Intraoperative Ultrasound-Guided Excision of Cardiophrenic Lymph Nodes in an Advanced Ovarian Cancer Patient

Francesca Moro, MD, PhD, Stefano Uccella, MD, PhD, Antonia Carla Testa, MD, PhD, Giovanni Scambia, MD, PhD, and Anna Fagotti, MD, PhD

Objective: Ovarian cancer is commonly diagnosed at an advanced stage. Complete macroscopic eradication of the disease is associated with improved prognosis. In this setting, the surgical resection of enlarged cardiophrenic lymph nodes (CPLNs) can help to achieve cytoreduction to no gross residual disease. During surgery, CPLN removal is usually performed either via video-assisted thoracic surgery or through a large transdiaphragmatic or subxiphoid incision. In the present case, we propose the use of an intraoperative transdiaphragmatic ultrasound to confirm preoperative imaging and to obtain a precise localization of the suspicious CPLNs.

Methods: A 50-year-old woman without peritoneal carcinomatosis was diagnosed with bilateral ovarian cancer and enlarged inguinal, pelvic, aortic, and cardiophrenic nodes. She underwent primary debulking surgery, including radical hysterectomy, bilateral salpingo-oophorectomy, omentectomy, peritoneal biopsies, and bulky nodes resection, at the iliac, inguinal, and lumboaortic regions.

Results: After obtaining complete abdominal cytoreduction, an intraoperative ultrasound scan was performed. Two enlarged CPLNs were ultrasonographically visualized using a convex contact probe through a transhepatic window, and their exact location was identified. After complete mobilization of the right liver, the right diaphragm was incised, proximal to the site of the lymphadenopathies. The 2 lymph nodes were identified, grasped, and removed by transdiaphragmatic approach. Absence of other residual disease was confirmed by thoracic inspection, palpation, and by a subsequent intraoperative ultrasound control. At final histology, CPLNs were positive for infiltration of high-grade serous ovarian carcinoma.

Conclusions: Intraoperative transdiaphragmatic ultrasound represents a possible approach to localize suspicious CPLNs and to guide their surgical eradication.

Key Words: Cardiophrenic lymph nodes, Cytoreductive surgery, Intraoperative ultrasound, Ovarian carcinoma

Received April 18, 2018, Accepted for publication August 3, 2018.

(*Int J Gynecol Cancer* 2018;28: 1672–1675)

Department of Woman and Child Health, Fondazione Policlinico A. Gemelli, Università Cattolica del Sacro Cuore, Rome, Italy.

Address correspondence and reprint requests to Anna Fagotti, MD, PhD, Department of Woman and Child Health, Fondazione A. Gemelli, Università Cattolica del Sacro Cuore, L.go A. Gemelli 8, 00168 Rome, Italy. E-mail: annafagotti@libero.it; anna.fagotti@unicatt.it.

The authors declare no conflicts of interest.

Supplemental digital content is available for this article. Direct URL citation appears in the printed text and is provided in the HTML and PDF versions of this article on the journal's Web site (www.ijgc.net).

ISSN: 1048-891X

Optimal cytoreduction represents the mainstay of treatment in patients with advanced ovarian cancer. It has been clearly demonstrated that patients with no macroscopic tumor at the end of primary debulking surgery have a significant survival advantage, compared with subjects with residual tumor at the end of the procedure.[1] Thoracic involvement is not infrequent in these patients, and cardiophrenic lymph nodes (CPLNs) usually represent the first extra-abdominal location of the disease.[2] Few pioneering groups of gynecologic oncologists have recently expanded indications to surgical debulking, embracing ultraradical procedures, such as trans-abdominal CPLNs excision through a full-thickness diaphragmatic incision, to obtain optimal residual tumor and possibly improve survival.[3] Others have proposed the use of video-assisted thoracic surgical excision.[2]

We here describe the use of intraoperative transdiaphragmatic ultrasound using the hepatic window, to confirm the preoperative imaging, to obtain a precise identification and localization of the suspicious CPLNs, and to avoid unnecessary or excessive diaphragmatic incisions/thoracoscopic procedures in case.

METHODS

A 50-year-old woman was referred to our center after an incidental finding of bilateral pelvic masses (Supplemental Digital Content, http://links.lww.com/IGC/A845). Her family history was positive for both ovarian and breast cancers.

Serum tumor marker levels were significantly above the cutoff values for malignancy (CA-125 >5000 U/mL and CA-15.3 >300 U/mL).

