

Case series

Short-term morbidity in transdiaphragmatic cardiophrenic lymph node resection for advanced stage gynecologic cancer

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ABSTRACT

Ovarian cancer is commonly diagnosed at an advanced stage, with disease involving the upper abdomen. The finding of enlarged cardiophrenic lymph nodes (CPLNs) on pre-operative imaging often indicates the presence of malignant spread to the mediastinum. Surgical resection of CPLN through a transdiaphragmatic approach can help to achieve cytoreduction to no gross residual. A retrospective chart review was conducted on all patients who underwent transdiaphragmatic cardiophrenic lymph node resection from 8/1/11 through 2/1/15. All relevant pre-, intra-, and post-operative characteristics and findings were recorded. A brief description of the surgical technique is included for reference. Eleven patients were identified who had undergone transdiaphragmatic resection of cardiophrenic lymph nodes. Malignancy was identified in 18/21 (86%) of total lymph nodes submitted. The median number of post-operative days was 7. The overall post-operative morbidity associated with CPLN resection was low, with the most common finding being a small pleural effusion present on chest x-ray between POD# 3–5 (55%). Transdiaphragmatic CPLN resection is a feasible procedure with relatively minor short-term post-operative morbidities that can be used to achieve cytoreduction to no gross residual disease.

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1. Introduction

Cancer of the ovary is a particularly insidious disease that is commonly diagnosed at an advanced stage. In 2015, the American Cancer Society estimated that 21,290 new cases were diagnosed and 14,180 women died of this disease (American Cancer Society, Inc. Cancer Facts, and Figures, 2015). One of the main reasons for such a high associated mortality is that approximately 65% of patients are initially diagnosed at International Federation of Gynecology and Obstetrics (FIGO) Stage III or IV (Pecorelli et al., 1998). Primary cytoreductive surgery to no gross residual (NGR) disease has consistently been found to be one of the most important prognostic indicators in patients with advanced stage ovarian cancer and remains the only factor under the control of the operating surgeon. Furthermore, statistically significant differences in recurrence and survival have been observed when residual tumor volume was reported as either microscopic (NGR), 0.1 to 5.0 cm, or >5.0 cm (Winter et al., 2008).

Various surgical techniques have previously been described to achieve complete resection of diaphragmatic and CPLN related disease. Bashir et al. described a procedure for full thickness diaphragm resection which in addition to removing bulky diaphragm disease, allowed

for access to the pleural and pericardial space (Bashir et al., 2010). In addition, our group recently published a surgical video displaying the technique of diaphragm resection and transdiaphragmatic resection of CPLNs (LaFargue and Bristow, 2015). Video-assisted thoracic surgery (VATS) has also been shown to be a successful modality for achieving resection of CPLNs (Lim et al., 2009).

The current case series was compiled to further define the pre-, intra-, and post-operative characteristics of patients undergoing transdiaphragmatic resection of CPLNs in advanced gynecologic cancer and delineate the associated short-term morbidities and time to adjuvant chemotherapy.

2. Methods

The study design was a retrospective review performed in the division of Gynecologic Oncology at the University of California Irvine Medical Center. All patients who underwent a transdiaphragmatic cardiophrenic lymph node resection from 8/1/11 through 2/1/15 as part of a primary or secondary cytoreductive surgery were selected for detailed review. Each identified subject had transdiaphragmatic CPLN resection performed in an effort to achieve cytoreduction to no gross residual disease. There were only two different physicians who were listed as the primary surgeon for all patients included in this report. All of the CPLN resection procedures were performed by the same gynecologic oncologist with the assistance of either the primary surgeon or a

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gynecologic oncology fellow. The necessity of prophylactic chest tube placement prior to closing the diaphragmatic defect was determined by the operating surgeon according to intra-operative findings and the overall patient status.

Individual subject data encompassing pre-, intra-, and post-operative characteristics were identified through electronic medical record review of inpatient and ambulatory records. Pre-operative data reviewed included: patient's age, initial CA-125, presence and size of CPLN on initial imaging, primary vs. recurrent cancer status, presumed stage, histology (if known), and whether neoadjuvant chemotherapy was given. Intra-operative characteristics were identified from operative notes and included: total operative time, estimated blood loss, amount of residual disease at conclusion, placement of prophylactic chest tube, and all ancillary procedures performed, including whether hyperthermic intraperitoneal chemotherapy (HIPEC) was performed at the conclusion of the operation. When an intra-operative frozen section was sent on the CPLN specimen, the initial diagnosis was recorded and included for analysis of congruence with final pathology. Pathology records were interrogated to determine the size and number of CPLNs obtained from each patient. Post-operative characteristics were identified through radiology and pathology reports as well as discharge summaries and included: final FIGO stage and histology, presence and size of pleural effusions or pneumothorax, all major complications, post-operative day of discharge, and time to adjuvant chemotherapy.

