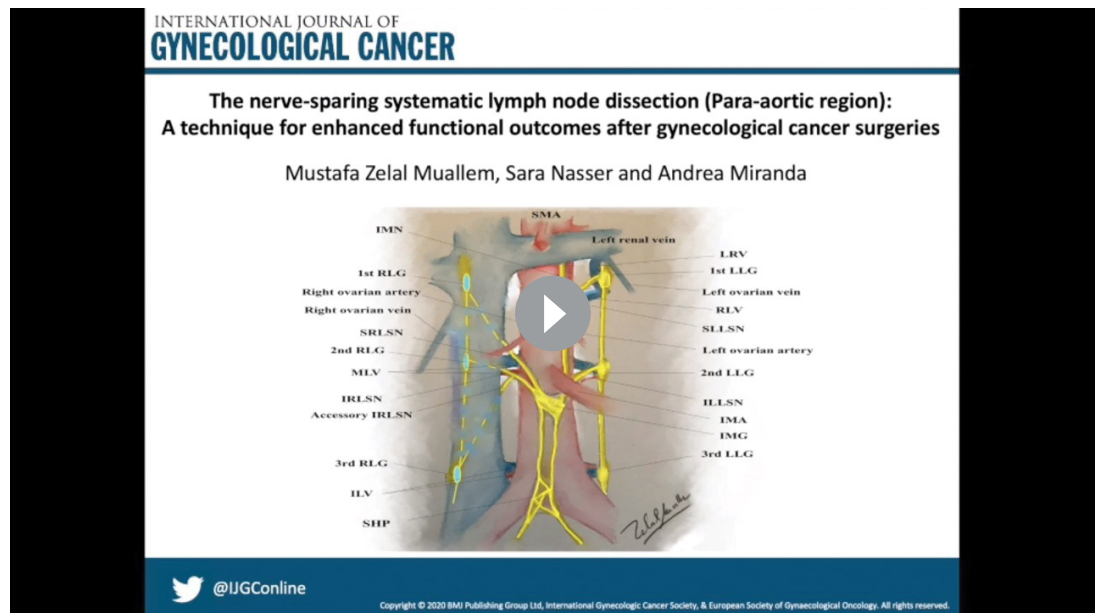
Prof. Dr. Mustafa Zelal Muallem, Charite Universitätsmedizin Berlin, Campus Virchow-Klinikum, 13353 Berlin, Germany; Mustafa-Zelal.Muallem@charite.de

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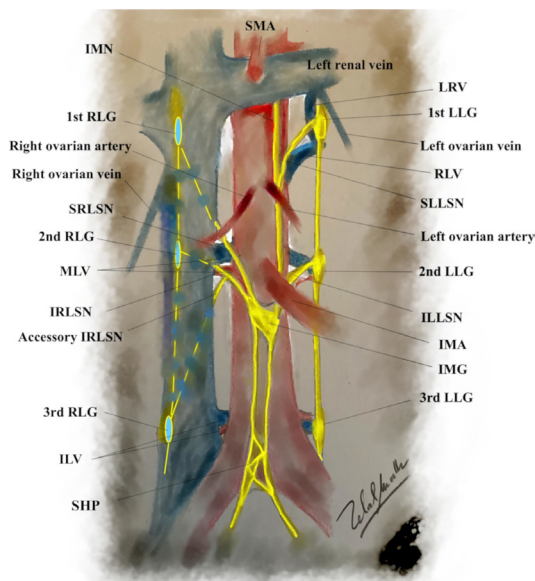
### SUMMARY

Systematic lymph node dissection has become less prevailing in the field of gynecological oncology in the past decade. However, it still remains an essential part of the gynecological oncologist's surgical

repertoire as a diagnostic and therapeutic procedure, in particular in gynecological cancer cases.<sup>1</sup> This procedure was associated traditionally with a higher incidence of postoperative bowel, bladder, and sexual dysfunctions. Several studies analyzing quality of life



**Video 1** Surgical steps of the Muallem technique for nerve sparing systematic para-aortic lymph node dissection, sparing the abdominal aortic plexus, the superior hypogastric plexus, and the intermesenteric nerve.



**Figure 1** 1st LLG, first left lumbar ganglion; 2nd LLG, second left lumbar ganglion; 3rd LLG, third left lumbar ganglion; 1st RLG, first right lumbar ganglion of the sympathetic trunk; 2nd RLG, second right lumbar ganglion of the sympathetic trunk; 3rd RLG, third right lumbar ganglion of the sympathetic trunk; ILLSN, inferior left lumbar splanchnic nerve; ILV, inferior lumbar vessels; IMA, inferior mesenteric artery; IMG, inferior mesenteric ganglion; IMN, intermesenteric nerve; IRLSN, inferior right lumbar splanchnic nerve; LRV, left renal vein; MLV, middle lumbar vessels; SHP, superior hypogastric plexus; SLLSN, superior left lumbar splanchnic nerve; SMA, superior mesenteric artery; SRLSN, superior right lumbar splanchnic nerve; RLV, renal-lumbar vein.

in patients following lymph node dissection have shown that the most persistently compromised quality of life indicator for 50% of patients was sexual function after treatment for gynecological malignancies.<sup>2</sup> A further study also highlighted vaginal dryness and reduced libido as persistent and negative complications following radical hysterectomy in cervical cancer patients.<sup>3</sup>