Transvaginal and transabdominal ultrasound examinations were performed, showing bilateral solid ovarian masses, 133 × 75 × 77 mm (right) and 103 × 58 × 89 mm (left) in size, with moderate vascularization. Neither ascites nor pelvic or abdominal carcinomatosis was detected. However, enlarged inguinal lymph nodes were observed on the right side.

In addition, computed tomography showed enlarged aortic and CPLNs (2 CPLNs of 14 and 11 mm of maximum diameter, respectively) (Fig. 1).

After diagnostic laparoscopy confirmed the absence of carcinomatosis, a midline xifopubic laparotomy was performed. Bilateral adnexectomy was accomplished, and intraoperative frozen section of ovarian masses revealed a bilateral high-grade serous ovarian carcinoma. Primary debulking surgery was then performed, including radical hysterectomy, radical omentectomy, peritoneal biopsies, and resection of bulky lymph nodes at the right iliac, right inguinal, and para-aortic and paracaval regions. A complete abdominal cytoreduction was obtained.

RESULTS

After obtaining a complete abdominal cytoreduction and complete mobilization of the right liver lobe, an intraoperative ultrasound scan was obtained. Using a sterile, convex contact probe, 2 enlarged cardiophrenic lymph nodes were ultrasonographically visualized through a transhepatic window (Fig. 2). The right diaphragm was incised in the upper-anterior muscular portion, far from the branches of the phrenic vessels, and proximal to the site of the lymphadenopathies. At this point, the lymphatic tissue with the first lymph node was identified, grasped, and removed by transdiaphragmatic approach (Fig. 3). The second lymph node was then excised using the same technique (Figs. 4 and 5).

Absence of residual lymphadenopathies was confirmed by thoracic inspection and palpation and by a subsequent intraoperative ultrasonographic control. Diaphragm was repaired as usual, and no thoracic drainage was inserted.

At final histology, CPLNs were positive for infiltration of high-grade serous ovarian carcinoma, showing marked nuclear pleomorphism, numerous mitotic figures, and necrosis (Fig. 6).

The patient developed postoperative pleural effusion, which was followed through serial chest x-rays and which progressively resolved in 30 days, with no sequelae.

DISCUSSION

Intraoperative ultrasound represents a valid tool to facilitate complete tumor excision in recurrent borderline tumors[4] and to identify the location and the extension of

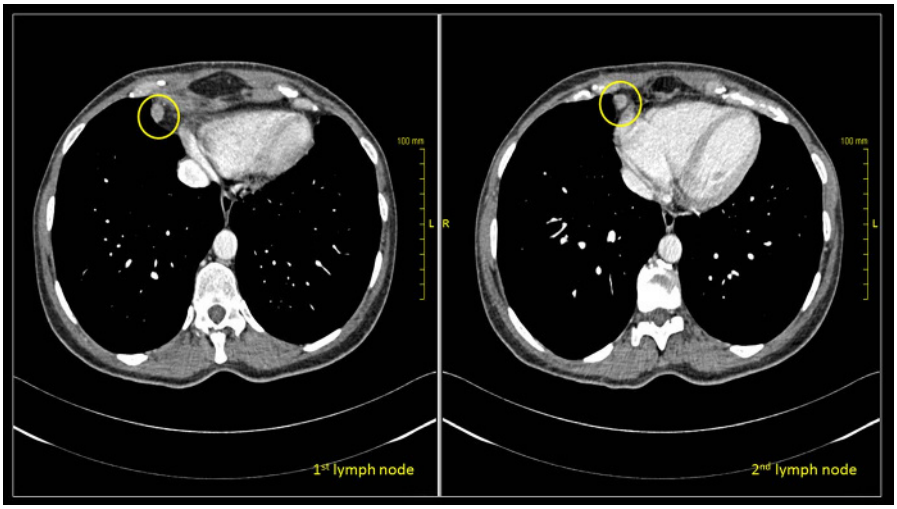

FIGURE 1. Computed tomography scan showing suspicious CPLNs (yellow loops indicate the lymph nodes).

