Empyema from Obstructing Lung Cancer

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KEYWORDS

• Obstructing cancer • Pleural effusion • Empyema • Malignant effusions • Para-malignant effusion

KEY POINTS

- It is of critical importance to fully investigate any pleural collection ipsilateral to an obstructing lung cancer.
- The order in which to approach patients is determined by presenting symptoms (pleural vs bronchial).
- A multidisciplinary approach is optimal when managing such complex patients.

INTRODUCTION

Pleural effusions that accompany obstructing lung cancers pose a particular challenge. In most situations, symptoms demand intervention; but in this situation, determining the nature of the effusion plays a critical role in the staging process. The fluid collection alone places patients in either stage IB if not malignant or stage IV if cancerous. It is, therefore, of paramount importance to place significant importance on determining the nature of the effusion and not rush to consider it a malignant-effusion and commit patients to a nonsurgical treatment modality. In this article, the author reviews the general principles of pleural effusions, including empyema, and their management with particular attention to those related to an obstructing mass.

PLEURAL CONDITIONS

The pleural space is a dynamic compartment of complex interactions between the parietal and visceral layers producing and reabsorbing pleural fluid at a rate of approximately 700 mL/d.[1] Any disturbance of that pleural balance will result in excess fluid accumulation, which over time can become infected. Alternatively, the fluid collection develops septations, resulting in a complex collection that ultimately traps the lung if left unattended. Approximately 50% of patients with metastatic malignancies develop a pleural effusion, including both malignant and para-malignant.[2]

Other pleural collections, such a chylothorax, are beyond the scope if this article but should always be considered when approaching patients with a malignancy and an unexplained pleural effusion.

Para-Malignant Effusion

With increasing diagnostic modalities and sensitivities over the past several years, it has become more frequent to diagnose para-malignant effusions. They are defined as benign fluid collections in the setting of a malignancy within the bronchial tree. These effusions pose a singular challenge when present in the ipsilateral side of the primary malignancy, as their appropriate diagnosis impacts the staging of the cancer dramatically. Patients may harbor either a small and localized cancer that obstructs a segmental bronchus with a simple mechanical process resulting in a pleural effusion (stage I) or a tumor with pleural dissemination resulting in a malignant effusion (stage IV). It is, therefore, of paramount importance to make every

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effort to establish the nature of the pleural effusion before committing patients to any treatment pathway.

Malignant Effusion

Any pleural effusion associated with a lung mass or any known cancer elsewhere should raise the concern of metastatic spread. This has prognostic implications, as the median survival of patients diagnosed with a malignant effusion is 4 months.[3] The typical malignant effusion is exudative, with only a minority being transudative. This initial finding of transudate fluid could indicate a paramalignant nature of the effusion encouraging further workup of the fluid to confirm its cause.[4] Initial imaging studies often demonstrates pleural implants that further raise suspicion of metastatic disease. Even in those circumstances, tissue confirmation is essential.

A thoracentesis is the ideal initial invasive approach to the effusion providing valuable information on the nature of the fluid itself as well as samples for microbiologic studies and cytologic analysis. This first step could establish the diagnosis of malignancy and avoid any further diagnostic interventions. Additionally, draining the pleural space provides symptomatic relief to patients with the potential added benefit of improving the performance status for further preoperative physiologic testing.

Trapped Lung

A prolonged presence of a pleural collection often results in trapped lung that does not re-expand despite the complete evacuation of the fluid. This condition results from a rind or peel that progressively forms over the visceral pleura that thickens over time. The resulting condition on completing a thoracentesis in this situation is an ex vacuo pneumothorax or hydropneumothorax if incompletely drained. Pleural manometry at the time of the thoracentesis can further differentiate the condition of the unexpandable lung into either trapped lung or lung entrapment.[5] Trapped lung refers to the unexpandable lung due to a thickened visceral pleura in the absence of an active pleural process. In other words, the parapneumonic effusion, empyema, or hemothorax resolved over time leaving behind the unexpanded lung that requires decortication to be re-expanded. Lung entrapment refers to an active pleural process that has resulted in the unexpanded lung. In this situation, the lung could re-expand if the active pleural process is treated promptly. Pleural manometry helps in the differentiation of these two conditions based on the pressure measurement at the time of the thoracentesis. In general, a sudden drop of the pleural pressure to less than 20 mm Hg indicates a trapped lung, whereas a gradual decrease of such negative pressure reflects entrapment, giving reasonable expectations that the lung could re-expand if the active pleural condition is treated successfully. The definitive criteria to distinguish both conditions by manometry are still being studied and are beyond the scope of this article. Nonetheless, gaining insight into the nature of a trapped lung versus lung entrapment helps determine which patients should be promptly referred for pleural decortication or, rather, be aggressively treated for the pleural process with the expectation that the lung will re-expand without surgical intervention.

MANAGEMENT OPTIONS

Any pleural process that results in fluid accumulation is likely to impact on patients' performance status and, therefore, requires intervention. Draining the pleural cavity accomplishes several goals, including relief of symptoms as well as establishing the nature of the effusion. Occasionally, it also establishes the diagnosis and results in the re-expansion of the lung. There are several pleural interventions available that, in general, are applied from least to most invasive.

Chest Tube Drainage

The initial thoracentesis often provides sufficient information that allows the clinician to decide if the placement of a pleural drain is warranted. With the needle in the pleural cavity, it is possible to pass a guidewire followed by a pigtail catheter. Over time it has become more common to start with a small-bore catheter even in the face of empyema, only upsizing to a bigger tube if needed.[6] The fluid is then sent for chemical, microbiological, and cytology studies.

Pleural Fibrinolytic Therapy

An untreated pleural effusion, particularly empyema, will frequently evolve into a loculated or compartmentalized collection. In this setting, a single drain is often ineffective in resolving the process. Traditionally, this was an indication for surgical drainage. However, the use of fibrinolytics in the pleural space has shown significant effectiveness in lysing loculations and thinning the fluid with good results. The results of a randomized trial comparing placebo versus both tissue plasminogen activator and deoxyribonuclease were

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