This is primarily due to the fact that vaginal lubrication is a neural reflex response initiated by the hypogastric nerve (sympathetic innervation).<sup>4</sup> This has also been well described in the LION-PAW (lymphadenectomy in ovarian neoplasm-pleasure ability of women) study<sup>5</sup> evaluating prospectively and substantially the role of systematic lymph node dissection (unsparing technique) in advanced ovarian cancer with reference to sexual function. The authors confirmed that lymphadenectomy (unsparing technique) is associated with a significant change in the orgasm score from baseline to 1 year in sexually active patients. These results are in line with previous results of the total retroperitoneal en bloc resection of multivisceral-peritoneal packet (TROMP) operation study,<sup>6</sup> which included our technique for nerve sparing systematic lymph node dissection. The results confirmed a worse score for discomfort during sexual intercourse and a reduced orgasm score with the conventional surgical technique compared with nerve sparing lymph node dissection.

Although the different approaches to lymph node dissection are well established, the essential aspect of the nerve sparing

techniques, and especially during para-aortic lymph node dissection, is seldom described in detail. A contributing factor to this is a poor anatomical understanding of the autonomic nerves within the boundaries of the para-aortic lymph node regions. This in turn limits the performance of precise nerve sparing surgery during lymph node dissection. Hence, in [video 1](#), we provide a detailed description of our surgical steps for nerve sparing systematic lymph node dissection, the Muallem technique in the female para-aortic area, and the benefits to performing this technique.

We focus on the steps to dissect, visualize, and highlight the sympathetic trunks, the superior hypogastric plexus, the abdominal aortic plexus, and the intermesenteric nerves ([Figure 1](#)) during para-aortic lymph node dissection using an open approach. Other studies from our study group confirmed the feasibility of nerve sparing surgery during radical hysterectomy for cervical cancer and explained the precise anatomy of the pelvic autonomic nervous system.<sup>7–9</sup> Nerve sparing para-aortic lymph node dissection is feasible and safe in gynecological cancer cases when following the steps outlined in the video for careful dissection of the aortic and superior hypogastric plexus.<sup>16</sup> Larger prospective trials are planned to assess the effects of this technique on postoperative functional patient reported outcomes.

#### Author affiliations

Department of Gynecology with Center for Oncological Surgery, Charité–Universitätsmedizin Berlin, Corporate Member of Freie Universität Berlin, Humboldt-Universität zu Berlin, and Berlin Institute of Health, Virchow Campus Clinic, Charité Medical University, Berlin, Germany

**Twitter** Sara Nasser @dr\_saranasser

**Contributors** MZM wrote the paper, developed the surgical technique, performed the operations, and added the audio explanation to the video. SN added the audio explanation to the video and reviewed the manuscript. AM filmed the operation and edited the video.

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#### ORCID iDs

Mustafa Zela Muallem <http://orcid.org/0000-0002-3351-9429>

Sara Nasser <http://orcid.org/0000-0002-5719-7532>

Andrea Miranda <http://orcid.org/0000-0001-5029-7365>

#### REFERENCES

- Muallem MZ, Diab Y, Jöns T, *et al*. Nerve-sparing systematic lymph node dissection in gynaecological oncology: an innovative neuro-anatomical and surgical protocol for enhanced functional outcomes. *Cancers* 2020;12:3473.
- Carmack Taylor CL, Basen-Engquist K, Shinn EH, *et al*. Predictors of sexual functioning in ovarian cancer patients. *J Clin Oncol* 2004;22:881–9.
- Jensen PT, Groenvold M, Klee MC, *et al*. Early-stage cervical carcinoma, radical hysterectomy, and sexual function. A longitudinal study. *Cancer* 2004;100:97–106.
- Bakker RM, Pieterse QD, van Lonkhuijzen LRCW, *et al*. A controlled study on vaginal blood flow during sexual arousal among early-stage cervical cancer survivors treated with conventional radical or nerve-sparing surgery with or without radiotherapy. *Int J Gynecol Cancer* 2017;27:1051–7.
- Hasenburg A, Sehouli J, Lampe B, *et al*. LION-PAW (lymphadenectomy in ovarian neoplasm) sexual function assessment:

- a prospective sub-study of the lion trial. *Int J Gynecol Cancer* 2020;30:1548–53.
- 6 Muallem MZ, Sehouli J, Miranda A, *et al.* Total retroperitoneal en bloc resection of multivisceral-peritoneal packet (TROMP operation): a novel surgical technique for advanced ovarian cancer. *Int J Gynecol Cancer* 2020;30:648–53.
- 7 Muallem MZ, Miranda A, Muallem J. Nerve-sparing radical hysterectomy—Muallem technique with explanation of parametrium and paracolpium anatomy. *Int J Gynecol Cancer* 2021;31:795–6.
- 8 Muallem MZ, Jóns T, Seidel N, *et al.* A concise paradigm on radical hysterectomy: the comprehensive anatomy of parametrium, paracolpium and the pelvic autonomic nerve system and its surgical implication. *Cancers* 2020;12:1839.
- 9 Muallem MZ. A new anatomic and staging-oriented classification of radical hysterectomy. *Cancers* 2021;13:3326.