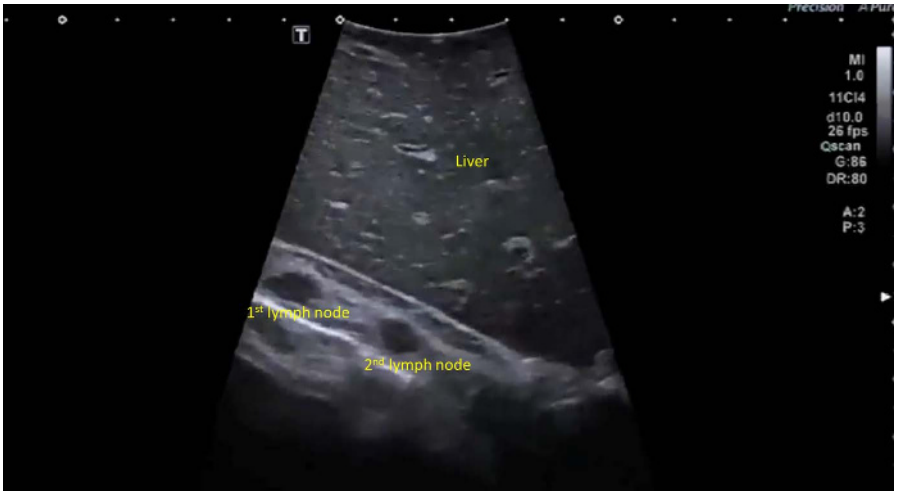

FIGURE 2. Intraoperative transdiaphragmatic ultrasound scan, showing 2 enlarged CPLNs.

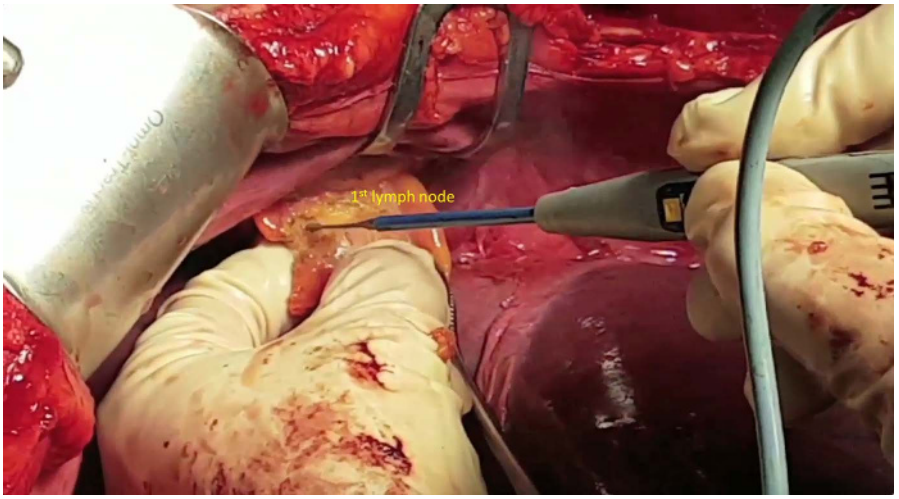

FIGURE 3. Transdiaphragmatic removal of the first CPLN.

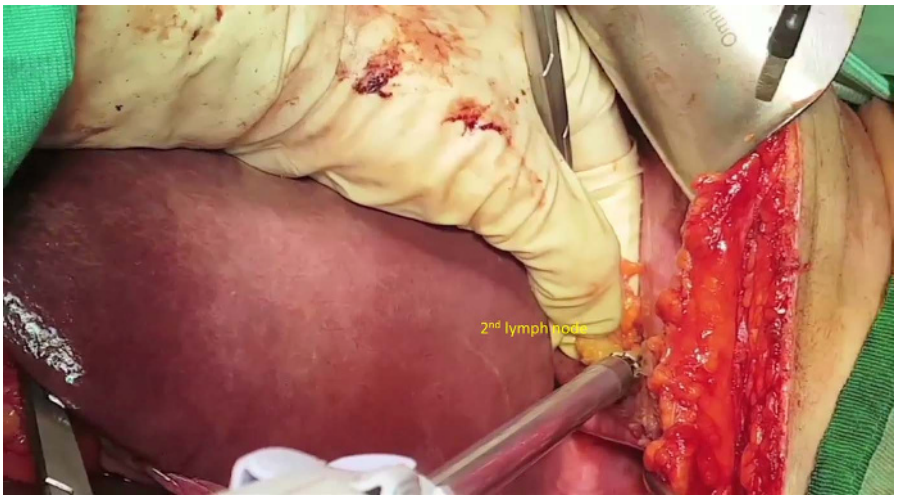

FIGURE 4. Transdiaphragmatic removal of the second CPLN.

