Robot-Assisted Internal Mammary Lymph Node Chain Dissection for Breast Cancer

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Clinical Practice Points

- Internal mammary node biopsy is important for us to make an appropriate locoregional lymph node staging and treatment decision.
- However, till now, there is no an ideal method to detect out metastatic nodes in internal mammary lymph chain exactly.
- Thoracoscopic internal mammary lymph chain dissection has been reported, but it is difficult to remove the left internal mammary nodes by this technique.
- Our study indicated that robotic internal mammary node dissection is a feasible, minimally invasive and

- simple procedure, which can improve nodal staging and be used to treat patients with left sided internal mammary lymph metastases which may spared patients getting adjuvant radiation therapy and its subsequent effects on the heart.
- The robotic internal mammary lymph chain dissection is sometimes recommended for tumors ≥5 cm, or axillary lymph nodes positive, positive surgical margins, or suspected internal mammary lymph node metastasis by CT, positron emission tomography-computed tomography examination, or ultrasonography examination.

Introduction

The status of internal mammary lymph nodes of breast cancer is an important parameter to determine regional lymph node staging, to predict accurate prognosis, and to guide suitable adjuvant therapy for patients.[1-4] The American Joint Committee on Cancer staging manual has placed special emphasis on the role of status of the internal mammary lymph nodes in the regional lymph node staging of breast cancer.[5] In this study, we evaluated the feasibility of robot-assisted internal mammary lymph node chain dissection by the Da Vinci robot-assisted surgical system (Intuitive Surgical, Sunnyvale, CA).

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Patients and Methods

Patients

From May 2015 to November 2017, after receipt of approval from the local ethics committee, 13 patients with suspected internal mammary lymph node metastasis demonstrated by computed tomography, positron emission tomography—computed tomography, or ultrasound and without distant metastases were included (Figure 1). After informed consent was obtained, 13 patients were available for enrollment onto the study. Five of these subjects had left breast cancer. The mean age was 46.5 years (range, 37-62 years). Before the operation, carbon nanoparticles in suspension (Chongqing Lummy Pharmaceutical, Chongqing, China) were injected into 4 depots surrounding the primary tumor or next to the biopsy scar, with about 0.1 mL injected at each point.
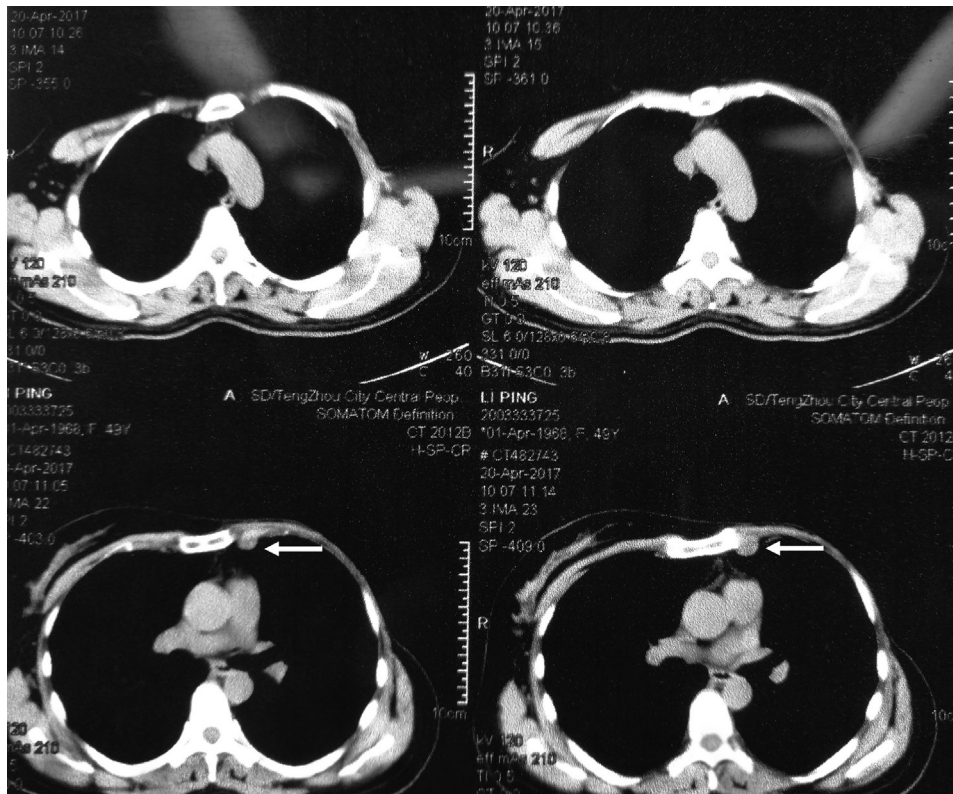
The research ethics committee of Jinan Military General Hospital of People's Liberation Army granted approval (no. 2016-28), and preoperative written informed consent was obtained from all patients.

Surgical Technique

After induction of general anesthesia using a double-lumen endotracheal tube, and sterile draping of the patient, an

incision was made in the predetermined line for mastectomy. Patients first underwent modified radical mastectomy, breast-conserving surgery, or sentinel lymph node biopsy. Robot-assisted internal mammary lymph node chain dissection was then performed.

Figure 2 Selection of Location of Postoperative Trocar

Single-lung ventilation using a double-lumen endotracheal tube that permits collapse of right or left lung was performed during the operation. The patient was placed in a semioblique position supported by an inflatable pillow. Two trocars were introduced through 2 thoracic incisions at the third and seventh intercostal spaces along the midaxillary line for placement of Maryland dissectors and Harmonic curved shears. Another trocar was introduced through a thoracic incision at the fifth (or fourth) intercostal spaces along the anterior axillary line or the midaxillary line for placement of the camera. The distance between each trocar was > 6 cm (Figures 2-4). The camera was used for visualization of the thoracic cavity, identification and exposure of the internal mammary artery, and visualization of black-dyed internal mammary lymph nodes. The position of the camera port and working ports can be modified as required for optimal visualization or to facilitate manipulation of the instruments.

The surgeon sat at the control table to operate the robotic system to complete the surgery. The first step of the procedure was to expose the internal mammary artery and vein. The right internal mammary artery could be identified easily just distal to its origin of the subclavian artery; the black-dyed node and lymphatic chain could be identified easily, as they were covered only by a thin parietal pleura (Figure 5). The left internal mammary artery was sometimes covered by pericardial fat, the aorta, or pleural adhesions.