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Thoracoscopic resection of pulmonary metastasis: Current practice and results

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Contents

Abstract

Video-assisted thoracoscopic surgery (VATS) is currently a routinely performed procedure for the management of early non small cell lung cancer. The oncological results of VATS in terms of local recurrence and overall survival are equivalent or superior to those of conventional thoracotomy with lower morbidity and hospital stay. In the field of pulmonary metastasectomy, current guidelines support a thoracotomy approach in order to properly palpate the lung and detect nodules too small to be identified on standard radiological examinations (typically less than 5 mm in diameter). However, the oncological and clinical significance of these millimetric nodules is not known. This has led some thoracic surgeons to rethink the approach of solitary pulmonary metastasectomy: because of improvements in thin slice helical CT-scans, some support a VATS approach for solitary pulmonary nodules without formal bimanual palpation and suggest this allows equivalent oncological results and decreased surgical morbidity.

Keywords: Video-assisted thoracoscopic surgery; Pulmonary metastasectomy

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1. Introduction

Approximately 30% of patients suffering from malignant solid tumors will develop pulmonary metastases [1]. Efficient chemotherapy is generally unavailable for most of these tumors. Currently, it is thought that a substantial group of patients with pulmonary metastases may benefit from the resection of lung metastasis. Although there are no prospective randomized studies comparing pulmonary metastasectomy with chemotherapy or observation, surgical resection of pulmonary metastases is nowadays widely performed in selected patients [2]. Several retrospective studies have suggested an increased survival for patients who underwent complete resection of lung metastases in comparison to historical series of patients who did not benefit from lung metastasectomy [3–6]. The largest multicentric study based on the International Registry of Lung Metastases reviewed 5206 patients from 18 centers (USA, Canada and Europe) retrospectively. Complete resection was achieved in 88% of patients and was an important prognostic factor for survival: the 5-year overall survival was of 36% in patients with complete resection compared to 13% in patients with incomplete resection [3]. These results supported that pulmonary metastasectomy offered a survival advantage when complete resection was achievable. Over the past two decades, several studies have supported the role of pulmonary metastasectomy in different tumors types with a 5-year survival rate ranging from 20% to 80% depending on the primary tumor type [7,8]. The improvement of surgical techniques (video assisted thoracoscopic surgery, VATS), radiological imaging (thin slices helical CT-scan), more frequent use of PET-CT and advances with new chemotherapeutic agents have contributed to increase the number of pulmonary metastasectomy procedures and enhance the survival of metastatic patients. The established criteria for lung metastasectomy are [8]: (1) a controlled or controllable primary tumor with no evidence of active disease; (2) the absence of extra-thoracic metastatic disease. However, involvement of other extra-thoracic sites may not be a contraindication to the resection of the pulmonary disease if all metastatic sites can be resected completely before the lung resection; (3) complete resection of lung metastasis must be achievable; (4) the patient has sufficient pulmonary and cardiovascular functional reserves to tolerate pulmonary resection; (5) there is no valid alternative therapy. Despite this aggressive strategy, series report up to 50% of patients with local or distant metastatic relapse [3].

The metastasis process is a highly debated and studied topic. Of the multiple theories reported to date, two major metastasis concepts are described and could have an influence in the clinical approach of lung metastasectomy [9]. A first theory suggests a late dissemination of metastasis from the primary tumor after the latter and surrounding environment have acquired sufficient genetic changes for migration and distant implementation function acquisition [10]. A second theory suggests that dissemination occurs very early in the cancer process (sometimes at the pre-malignant stage) and that single dormant cells can but will not necessarily develop into proper metastasis following genetic and environmental alterations [11]. These theories could occur separately in different tumor types/individuals or may occur together in a same patient. The surgical metastasectomy approach is compatible with a late dissemination process if the five criteria described above are fulfilled. However, in case of an early dissemination process theory, surgical metastasectomy may not be able to achieve complete metastatic resection as pre-metastatic niches are too small to be palpated. Therefore, a resection approach with surveillance and possibility to redo resection should be favored in this case.

Since 1990s, the VATS approach has progressively gained acceptance initially for many basic procedures such as pleural pathologies (pleural biopsy, empyema) and non-anatomical resection for benign diseases (lung biopsies, management of pneumothorax). With growing experience and advances in instrumentation, many surgeons are now routinely performing anatomical lung resections by thoracoscopy with identical standards to those obtained by open thoracotomy. Recently, the American College of Chest Physicians (ACCP) stated in their guidelines that VATS should be preferred over thoracotomy for early lung cancer in experienced centers [12]. However, controversy still exists for the utility of VATS in the resection of isolated pulmonary metastases. While this approach seems to be favored by most thoracic surgeons, there are currently no prospective randomized studies comparing the VATS approach with standard thoracotomy for the resection of lung metastases. VATS is still considered by the European Society of Thoracic Surgery (ESTS) working group for lung metastasectomy as a diagnostic but non therapeutic tool for the management of lung metastases [13]. However, recent thin slice CT scans allow a better spatial resolution and seem to achieve a level of metastasis detection comparable to a bimanual palpation [14]. In addition, several surgical studies have reported solitary pulmonary metastasis in a majority of patients (60–70%). Thus, the thoracoscopic approach of these diseases is more and more defendable, reason why, more and more surgeons are now considering VATS metastasectomy as a therapeutic procedure especially for isolated lung metastases.

2. Rationale for VATS resection of solitary lung metastasis

2.1. Advantages

Despite the initial controversies regarding VATS to treat primary lung malignant diseases, it has become over the past years the method of choice for the management of early NSCLC. By analogy, several surgeons have advocated the use of VATS for the management of isolated pulmonary metastases by highlighting the following advantages: smaller incisions, better visualization of the pleural cavity, less postoperative pain, less surgical morbidity, shorter length of