Pneumonectomy for Non–Small Cell Lung Cancer

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KEYWORDS

• Pneumonectomy • Multimodal therapy • Operative technique • Lung cancer
• Preoperative evaluation • Operative complications

KEY POINTS

- The diagnosis and management of lung cancer requires a multimodal approach that often involves surgical resection.
- Accurate preoperative staging is essential in selecting patients who would benefit the most from pneumonectomy.
- Pneumonectomy is usually indicated when tumors are centrally located, involving the hilum, or as part of a multimodal approach to locally advanced tumors.
- Pneumonectomy is a difficult and technically demanding operation associated with a high rate of perioperative morbidity.

INTRODUCTION

Lung cancer remains the most common cancer in the world, both in terms of new cases (1.8 million cases, 12.9% of total) and deaths (1.6 million deaths, 19.4).[1–3] The 2 major histologic types of lung cancer are small cell lung cancer (SCLC) and non–SCLC (NSCLC). SCLC accounts for 20% of all new lung cancer diagnoses.[2] Although SCLC is the more aggressive cancer, limited stage SCLC is usually responsive to systemic chemotherapy, with median survival rates of 18 to 36 months and 5-year survival of 20% to 25%.[4] In contrast, NSCLC accounts for 80% of all new lung cancers and is amenable to surgical excision in select patients. NSCLC

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includes three major subtypes; squamous cell carcinoma (30%-40%), adenocarcinoma (25%-30%), and large cell lung carcinoma (<10%).[5]

A multidisciplinary approach to the diagnosis and management of lung cancer is essential to design a personalized treatment plan for each patient. The overall clinical status of the patient, pathologic subtype, and disease stage are all taken into account when designing the treatment plan.[6–10] Staging is specifically important because the anatomic extent of the tumor has a significant impact on the treatment of choice and the final prognosis.[11] Original staging classifications were based on the TNM system dating back to 1944 and the multiple revisions of the staging classifications that have taken place since then.[3] The most recent edition (seventh edition) of the lung cancer staging system has been defined by the International Association for the Study of Lung Cancer using a patient database of more than100,000 patients. The next revision of the lung cancer staging system is slated to be published in 2016.[3]

Early and intermediate stage cancers (I and II) have in common the fact that a complete resection is achieved by anatomic resection, either lobectomy or pneumonectomy.[12] Locally advanced lung cancers (IIIA and IIIB) are also amenable to surgical resection in select groups using a multimodal approach to therapy.[13–15] Pneumonectomy for non–SCLC is usually indicated when tumors are located centrally and invading vascular structures or the proximal bronchus, or when part of a multimodal approach to locally advanced tumors. Pneumonectomy, when part of a multimodal approach, has been shown to offer improved encouraging long term survival rates in selected patients with N2 disease.[13,15–19]

Neoadjuvant chemotherapy and radiation are not recommended as treatment options for early to intermediate stage lung cancer.[7,12] However, neoadjuvant chemoradiation has been shown as an effective tool to achieve regression of N2 nodes.[20] Adjuvant chemotherapy is recommended for stage IIA, IIB, and IIIA cancers, whereas adjuvant radiation therapy is currently only recommended for patients with N2 nodal disease to decrease local recurrence.[7,12,21] Current data describe 5-year survival rates for stages I and II as 60% to 80% and 30% to 50%, respectively.[8,22] The 5-year survival for stage III disease has been reported to be approximately 25% to 45% when using a multimodal approach to therapy.[12,14,23–25] Accurate preoperative staging is essential in selecting patients who would benefit the most from a multidisciplinary approach to treatment of locally advanced disease that includes pneumonectomy.[26,27]

PREOPERATIVE WORKUP

Staging

First, a complete history and a physical examination that focuses on performance status and weight loss as well as on identification of chest wall and lymph node involvement, and on sings of distant spread is performed. Next, a computed tomography scan of the chest and a PET/computed tomography scan are performed.[28–30] These measures will rule out distant metastases, other than brain metastases. Patients without symptoms of headache and with a PET-negative mediastinum are unlikely to have brain metastases, so brain computed tomography scans or MRIs are not mandatory for preoperative staging. However, brain imaging should be included in the standard workup of those patients with locally advanced disease (stage IIIA or IIIB) or preoperative evaluation suggesting a high likelihood of nodal involvement to rule out brain metastases.

All patients with lung cancer should first undergo preoperative staging (**Box 1**). Candidates for pneumonectomy typically have large or central tumors and thus are likely