

Laparoscopic Ultrasonography–Assisted Retroperitoneal Lymph Node Sampling in Patients Evaluated for Stomach Cancer Recurrence

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Objective. The precise localization of target lymph nodes during laparoscopic biopsy can often be technically challenging. The purpose of this series was to report 2 patients who successfully underwent laparoscopic para-aortic lymph node sampling with the assistance of laparoscopic ultrasonography (LUS). **Methods.** We describe 2 patients previously treated for gastric cancer who later had suspicious retroperitoneal lymphadenopathy detected by computed tomography. They received LUS-assisted lymph node biopsies for histologic evaluation. **Results.** Laparoscopic ultrasonography precisely localized the target lymph nodes, which measured 1.4 and 1.5 cm, respectively, in both patients. A transperitoneal laparoscopic approach and target lymph node sampling were successfully performed. No procedure-related technical difficulties or immediate complications occurred. The 2 patients were histologically proven to have nodal tumor recurrence and tuberculous lymphadenopathy, respectively. **Conclusions.** Precise localization of a small lymph node located deep in the abdomen can be readily performed by intraoperative LUS. **Key words:** laparoscopic biopsy; laparoscopic surgery; laparoscopic ultrasonography; lymph node recurrence; stomach cancer.

Abbreviations

CT, computed tomography; FDG, fluorodeoxyglucose; LUS, laparoscopic ultrasonography; PET, positron emission tomography

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Laparoscopic biopsy is a safe and effective method that is frequently performed. High diagnostic accuracy and minimal invasiveness have made laparoscopic biopsy an attractive method,^{1,2} especially for lymph node sampling in patients requiring evaluation of malignant lymph node metastasis who cannot tolerate invasive laparotomy for diagnostic purposes. Accurate localization of the target lymph nodes for laparoscopic biopsy can entail a challenging and time-consuming procedure, particularly in cases with target nodes buried in the deep compartments of the abdomen. Recently, laparoscopic ultrasonography (LUS) has been used to facilitate the localization of lesions in laparoscopic surgeries of various fields.³⁻⁶

We report 2 patients with a history of gastric cancer who received LUS-assisted retroperitoneal lymph node sampling for histopathologic diagnosis of suspected lymph node tumor recurrence.

Case Descriptions

Case 1

A 57-year-old man was admitted to our institution for evaluation of enlarged retroperitoneal lymph nodes detected by computed tomography (CT). He had undergone a radical total gastrectomy for stomach cancer 36 months previously, and histopathologic evaluation showed moderately differentiated adenocarcinoma extending to perigastric fat tissue. Sixty-six of 127 dissected lymph nodes were reported to have positive findings for metastatic carcinoma (T3N3M0, stage IV). After surgery, he completed 6 cycles of chemotherapy with an irinotecan/cisplatin regimen.

No evidence of tumor recurrence was detected for 3 years after surgery according to abdominal CT performed every 6 months, endoscopy performed annually, and positron emission tomography (PET) performed 2 years after surgery. Routine follow-up CT performed 36 months after surgery showed 2 questionable lymph nodes measuring 1.4 and 0.9 cm, each located in the left para-aortic region inferior to the left renal vein and the aortocaval region posterior to the third portion of the duodenum, respectively. These lymph nodes were thought to be growing because they had measured 1.1 and 0.4 cm on CT performed 6 months previously, further raising the suspicion of tumor recurrence. A faint low-density portion suspicious for necrosis was observed in 1 lymph node, suggestive of malignancy (Figure 1A). Subsequent PET and CT showed increased fluorodeoxyglucose (FDG) uptake corresponding to the locations of the enlarged lymph nodes, increasing the suspicion of tumor recurrence (Figure 1B), but no evidence of abnormal FDG uptake was observed elsewhere. We decided to sample the enlarged left para-aortic lymph node, and laparoscopic lymph node biopsy under LUS guidance was performed (Figure 1, C–E).

Case 2

A 68-year-old man was admitted to our institution for further evaluation of multiple enlarged para-aortic and retroperitoneal lymph nodes. He denied any medical history other than pulmonary tuberculosis, which had been cured by medication. He had undergone a subtotal gas-

trectomy for stomach cancer 29 years previously and then had a second operation (total radical gastrectomy) for locally recurring stomach cancer (pathologically reported as well-differentiated adenocarcinoma, TisN0M0, stage Ia) 33 months previously.

