

Laparoscopic Nephrectomy and Transdiaphragmatic Resection of Inferior Solitary Lung Tumor: Technique and Feasibility of the Approach

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Keywords: laparoscopy; nephrectomy; diaphragm; lung neoplasms; treatment outcome.

INTRODUCTION

About 20% to 30% of patients with renal cell carcinoma (RCC) have metastatic disease at presentation.⁽¹⁾ In case of a solitary metastasis, resection of both lesions has demonstrated increased survival.⁽²⁾ Therefore, once detected, resection is always advised if resectable. Traditionally, resection of solitary lung metastasis has been performed by way of standard lobectomy. Recently, such tumors have also been removed thoracoscopically.⁽³⁾ Sometimes a laparoscopic approach is less invasive than thoracoscopy, if the patients have either pulmonary disease or coincident renal mass, which are indicated to require an operation. Now pure laparoscopic techniques has also been used to treat coexisting pathologies.⁽⁴⁾ We attempted to perform laparoscopic surgery to excise an inferior solitary lung tumor and concomitant renal mass. This surgical procedure is herein presented.

CASE REPORT

A 39-year-old woman underwent a computed tomography (CT) scan which showed a left inferior solitary lung tumor and ipsilateral renal mass. The tumor was located in the posterior basal

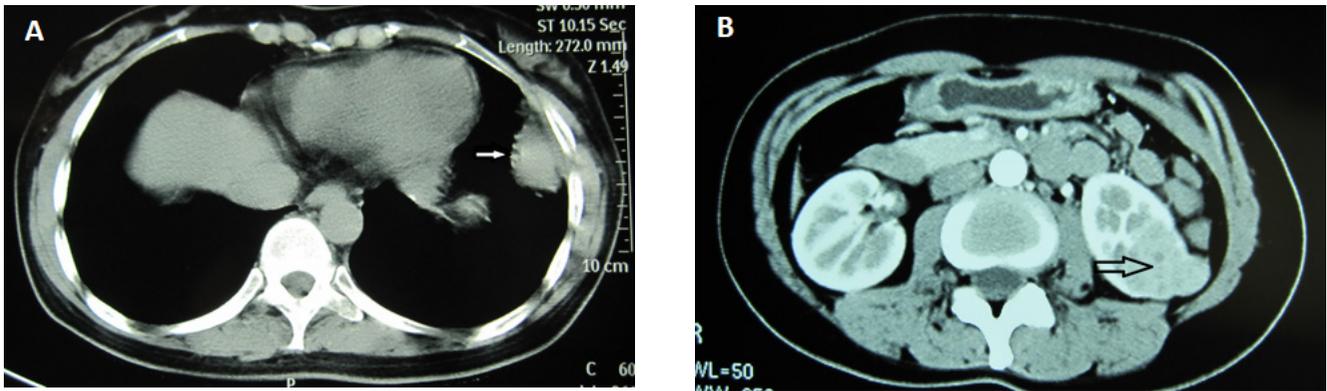


Figure 1. A) Computed tomography scan showing a lung tumor measuring 4.5 cm in diameter. The tumor was located in the posterior basal segment of the left inferior lung lobe (arrow heads). B) Computed tomography scan showing an enhancing, inferior pole, 4 cm, incidentally detected, left renal mass (arrowheads).

segment of the left inferior lung lobe (Figure 1A) and with an enhancing, inferior pole 4 cm incidentally detected left renal mass (Figure 1B). Meanwhile CT revealed no evidence of adenopathy and a normal contralateral kidney. Further examinations such as positron emission tomography were taken but the remaining metastatic evaluation was negative. The scans were reviewed with our cardiothoracic surgery department, and preoperative diagnosis was left renal cell carcinoma and pulmonary solitary tumor. We thus planned a laparoscopic resection of the left inferior solitary lung tumors and a nephrectomy.