2.1. Surgical technique

In most cases, enlarged cardiophrenic lymph nodes were first identified on pre-operative CT imaging (Fig. 1). For the patients in which pre-operative imaging did not show lymphadenopathy, the decision was made to proceed with CPLN resection based on an intraoperative assessment consisting of the degree of diaphragm involvement and palpation of the pericardial space. The surgical technique used to perform full-thickness diaphragm resection and CPLN resection has been previously described and illustrated (Bashir et al., 2010; LaFargue and Bristow, 2015). In brief, full exposure of the diaphragm peritoneum is achieved after mobilization the liver. The diaphragm is then incised using electrocautery, the pleural space is explored, and the cardiophrenic nodes are resected using a vessel sealing-cutting device (Fig. 2). A 15F, round Jackson Pratt (JP) drain is then used as an alternative to the standard chest tube and placed through the diaphragmatic defect into the pleural cavity under direct vision and brought out through a separate stab incision in the mid-axillary line above the seventh or eighth rib. The diaphragmatic defect is then closed using a non-absorbable suture (2-0 polypropylene in figure-of-eight stitches). The Jackson-Pratt drain is then connected to suction to evacuate the pneumothorax. If no chest tube is placed, prior to tying the last stitch,

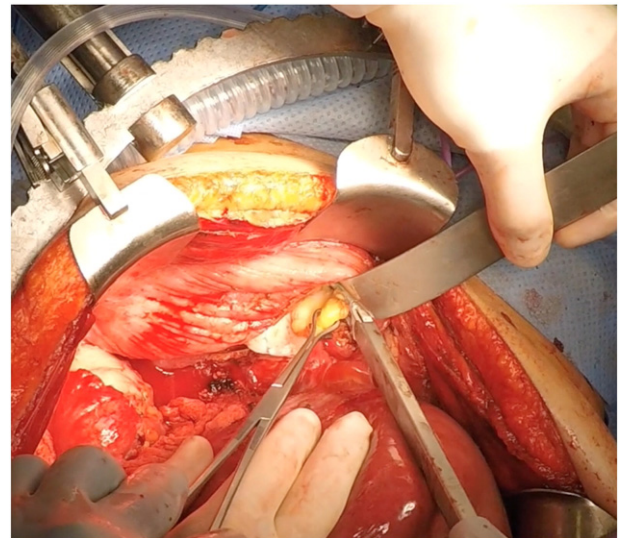


Fig. 2. Cardiophrenic fat pad is grasped with Babcock clamp and excised using vessel sealing-cutting device via diaphragmatic defect.

a fenestrated 16F Robinson catheter attached to wall suction is placed into the pleural cavity to remove the pneumothorax and withdrawn as the last knot is tied. The “bubble test” is then performed to evaluate for any air leak by filling the right upper quadrant with saline solution and delivering several large mechanical inspiratory breaths while inspecting the repair for extravasation of air bubbles. If present, air leaks are oversewn, the pneumothorax evacuated, and the test repeated.

3. Results

3.1. Patient demographics

A total of 11 patients underwent transdiaphragmatic CPLN resection (10 with unilateral CPLN resection, and 1 patient with bilateral resection). Specific patient characteristics are displayed in Table 1. The mean age was 58 years (range 42–71 years), with FIGO stage IVB serous ovarian cancer being the most common stage, histology, and primary tumor site, respectively. One patient included in the study had clear cell uterine cancer. Enlarged cardiophrenic lymph nodes were identified in 7 patients on pre-operative imaging (64%), while the remainder was identified based on intra-operative suspicion.

3.2. Surgical outcomes

Table 2 displays the intra-operative and post-operative findings. The average operative time was 385 min (range 277–568 min), and the average estimated blood loss was 564 cm³ (range 200–900 cm³). Ten patients underwent optimal cytoreduction defined as <1 cm (91%), while 7 of these patients had no gross residual disease (64%). A prophylactic Jackson-Pratt drain was placed in the pleural cavity, as an alternative chest tube, and brought out through a separate stab incision in the chest in 8 patients (73%).

Intra-operative frozen section of the resected CPLNs was sent in 6 patients, with malignancy being identified in 5 of them. On final pathologic evaluation, the average number and size of CPLNs obtained per patient was 1.9 (range 1–4) and 1.6 cm (range 0.2–2.5 cm), respectively, with final diagnosis of malignancy confirmed in 10 of the 11 total patients. The total number of CPLNs resected from all patients was 21 with malignancy being confirmed in 18 (86%).

The median number of post-operative days was 7 (range 4–37). The overall post-operative morbidity associated with CPLN resection was low with the most common finding being a small pleural effusion

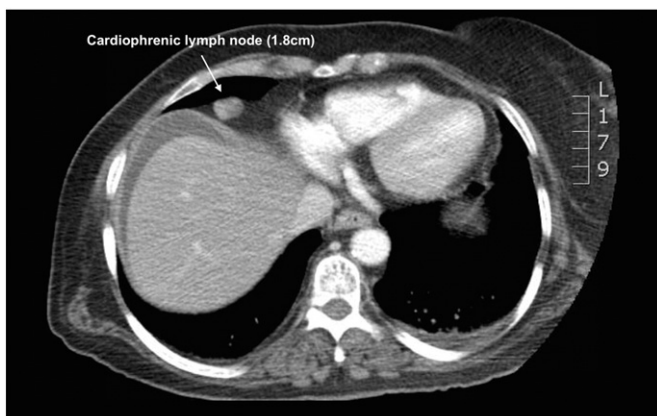


Fig. 1. Pre-operative CT scan demonstrating enlarged cardiophrenic lymph node in mediastinum.

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