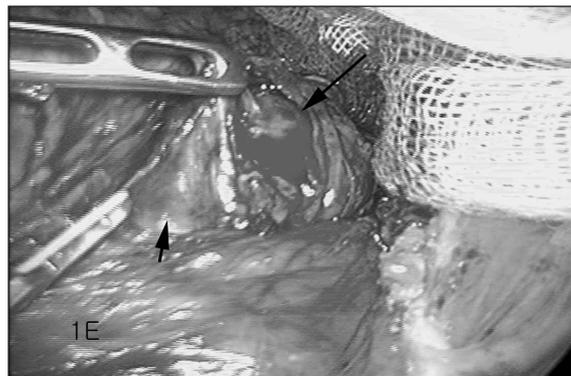
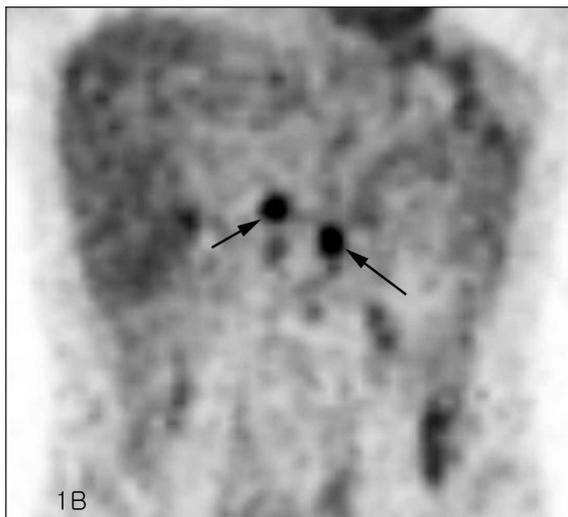
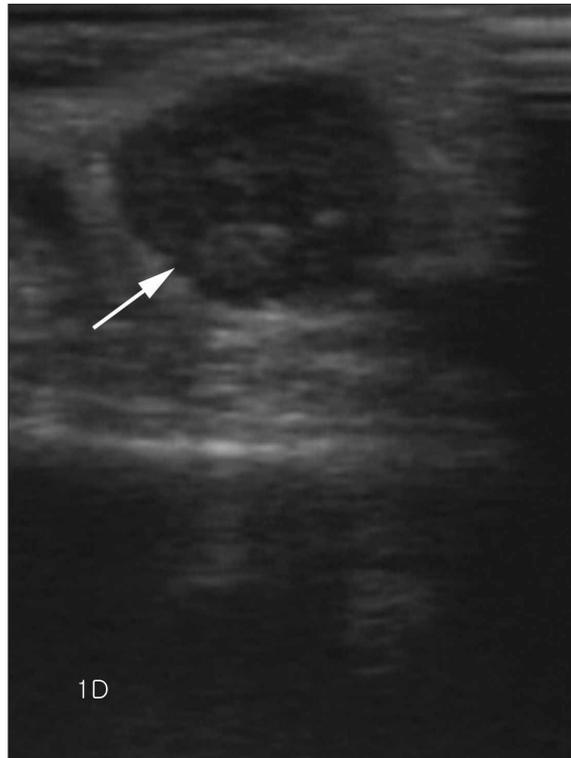
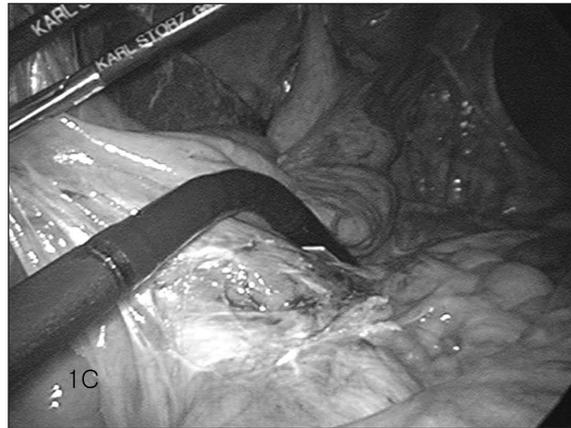
Abdominal CT performed 12 months after the second operation showed multiple enlarged aortocaval, para-aortic, and retroperitoneal lymph nodes suspicious for tumor recurrence (Figure 2A). The largest lymph node was located at the posterior part of portal vein, measured 1.5 cm, and had apparently increased in size from 0.9 cm according to a CT scan performed 6 months previously. Subsequent PET (Figure 2B) revealed multiple lesions with intense FDG uptake on the multiple retroperitoneal lymph nodes, lung nodules, and hilar lymph nodes, suggesting widespread metastasis. We decided to sample the lymph node located at the posterior part of the portal vein, and laparoscopic lymph node biopsy under LUS guidance was performed (Figure 2, C and D).

