Indications for Surgery in Patients with Localized Pulmonary Infection

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KEYWORDS

• Localized pulmonary infection • Aspergilloma • Mucormycosis • Surgical resection

KEY POINTS

- The indications for surgical therapy for localized pulmonary infections can be broken down into 4 broad categories: (1) failure of medical therapy; (2) no medical therapy available that is effective as monotherapy; (3) development of complications such as hemoptysis, empyema, and/or bronchopleural fistula; (4) inability to rule out malignancy in a mass lesion.
- The common localized pulmonary infections that are encountered in adult thoracic surgical practice in the developed world include bacterial lung abscess, aspergilloma, multidrug-resistant tuberculosis, and mucormycosis.
- The principles of surgical therapy, when indicated, are: resection consisting ideally of either lobectomy or sublobar resection; decortication, tissue flap transposition, or other modalities to obliterate any residual pleural space; and coverage of bronchial stumps. Pneumonectomy is avoided if at all possible because of its high morbidity and mortality rates in this patient population.

INTRODUCTION

The availability of effective antibiotic and antifungal therapy has altered the natural history of some of the infections that can involve the lung parenchyma in a localized manner, such as bacterial abscess and infection with nonresistant tuberculosis strains. In these diseases, the need for surgical intervention has become rare. However, other localized pulmonary infections, for example aspergilloma and mucormycosis, are highly resistant to nonsurgical therapy, and in these diseases there are no generally successful options that do not include surgical resection. Furthermore, vulnerable patient populations, such as those who are immunocompromised secondary to chemotherapy or corticosteroid therapy, may require surgical therapy even for infections that in normal patients are typically responsive to antibiotics. Any patient with a localized pulmonary infection can develop life-threatening complications, such as massive hemoptysis or bronchopleural fistula with associated empyema, which will dictate the need for surgical intervention.

The localized pulmonary infections that are encountered with some regularity in adult thoracic surgical practice in the developed world include:

- Bacterial lung abscess
- Aspergilloma
- Mucormycosis
- Multidrug-resistant tuberculosis.

This article reviews the indications for surgical intervention in the treatment of each of these common infections involving the lung. Because each of these topics will be covered in more detail

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in articles elsewhere in this issue, the authors focus here on the general approaches to management rather than the details of that management.

GENERAL APPROACHES TO MANAGEMENT

To generalize, the indications for surgical therapy for localized pulmonary infections can be broken down into 4 categories:

1. Failure of medical therapy
2. No medical therapy available that is effective as monotherapy
3. Development of complications such as hemoptysis, empyema, and/or bronchopleural fistula
4. Inability to rule out malignancy in a mass lesion.

Other than in cases in category 3, where surgical therapy is usually urgent and cannot be avoided, there is much "art" that comes into the decision making about when and how to surgically intervene in each of these other categories. These patients are often critically ill (immunosuppressed, few platelets, and so forth), and one must always be sure that the surgical "cure" is not worse than the disease and that one is not operating on a patient with minimal chance of survival. On the other hand, one must realize that in many of these patients, despite the substantial risk of operation, surgery is the only chance of cure. It is therefore often appropriate to be surgically aggressive.

BACTERIAL LUNG ABSCESS

A bacterial lung abscess results from necrosis of the pulmonary parenchyma caused by a microbial infection that creates a cavity which then fills with purulent fluid and debris. Aspiration of oropharyngeal flora is the most common mechanism for the development of a bacterial lung abscess. Patients with altered mental status, esophageal motility disorders, recurrent nerve palsy, immunocompromised states, and poor oral hygiene are at particular risk for the development of this problem. The posterior segment of the right upper lobe and the superior segment of the right lower lobe are the most common locations for the development of lung abscesses, because of their dependent locations.

The common microbial pathogens involved with lung abscesses include[1]:

- *Peptostreptococcus*
- *Bacteroides*
- *Prevotella*
- *Streptococcus pneumoniae*
- *Haemophilus influenzae*
- *Klebsiella pneumoniae*
- Mycobacteria.

The symptoms of bacterial lung abscess are similar to the symptoms of pneumonia, which include:

- Malaise
- Productive cough
- Night sweats
- Fevers
- Weight loss.

Patients can also present with hemoptysis when the lung abscess involves the pulmonary vasculature. A chest radiograph will often demonstrate the distinctive appearance of a lung abscess, with an air-fluid level resulting from communication with the airway (**Fig. 1**). A computed tomography (CT) scan of the chest will often demonstrate a cavitary lesion with associated consolidation (**Fig. 2**). Because a cavitary lung carcinoma can have a similar appearance to a lung abscess on CT scan, and may in fact become infected, separating benign from malignant disease can occasionally be challenging. Flexible fiberoptic bronchoscopy can be performed to rule out an obstructing or associated tumor or foreign body. Transthoracic needle biopsy of the thickest part of the cavity's wall may be indicated when malignancy seems possible.

Medical Treatment

The implementation of appropriate antimicrobial therapy is the cornerstone of medical treatment of bacterial lung abscess.[2,3] In addition to initially broad antimicrobial therapy, which can subsequently be narrowed based on culture results, patients should receive chest physiotherapy with postural drainage and nutritional supplementation as supportive therapy.

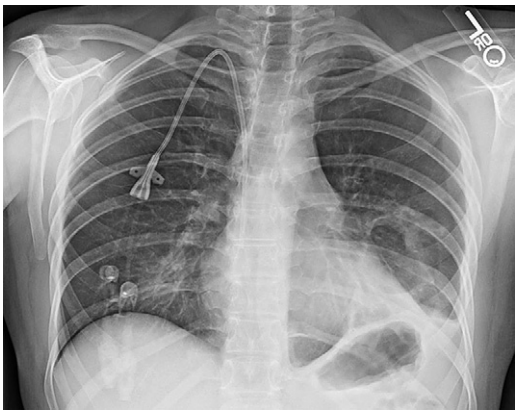

Fig. 1. Chest radiograph demonstrating a left lower lobe lung abscess with air-fluid level.