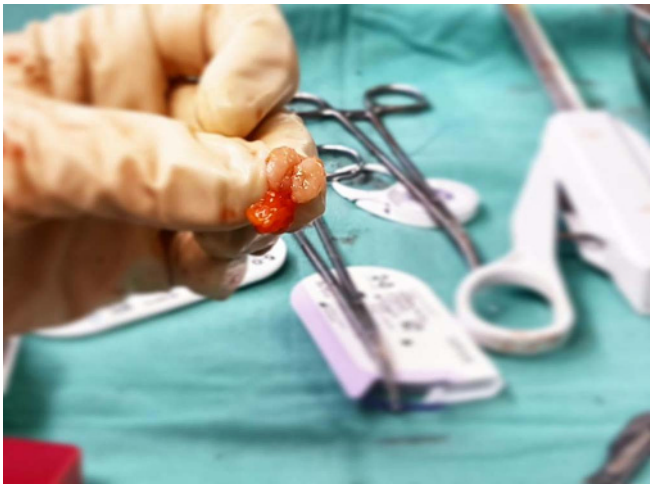

FIGURE 5. Macroscopic appearance of the positive CPLN.

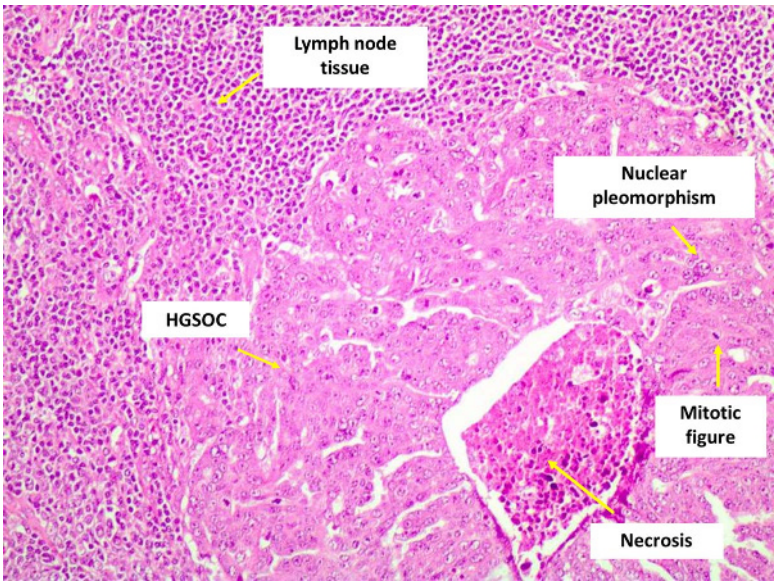

FIGURE 6. Histological appearance of the positive CPLNs.

metastatic disease in ovarian cancer patients.[5] The adoption of this technique allows a precise and readily available method to specifically identify hidden disease and to avoid unnecessary invasive procedures.

In the case of suspicious CPLNs, transdiaphragmatic scan enabled us to confirm preoperative imaging, to exactly locate the disease before diaphragmatic incision, and to ensure complete excision of the disease, before diaphragmatic repair. This approach may help in better tailoring treatment in advanced ovarian cancer patients with CPLNs involvement and to specifically target the extent of radical surgical debulking.

REFERENCES

1. Aletti GD, Dowdy SC, Gostout BS, et al. Aggressive surgical effort and improved survival in advanced-stage ovarian cancer. *Obstet Gynecol*. 2006;107:77–85.
2. Cowan RA, Tseng J, Murthy V, et al. Feasibility, safety and clinical outcomes of cardiophrenic lymph node resection in advanced ovarian cancer. *Gynecol Oncol*. 2017;147:262–266.
3. LaFargue CJ, Sawyer BT, Bristow RE. Short-term morbidity in transdiaphragmatic cardiophrenic lymph node resection for advanced stage gynecologic cancer. *Gynecol Oncol Rep*. 2016;17:33–37.
4. Jones BP, Saso S, Farren J, et al. Ultrasound-guided laparoscopic ovarian wedge resection in recurrent serous borderline ovarian tumours. *Int J Gynecol Cancer*. 2017;27:1813–1818.
5. Mascilini F, Quagliozzi L, Moro F, et al. Role of intraoperative ultrasound to extend the application of minimally invasive surgery for treatment of recurrent gynecologic cancer. *J Minim Invasive Gynecol*. 2018;25:848–854.