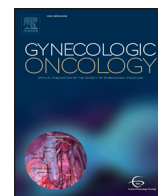




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Comprehensive laparoscopic lymphadenectomy from the deep circumflex iliac vein to the renal veins: Impact on quality of life[☆]

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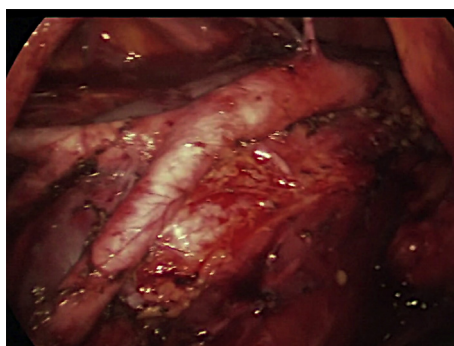
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HIGHLIGHTS

- Comprehensive lymphadenectomy does not harm patients' quality of life.
- Comprehensive lymphadenectomy does not cause lower extremity lymphedema.
- Comprehensive lymphadenectomy mildly contributes to lower extremity lymphedema after radiation and/or chemotherapy.
- Routine omission of the distal circumflex nodes may account for the low risk of lymphedema.
- Numbness and tingling may be caused by trauma to the genitofemoral nerve and should be avoided.

GRAPHICAL ABSTRACT



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ABSTRACT

Objective. Compare quality of life metrics for consecutive patients having total laparoscopic hysterectomy, bilateral salpingo-oophorectomy (TLHBSO) with and without comprehensive pelvic/aortic lymphadenectomy (CPALND) from proximal to the distal circumflex iliac nodes and vessels to the renal vessels.

Methods. Analysis of mailed survey responses with 25 validated questions regarding musculoskeletal/lower extremity, gastro-intestinal, abdominal, urological, and energetic/activities of daily living. Data analyzed with Chi-Square tests of Association, Mann-Whitney *U* tests and follow up regression analysis.

Results. Of 533 surveys mailed, 197 (37%) responded; 57 (28.9%) received CPALND. Age and parity were not different between groups, but the TLHBSO group had a higher BMI (31.4 v. 25.8, $p < 0.001$), and were less likely to receive chemotherapy (CT), radiotherapy (RT), or both (CT + RT). In the CPALND cohort, a mean of 47 nodes were removed, of which 26% were positive: 21% pelvic, 11% inframesenteric, 11% infrarenal. Both groups had similar total quality of life total scores of 86/92. Those having CPALND did not report more swelling but they did report more tingling/numbness (2.8 v. 3.5, $p < 0.001$). A series of hierarchical regressions confirmed that CPALND, per se, did not significantly reduce lower extremity scores apart from CT ($p = 0.402$) and CT + RT ($p = 0.108$). However, CPALND did predict for lower extremity swelling after receipt of CT, RT, or CT + RT. Node count, in total, or from each basin, did not correlate with any QOL decrement.

[☆] The author is a private practice Gynecologic Oncology surgeon in California, and consultant and/or speaker for Baxter, BD, and Medtronic. There is no off-label use of any medical device in this manuscript. No support was received for any part of this manuscript from any source. No proprietary interest is mentioned.

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Conclusions. CPALND did not cause lymphedema or a reduction in overall quality of life. Only after controlling for BMI, and receipt of radiation and/or chemotherapy were QOL scores mildly reduced. Routine omission of the distal circumflex nodes from the dissection may account for the low risk of lymphedema from the dissection. Larger prospective studies are needed to determine the optimal staging protocols that address all the likely sites of metastasis and recurrence, and optimize survival, while maintaining our patients' quality of life.

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1. Introduction

The treatment of both ovarian and endometrial neoplasia involves at least a laparoscopic hysterectomy with bilateral salpingo-oophorectomy (TLHBSO). However, many patients with clinically early high-risk endometrial and ovarian carcinoma must also undergo laparoscopic staging of their disease, including a comprehensive lymphadenectomy from the deep circumflex iliac vein in the lower pelvis to the renal veins, to assign an appropriately aggressive and accurately targeted postoperative therapy that will minimize risk of recurrence [1].

Understanding how each surgical procedure impacts quality of life after gynecologic cancer surgeries is important for surgeons as they weigh the risk-benefit ratio for each procedure under consideration in the individual patient's surgical plan and provide pre-operative counselling. The quality of life impact from TLHBSO is well-documented and minimal [2], but quality-of-life of patients receiving TLHBSO with a comprehensive laparoscopic pelvic and aortic lymphadenectomy (CPALND) from proximal to the deep circumflex iliac vessels to the renal vessels has never been reported. The additional impact of radiation and chemotherapy on their quality of life and on lower extremity lymphedema has not been well explored either. This is the first quality of life report of patients having a comprehensive lymphadenectomy from the pelvis to the renal vessels. This report also analyses the potentially confounding effects of age, body mass index, and post-operative chemotherapy and radiation therapy, using those patients undergoing laparoscopic hysterectomy/salpingo-oophorectomy as control subjects, for comparison with those also having a stringently defined laparoscopic lymphadenectomy from proximal to the distal circumflex pelvic nodes up to the renal vessels.

