



# Invasive Mediastinal Staging: Endobronchial Ultrasound, Endoscopic Ultrasound, and Mediastinoscopy

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Accurate mediastinal staging is essential to determining the optimal therapeutic strategy for many patients with lung cancer. Computed tomography and positron emission tomography are first steps, but frequently tissue sampling is recommended to confirm the radiographic findings. Mediastinoscopy has been the gold standard for thirty years, but the new technologies of esophageal endoscopic ultrasound and endobronchial ultrasound provide a less invasive method for biopsy. These techniques enable needle aspiration sampling of nearly all mediastinal and hilar lymph nodes, and experience with them is now sufficiently mature to conclude that they can be equivalent if not preferable to mediastinoscopy. The keys to achieving accurate results are skillful execution combined with sound clinical judgment regarding when to use which techniques. Patients with lung cancer are best served by clinicians experienced with all three methods for invasive mediastinal staging.

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## INTRODUCTION

In 1982, Pearson et al<sup>1</sup> published their findings that survival following lobectomy for lung cancer was significantly better for patients whose mediastinoscopy was negative than for patients whose mediastinoscopy was positive even if N2 disease was subsequently discovered at lobectomy. Since then, accumulating evidence has repeatedly demonstrated that mediastinal disease is a contraindication to surgery as initial therapy. Guidelines from the American College of Chest Physicians recommend invasive staging for patients with (1) mediastinal or hilar lymph nodes enlarged on chest computed tomography (CT) or hypermetabolic lymph nodes on positron emission tomography (PET)/CT, (2) central tumors, or (3) peripheral tumors larger than 3-cm diameter.<sup>2</sup> Mediastinoscopy has been the gold standard procedure for this assessment, but a national survey of 729 hospitals found that of

11,668 patients undergoing lung resection, only 27% underwent mediastinoscopy, and lymph nodes were sampled in only 47% of those procedures.<sup>3</sup> This finding exposes the unfortunate reality that many patients proceed to surgery without appropriate mediastinal staging. It is also likely that many patients are denied surgery on the basis of imaging alone, without biopsy confirmation of suspected mediastinal disease.

Over the past 10 years, esophageal endoscopic ultrasound-guided fine-needle aspiration (EUS-FNA) and endobronchial ultrasound-guided transbronchial needle aspiration (EBUS-TBNA) have emerged as viable, and possibly, preferable alternatives to mediastinoscopy. Their introduction and growing availability make invasive mediastinal staging more accessible. But this also means that staging may be performed by physicians for whom management of patients with lung cancer is not a core part of their clinical practice and whose recommendations may be limited by their inability to offer the full range of invasive options. It is, therefore, imperative that thoracic surgeons become adept at EUS-FNA and EBUS-TBNA, as well as mediastinoscopy.

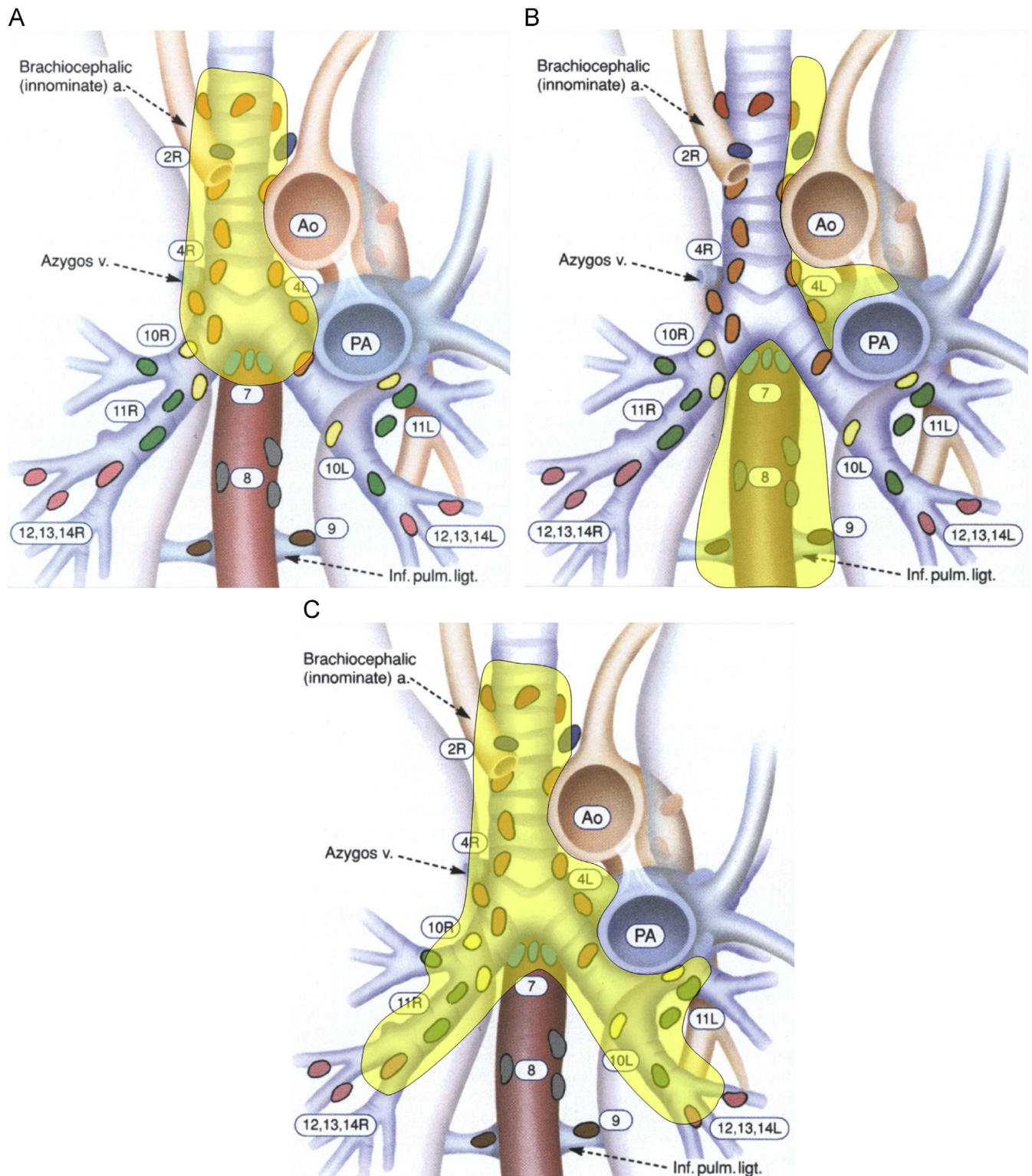
## MEDIASTINOSCOPY

Carlens<sup>4</sup> introduced cervical mediastinoscopy in 1959 as a technique for sampling mediastinal lymph

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**Figure 1.** Lymph node accessibility with invasive staging. Maps are highlighted to show the lymph node stations that can be sampled with each of the 3 different modalities. (A) Cervical mediastinoscopy, (B) EUS-FNA, and (C) EBUS-TBNA. Adapted with permission from Mountain CF, Dressler CM: Regional lymph node classification for lung cancer staging. *Chest* 111:1718-1723, 1997. (Color version of figure is available online at <http://www.semthorcardiovacurg.com>).

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