Procedure

Both patients underwent laparoscopic lymph node biopsy for histologic examination. The surgical procedure was as follows. Under general anesthesia, the patient was placed in the Trendelenburg position with both legs elevated about 15°. The surgeon operated on the patient's right side; a camera operator was also on the patient's right side just to the right of the operator; and an assistant surgeon stood on the patient's left side. After pneumoperitoneum was established by the open technique, 4 ports (12, 10, 5, and 5 mm in diameter) were placed. After the trocars were inserted, a laparoscopic probe with a flexible tip fitted with a 7.5-MHz linear transducer (Aloka Co, Ltd, Tokyo, Japan) was introduced through the right paramedian 12-mm port.

In case 1, first the aorta was visualized and traced by LUS to identify the left renal vein lying next to the aorta (Figure 1C). Then the target lymph node was successfully visualized inferior to the left renal vein as revealed on CT (Figure 1D). In case 2, the portal vein was traced by LUS, and the target lymph node shown on CT was successfully visualized posterior to the portal vein (Figure 2C). Once the location of the target-

Figure 1. Case 1. **A,** Coronal plane portal venous phase CT shows an enlarged left para-aortic lymph node (long arrow) inferior to the left renal vein (arrowhead) measuring 1.4 cm in diameter with faint internal low density (short black arrow) suspicious for necrosis. Another lymph node (short white arrow) borderline in size at the aortocaval region is also shown. **B,** Positron emission tomography shows 2 focal lesions with intense FDG uptake at the locations corresponding to the suspicious lymph nodes (arrows) detected by CT. **C,** Intraoperative LUS. The ultrasound probe was manipulated to first identify the aorta, the left renal vein, and then the targeted retroperitoneal lymph node located just inferior to the left renal vein. **D,** Sagittal plane of the targeted lymph node (arrow) visualized as a hypoechoic nodule by LUS. **E,** The peritoneal layers were dissected to expose the targeted lymph node (long arrow) located posterior to the left renal vein. Note the contour of the aorta (short arrow) beside the targeted lymph node. Microscopic examination of this lymph node revealed metastatic adenocarcinoma, which probably originated from the previously treated stomach cancer.

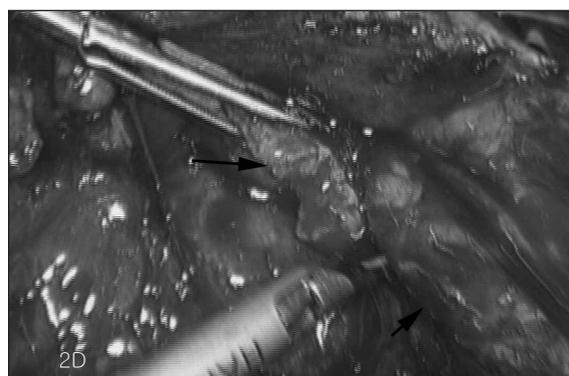
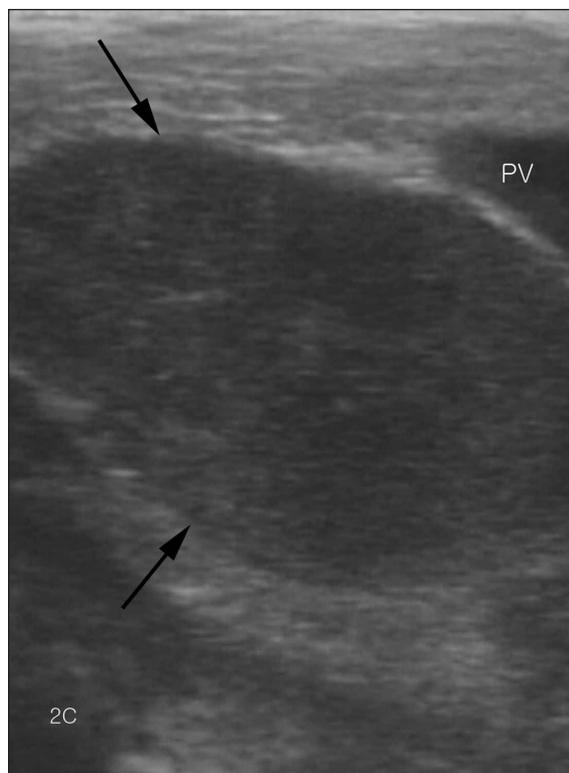
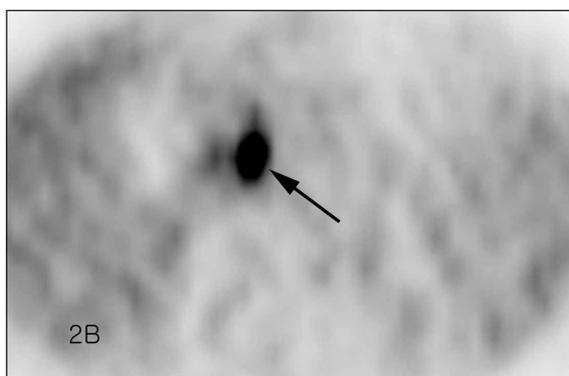