2. Patients and methods

With Investigational Review Board approval (BAY-2013.011) from Sequoia Hospital in Redwood City, CA, data was abstracted from hospital and office files for a consecutive series of patients who had laparoscopic surgeries for endometrial or ovarian neoplasia between January 1, 2002, when CPALND was introduced to this practice, until June 15, 2015.

Included in the study were patients with all types of endometrial neoplasia, from hyperplasia to clinically early carcinoma, so that the patients who had only TLHBSO could serve as controls for those receiving CPALND. Patients with endometrial lesions that were grade 3, or deeply invasive >50%, or invading the cervical stroma had TLHBSO with CPALND. Patients with all ovarian neoplasia, from benign ovarian mass to ovarian/tubal carcinoma, are included so that the portion who had only TLHBSO for an ovarian mass could serve as a control for those with malignant ovarian neoplasia who had TLHBSO with CPALND. Since the TLHBSO procedure was the same for both endometrial and ovarian neoplastic patients, all patients having only TLHBSO without CPALND will be grouped together as the study controls and called the TLHBSO group. All patients having TLHBSO with CPALND will be grouped together for comparison and referred to as the CPALND group.

Excluded from the study were patients referred with endometrial or ovarian carcinoma with radiographic evidence of metastasis, ascites or omental stranding, as these patients all had open laparotomy staging. Additionally, patients with BMI over 40 were excluded from this study because CPALND was not attempted in these patients.

2.1. Surgical technique

As reported elsewhere, a community gynecologic oncologist performed all procedures laparoscopically, assisted by a general gynecologist or a general surgeon, using a single field surgical prep technique [3], and a bipolar and monopolar vessel sealing device. A TLHBSO was performed in all cases [4,5]. CPALND was performed when laparoscopic staging was indicated, by either a transperitoneal or extraperitoneal approach.

CPALND consisted of a methodical *en masse* resection of the entire fibrofatty lymph-node bearing tissue surrounding each artery and vein, in six anatomic bundles, from three levels, bilaterally [6]. The distal surgical margins of the pelvic node dissections from proximal to the deep circumflex iliac vein crossing over the external iliac artery in the distal pelvis, medial to the genitofemoral nerve, cephalad to the ureter crossing the common iliac artery comprised the pelvic nodes, right and left. The distal-most, lateral external iliac nodes, also called the circumflex iliac nodes, were never removed because they are known to primarily drain the lower extremity [7], are not involved in pelvic malignancies absent widespread pelvic adenopathy [8,9], and are known to contribute to lower extremity lymphedema if removed. The systematic dissection continued from the ureter cephalic to the inferior mesenteric artery, for the Inframesenteric nodes (IM), right and left, and from the inferior mesenteric artery cephalad to the top of the bilateral renal vessels for the Infrarenal nodes (IR) [1]. In addition to the TLHBSO and CPALND, some patients had omentectomy, appendectomy, and other procedures as clinically indicated by their cancers (papillary serous or clear cell uterine, all tubal and ovarian primaries) for their staging. An appendectomy was encouraged for all patients in this practice, regardless of staging requirements, because the incidence of appendicitis is rising in the adult population, and the simple procedure takes about 2 min and requires only one pre-tied lasso vicryl suture [10,11].

A survey was sent to all eligible patients with a numbered return envelope that correlated their survey responses with their clinical history. This survey was adapted from the previously validated survey by Yost et al. [12] and from the validated EORTC questionnaire of quality of life, EORTC QLQ-C30 [13](Table 1). This questionnaire has a total of 25 questions that addressed six categories of quality of life: energetic activity, abdominal problems, the lower extremities, genito-urinary problems, gastro-intestinal problems, and sense of general well-being. For most questions, the respondent indicated on a four-point scale any difficulties with a specific issue (e.g. having difficulty walking for long periods) with a maximum score of 92. The questions were randomly arranged in the survey, but for this analysis and manuscript, they are grouped into subcategories according to biological system: Energetic/Activities of daily living, abdominal symptomatology, musculo-skeletal/lower extremity, genito-urinary, gastro-intestinal, and overall. When significant differences were identified in the subcategories, sub-analysis of the individual questions in that group was performed to identify the specific QOL differences and their magnitude. Further impact of radiotherapy and chemotherapy were assessed using regression analyses.

Data was stored and analyzed on a Microsoft Excel Spread sheet using the IBM SPSS Statistical package version 24. Descriptive statistics including means, standard deviations, medians, and range were calculated. Correlation analyses, Pearson's R correlation, Man-Whitney U tests were used to compare overall and category scores and *t*-tests.

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