Surgical Technique

The lung tumorectomy was carried out first followed by nephrectomy. The patient was put in the lateral decubitus position under general anesthesia for both surgery. Pneumoperitoneum was established first by a 5-mm trocar through a 10-mm incision, 2 cm on the left lateral side of the rectus abdominis muscle and 2 cm above the umbilicus. This was the camera port. Next, when a 12-mmHg pneumoperitoneum established we placed a 10-mm trocar instead the camera port. In addition, a 10-mm port providing access to instruments held by the surgeon's right hand was placed subcostally in the left anterior axillary line. Then, we placed a 5-mm port subcostally at 1cm below arcus costarum at left midclavicular line to provide access to the instruments held by the surgeon's left hand. Finally, we placed a 5-mm port subcostally in the left midaxillary line to provide access for the instruments that held by the first assistant (Figure 2). The colon was medial-

ized by peritoneal incision along the white line of Toldt. The colon was shifted and then the left crus of the diaphragm was directly identified. We used laparoscopic ultrasound probe with a deflective linear headpiece for intraoperative localization of the lung tumor when the lung was completely collapsed. We dissected the diaphragmatic muscle along a radial incision using the Ultracision-Harmonic scalpel device (UltraCision, Ethicon Endosurgery, Cincinnati, OH, USA). We identified the mass (Figure 3). The mass was mobilized and underwent laparoscopic wedge resection of the lung tumor using Endo cut stapler (Ethicon Endo-Surgery, LLC Guaynabo, Puerto Rico). The excised mass was extracted in an endobag for frozen section pathologic evaluation. No pleural injury occurred intraoperatively. The diaphragmatic muscle was sutured continuously with 2-0 polyglactin suture when the anesthesiologist repeatedly hyperinflated the lungs to expel all pleural CO₂. This step was performed blindly since pneumoperitoneum had been nearly evacuated. The basic principle is to over sew the diaphragmatic incision and evacuate the air out of the pleural space. Thereafter, we performed a laparoscopic nephrectomy using the same ports. Postoperatively, an abdominal drain was inserted.

The total operation time was 135 minutes. It spent 90 and 45 minutes to perform the lung tumorectomy and nephrectomy, respectively. The total bleeding volume was 90 mL. No noticeable hemodynamics changes was found after surgery and finally no respiratory complications happened. Postoperatively, a left-sided chest tube was placed prophylacti-

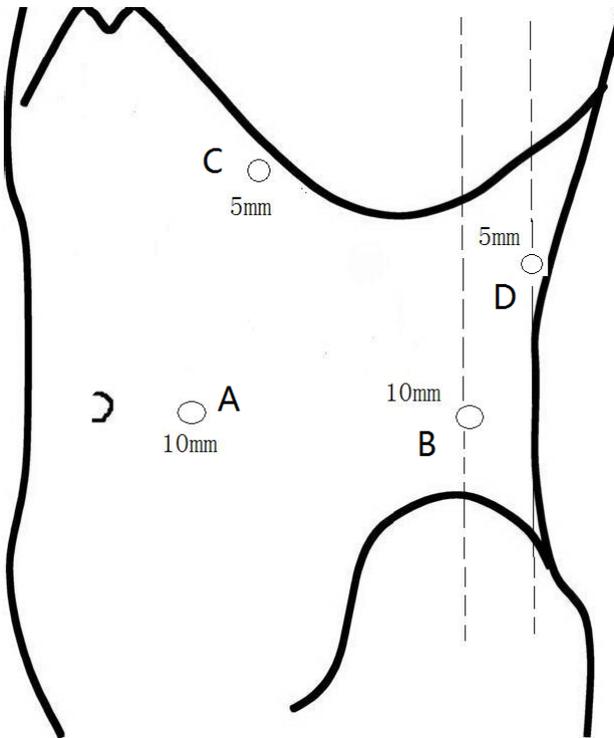


Figure 2. Port sites. A) the camera port; B) the surgeon's right hand; C) the surgeon's left hand; D) the first assistant's hand.

cally. The tube was removed after 48 hours, when the chest radiograph revealed a well expanded lung. We removed the abdominal drain after 72 hours. On the 4th postoperative day the patient activity returned to normal. The final pathologic examination of the lung tumor found a necrotic granuloma that was negative for malignancy. The pathologic findings of the renal mass was renal cell carcinoma, clear cell type, extending into the perinephric tissues but not beyond Gerota's fascia. All surgical margins were negative.