ed retroperitoneal lymph node was marked in each patient, a straightforward transperitoneal approach with minimal tissue dissection was attempted. The dissection was advanced into the retroperitoneal compartment without difficulty, and the targeted retroperitoneal lymph node was successfully retrieved (Figures 1E and 2D). After retrieval of the targeted lymph node was completed, postbiopsy LUS was performed to ensure the adequacy of the procedure. No immediate complications occurred.

Histologic Results

The lymph node sampled from case 1 was histologically proven to be metastatic adenocarcinoma, which was assumed to have originated from the patient’s previous stomach cancer. He resumed chemotherapy. Histologic review of the sampled lymph nodes from case 2 revealed chronic granulomatous inflammation consistent with tuberculosis. The remaining enlarged lymph nodes were found to have decreased in size on CT performed 6 months after the patient received antituberculosis medication.

Figure 2. Case 2. **A**, Transverse plane portal venous phase CT scan shows an enlarged lymph node (arrow) located at the posterior part of the portal vein measuring approximately 1.5 cm. **B**, Transverse plane PET shows intense FDG uptake (arrow) at the location corresponding to the enlarged lymph node posterior to the portal vein detected by CT. **C**, Transverse plane of an enlarged hypoechoic lymph node (arrows) visualized posterior to the portal vein. Targeted lymph node localization was done by tracing the portal vein (PV) with LUS. **D**, Intraoperative laparoscopic lymph node biopsy. The targeted lymph node (long arrow), which was located posterior to the portal vein (short arrow), was exposed and dissected. This lymph node was histologically proven to be tuberculous lymphadenopathy.



Discussion

Evaluation of lymph node status is essential for postoperative patients treated for any kind of malignancy. It was particularly important for the 2 patients in this study because locoregional lymph nodes are well known as major sites of gastric cancer recurrence.⁷ We generally suspect tumor recurrence in cross-sectional imaging studies if a lymph node has a short-axis diameter of greater than 1 cm, a round shape, or an increase in size during serial studies.⁸ The accuracy in predicting lymph node metastasis solely on the basis of radiologic evaluation is far from satisfactory, however, and pathologic evidence supporting tumor recurrence is indispensable. Recently, PET scanning has been widely applied for evaluation of metastatic lymph nodes, but false-positive and -negative results remain issues.^{8,9} Nontumorous lesions with intense FDG uptake on PET such as tuberculous lymphadenopathy can mimic tumorous conditions; thus, the histologic nature of the lesion must be clarified before initiating aggressive treatment.

Percutaneous biopsy guided by CT or ultrasonography could be a reasonable means of performing histologic examinations, producing an acceptable diagnostic yield with low morbidity.^{1,2} At the same time, percutaneous sampling of a small lymph node located in the deep abdomen can be technically difficult and sometimes even risky. In such conditions, laparoscopic biopsy may serve as a reliable, minimally invasive alternative.^{1,2} If the lymph node is large enough and displaces the adjacent organs, no additional guidance for lesion localization would be necessary for laparoscopic biopsy. If the targeted lymph node is small (1.4 and 1.5 cm on preoperative CT in this study), however, or lies in the deep compartments of the abdomen, localization of the node itself can become a challenging task. Wide dissection of normal tissue might be necessary merely to achieve an approach route and expose the targeted lymph nodes. In such cases, precise localization of the target lymph nodes could instead be accomplished with the assistance of LUS, presumably reducing excessive tissue dissection and visceral manipulation and minimizing tissue injury and operation time.

In summary, precise localization of small lymph nodes in the deep compartments of the abdomen can be readily performed by intraoperative LUS. Precise LUS localization of a targeted lymph node may facilitate laparoscopic biopsy.

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