Case Report

A Case of Chest Wall Recurrence of Pulmonary Adenocarcinoma after Video-Assisted Thoracic Surgery (VATS)

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Abstract: Video-assisted thoracic surgery (VATS) can be used to resect peripheral lung nodules in selected patients. Seeding of thorascopy trocar sites with malignant cells is uncommon. A 79-year-old male was admitted for evaluation of an abnormal radiographic shadow in the left middle lung field. He underwent VATS wedge resection of the pulmonary nodule. The mass was a primary pulmonary adenocarcinoma. Six months later, the patient developed dyspnea and a painful lateral chest wall mass at a trocar site. Multiple masses were found to be recurrent adenocarcinoma. Excessive manipulation of the pulmonary parenchyma should be avoided during resection of pulmonary nodules. Techniques to protect against implantation during the removal should be employed, such as irrigation of the pleural cavity and chest wall incision sites with large volumes of saline solution prior to closure of the wounds.

Key words: implantation, chest wall recurrence, pulmonary adenocarcinoma, video-assisted thoracic surgery.

Introduction

Recently, with advances in thorascoscopic surgical equipment and related instruments, video-assisted thoracic surgery (VATS) has become a popular technique for the diagnostic evaluation of pulmonary nodules and for resection of thoracic malignancies. Wedge resection of small peripheral nodules is an acceptable therapeutic alternative, when adequate margins can be obtained, in patients with poor pulmonary function who would not tolerate lobectomy. A rare complication of VATS wedge resection is implantation of malignant cells into a thoracoscopic tract, with subsequent growth of a chest wall tumor. In this report, a patient with chest wall recurrences is presented in whom seeding occurred at a trocar site through which the resected specimen had been extracted.

Case report

A 79-year-old male was admitted for evaluation of an abnormal radiographic shadow in the left lung field. Computed tomography (CT) of the chest revealed a peripheral opacity

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in the left lower lobe (S6), which was highly suspected to be a pulmonary adenocarcinoma. No associated mediastinal lymphadenopathy was evident (Fig. 1). Bronchoscopy revealed no endobronchial abnormalities. No malignant cells were identified on examination of endobronchial brushings. The forced expiratory volume in 1 second (FEV1.0) was 1.1 L, and the vital capacity (VC) was 2.3 L. Overall, the patient had impaired cardiopulmonary reserve, poor pulmonary function, and was of advanced age. This precluded a standard thoracotomy. He had undergone no previous chest surgery. VATS wedge resection of the pulmonary nodule was thus undertaken.

A double-lumen endotracheal tube was used for contralateral ventilation and ipsilateral lung collapse. The first trocar was introduced into the pleural cavity through the seventh intercostal space in the mid-axillary line. The second and third trocars were placed in the fifth intercostal space in the anterior axillary line and the seventh intercostal space in the posterior axillary line, respectively. Instruments used to manipulate the lung were inserted through these ports. No abnormalities were noted within the pleural cavity. A significant amount of compression and traction of the lung parenchyma was required to locate the nodule. Endoscopic stapling devices were used to perform wedge excision of the peripheral pulmonary nodule with margins of at least 1.5 cm. The second trocar site was enlarged to facilitate extraction of the resected lung. The specimen (4×2 cm) was removed from the pleural cavity without the use of a disposable endoscopic bag. Frozen section examination was performed. The pathologic diagnosis was primary lung adenocarcinoma. The pleural cavity was irrigated with 500 ml of warm, physiologic saline solution. Cytological examination of the pleural lavage fluid was negative for malignant cells. The remaining lung was allowed to inflate. Histopathologic examination of the resected specimen revealed a poorly differentiated adenocarcinoma (p-T1). The surgical margins were negative, and no vascular or lymphatic invasion was noted.

Fig. 1. Computed tomography of the chest demonstrating a peripheral opacity in the left lower lobe (S6), which was highly suggestive of a pulmonary adenocarcinoma (arrow).
The postoperative course was uneventful. The patient did well for 6 months. However, he developed dyspnea and a painful lateral chest wall mass at the second trocar site (Fig. 2). CT of the chest revealed masses at the second trocar site, the primary tumor site (S6), and on the anterior parietal pleura (Fig. 3). Moreover, a pleural effusion was identified. Thoracentesis and percutaneous needle aspiration biopsy were performed. Pathological examination confirmed that the masses and pleural effusion represented
recurrences of the adenocarcinoma. Bone scintigraphy was suggestive of multiple metastases on the left ribs. Chemical pleurodesis with doxorubicin and OK-432 was performed. This was followed by supportive care for 5 months, until the patient died.

Discussion

Seeding of thoracoscopy trocar sites with malignant cells is uncommon, and only a few cases of chest wall implantation of lung cancer after VATS have been reported\(^1\,\,2\)\. The mechanism for the implantation of malignant cells remains controversial. Downey et al. have reported that VATS, with its limited ability to define tissue margins, is more likely to disrupt and disseminate malignant cells than open thoracotomy\(^3\)\. Pleural washing studies performed during thoracotomy have suggested that malignant cells are released into the pleural space during pulmonary resection\(^4\)\. Alveolar and interstitial hemorrhage and neutrophil margination are extremely common in surgical specimens, particularly in those that have been extensively manipulated before biopsy or wedge resection\(^5\)\. These findings are significantly more common in specimens from a thoracoscopic lung biopsy than from an open lung biopsy. Furthermore, it has been demonstrated that local recurrence occurs more frequently after wedge or segmental resection of stage I lung cancers than after lobectomy\(^6\)\. Thus, the impact of intraoperative pleural damage is much more important after VATS wedge resection than after radical, open surgery for lung cancer.

This report also raises important questions regarding the risk of implantation during the extraction of malignant specimens through a trocar site. Joncovici et al. have observed that chest wall recurrence is more common when specimens are extracted without using a disposable endoscopic bag\(^7\)\. Fry et al. have also reported that some form of tissue receptacle, such as a condom, globe, or sheath should be used to remove resected specimens if malignancy is suspected and the specimen is larger than the trocar site\(^2\)\. Techniques to isolate the resected specimen from the subcutaneous tissue were not used in our case. Protection against implantation must be employed in the resection of indeterminate pulmonary nodules.

Sugi et al. have recommended irrigation of the pleural cavity with large volumes of physiologic saline solution prior to closure of the chest wall to prevent cancer cell seeding\(^1\,\,8\)\. They speculated that the number of malignant cells in the pleural cavity is small enough to be removed by washing alone. Although in our case the pleural cavity was irrigated with 500 ml of saline, multiple recurrences were noted. These results suggest that the volume of irrigation was inadequate, that pleural damage due to manipulation may have been present, and that the specimen should have been removed in a plastic bag.

Excessive manipulation of the pulmonary parenchyma should be avoided during resection of suspicious nodules. Techniques to protect against implantation during the removal of suspected malignancies should be employed. Furthermore, irrigation of the pleural cavity and thoracoscopic tracts with large quantities of saline solution should be performed prior to closure of the wounds. These steps may reduce the risk of recurrence due to cancer cell seeding after VATS wedge resection.

References

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