DISCUSSION

The most common treatment for patients who present with renal cell carcinoma with a solitary metastasis is surgical excision of both lesions. In the past patients with several concomitant pathologic findings requiring surgery that belong to different surgical specialties are commonly treated in separate time.⁽⁵⁾ Concomitant laparoscopy with other surgical procedures to treat coexisting pathologies is not a novel strategy, and its benefits for the patients, which are mainly

the avoiding of repeat anesthesia, reducing surgery-related stress, less pain, and shorter hospital stay.⁽⁵⁾ There has been one report in the literature on the surgical management of lung tumors using video-assisted thoracic surgery (VATS) and concomitant nephrectomy.⁽²⁾

The preoperative CT scan was jointly reviewed by the surgeon and the radiologist to determine whether the tumor could be excised using laparoscopic staple wedge resection techniques.

We attempted to perform laparoscopic surgery in the excision of this inferior solitary lung tumor because of the anatomic location, the familiarity of the approach, the need to carry out a nephrectomy simultaneously, and also to avoid the morbidity normally associated with a thoracic approach. The suitable mobilization of the adjacent structures to ensure good visualization allows successful resection of such lesions intraoperatively. By the use of a 30° angled telescope we get an excellent view to access this space, laparoscopically. It was easy of access to reach the tumor using this procedure after dissecting the left crus of the diaphragm. A meticulous dissection from the diaphragm, pleura, and thoracic cavity tissue could thus be successfully performed. The absorption of CO₂ from pleural space basically can be ignored because the anesthesiologist can expel all pleural CO₂ by repeatedly hyperinflating.

Laparoscopic stapler appeared both safe and expedient during wedge pulmonary resection. In addition, the diaphragm was easily sutured. No pleural injury occurred and we inserted a chest drain for safe. The less destructive character of the thoracoscopic (VATS) approach is associated with less deformity of the thorax than an open lobectomy, but the former is associated with an increased anesthetic morbidity compared with a laparoscopic approach.⁽⁶⁾ Some patients also have pneumonic disease and/or abdominal disease, which is thus an indication for operation. The Laparoscopic transdiaphragmatic technique is a novel minimally invasive procedure considered to be advantageous for such patients. Meanwhile, careful assessment of the resected margin and follow-up are mandatory.

Otherwise, several limits should be mentioned. The transabdominal transdiaphragmatic approach appears unlikely to afford adequate visualization for evaluation of the entire chest.

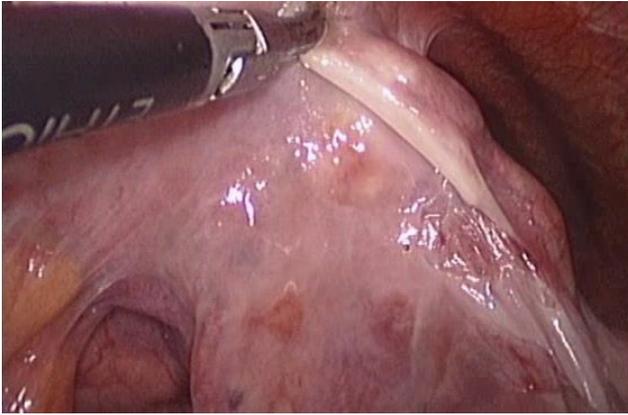


Figure 3. Intraoperative view of the left inferior solitary lung tumor.

Intraoperative bleeding may become predicament when working in the thoracic cavity from inside the abdominal cavity. Meanwhile, surgical instruments need to be further improved so this technique could be used in the future, and patients need to be carefully selected.

It is a feasible procedure with an acceptable risk of complications. Actually, they may justify the use of laparoscopic techniques as an alternative approach in the management of thoracic surgery in the future. Further randomized trials are needed to follow up the long-term survival rates of laparoscopic excision in such cases.

CONFLICT OF INTEREST

None declared.

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