Monaldi Archives for Chest Disease

Monaldi Archives for Chest Disease 2026; 96:3553
doi: 10.4081/monaldi.2025.3553

©Copyright: the Author(s), 2025
Licensee PAGEPress, Italy

Resectability in lung cancer: a surgeon's judgment in the era of the multidisciplinary team

Nicola Rotolo

Thoracic Surgery Unit, Research Center for Minimally Invasive Surgery, University of Insubria, ASST-Settelaghi, Varese, Italy

Key words: lung cancer, lung cancer resectability, locally advanced lung cancer, multidisciplinary teams, lung cancer operability.

Correspondence to: Nicola Rotolo, Thoracic Surgery Unit, Research Center of Minimally Invasive Surgery, University of Insubria, ASST-Settelaghi, Viale Guicciardini 9, 21100 Varese, Italy. Tel.: 0039.0332.278629. E-mail: nicola.rotolo@uninsubria.it

Dear Editor,

The concept of resectability plays a crucial role in determining the operability of non-small cell lung cancer (NSCLC) patients. Lung cancer continues to be the leading cause of cancer-related death worldwide, with outcomes strongly dependent on stage at diagnosis. Five-year survival can reach 68-92% in Stage I, 53-60% in Stage II, and only 36-40% in Stage IIIA disease [1]. Also, in patients with Stage III NSCLC, a recent study demonstrated that an 80% adequate margin (R0) resection rate was achieved, leading to favorable survival outcomes, independent of pretreatment N status [2]. Beyond staging, surgical decisions, including lobectomy *vs.* sublobar resection, also influence survival, with lobectomy often preferred in early-stage disease [3]. In more advanced cases, extended "en-bloc" resections with negative margins are associated with a favorable prognosis in T4 tumors involving the carina, vertebra, vena cava, atrium, or aorta [4].

Moreover, now more than ever, the integration of neoadjuvant and adjuvant therapies has further influenced resectability and operability, with the advent of increasingly promising immunotherapy. Neoadjuvant chemotherapy and immunotherapy can shrink tumors, making them resectable and improving surgical outcomes. Trials have shown that neoadjuvant chemoimmunotherapy can lead to high rates of major pathological response, enhancing the likelihood of successful resection [5].

In addition, advancements in surgical techniques have expanded the criteria for resectability, allowing more patients to be considered operable. Minimally invasive surgeries, such as video-assisted thoracoscopic surgery and robotic-assisted thoracoscopic surgery, have reduced the morbidity associated with lung cancer surgeries, allowing access to operation for patients who could otherwise be considered ineligible for surgery because of their comorbidities [6]. These techniques also contribute to better postoperative recovery and reduced hospital stays.

While lobectomy remains the standard of care for early-stage NSCLC, more extensive resections such as pneumonectomy or an extended pulmonary resection are associated with higher perioperative morbidity and long-term functional impairment, with the risk of complications related to the amount of lung tissue removed. Conversely, anatomical segmentectomy and sublobar resections may reduce functional loss, provided that oncological principles such as R0 and nodal assessment are respected. Although not routinely recommended as a standard oncological procedure, wedge resection can play a role in highly selected patients (frail individuals with limited functional reserve, or when dealing with small, peripherally located nodules). In this context, preoperative functional assessment plays a pivotal role. Cardiopulmonary evaluation, including spirometry, diffusing capacity of the lungs for carbon monoxide, and in selected cases cardiopulmonary exercise testing (VO_2 max), is essential to determine not only operability but also the most appropriate extent of resection, emphasizing the dynamic interplay between functional reserve and surgical strategy. The balance between oncological radicality and functional preservation must therefore guide the surgical decision, always bearing in mind that the primary goal remains a complete (R0) resection, the most significant favorable prognostic factor.

In the current clinical practice, the therapeutic decision and the resectability of a tumor are discussed and decided by the multidisciplinary teams (MDTs), that is the cornerstone of modern thoracic oncology. Surgeons, oncologists, radiologists, and other experts collaborate to assess the patient's fitness for surgery and the potential for complete tumor removal, with the aim of obtaining R0, a primary parameter that impacts the prognosis. This collaborative approach ensures that patients receive the most appropriate treatment, balancing the benefits of surgery with the risks of potential complications [7,8].

It goes without saying that the surgeon's role in the final MDT therapeutic decision is crucial, particularly when asked to address the oncologist's question: *is this tumor resectable*? In MDTs, which are rightly praised for integrating perspectives, the surgeon's voice often carries the heaviest weight when discussing resectability. Within the MDT, the therapeutic goal is to achieve an R0 resection, even in stage IIIA, through surgery when feasible. But what does "feasible" mean? *Is this cancer resectable?*

A deceptively simple question that, in daily multidisciplinary meetings, reveals itself to be anything but. We are taught to distinguish between resectability (the technical possibility of removing the tumor with negative margins), which is a key factor in deciding whether surgery is a viable treatment option, and operability (the patient's physiological capacity to tolerate surgery). Yet, these categories are not siloed: in reality, resectability profoundly impacts operability. A patient may be operable for a lobectomy but not a

pneumonectomy. If a tumor is deemed unresectable, the question of operability becomes irrelevant.

And herein lies the clinical tension: resectability is not a fixed property of the tumor; it is a surgeon-dependent judgment. A centrally located tumor involving the left main bronchus might be considered unresectable in one setting and approached with a sleeve resection in another. A vertebral body invasion may prompt palliative treatment in a low-volume center but is considered for en-bloc resection in a highly specialized unit. These differences reflect not only surgical skill, but also the availability of multidisciplinary support, perioperative care, and technology. The surgeon's expertise defines the boundaries of what is possible. It is the surgeon who sees beyond the scan, who mentally rehearses the dissection planes, who considers when risk becomes unacceptable. High-performing surgeons tend to achieve better outcomes, suggesting that surgeon expertise is a critical factor in resectability decisions [9,10]. Surgeon-level differences in outcomes can vary significantly among surgeons and can impact patient survival. Even imaging interpretation can vary. What one surgeon sees as clear separation from the pulmonary artery, another might suspect as subtle invasion. The radiologist present at the MDTs, unless there are clear signs of vascular involvement, in borderline cases, may have difficulty defining the vascular infiltration, which can only be verified by the surgeon during the operation in doubtful cases. The same CT scan, the same positron emission tomography–computed tomography, can generate different decisions. And while technology such as 3D reconstruction, robotics, and intraoperative bronchoscopy can assist, they are not universally available. This surgeon-dependency and limited access to resources creates significant variability in access to curative treatment.

In selected cases, a patient's chance of being offered surgery may depend less on their disease and more on who is reviewing their case. This raises uncomfortable but necessary questions: are we denying surgery to some patients because of local limitations? Are we too quick to label a tumor "unresectable" when we could seek a second opinion or refer the case to a high-volume center?

Thoracic surgical societies such as the European Society of Thoracic Surgeons and International Association for the Study of Lung Cancer have made commendable efforts to define categories like "potentially resectable" or "technically resectable" after induction [7]. These frameworks are valuable, but they cannot eliminate the variability introduced by the operator. Resectability is not merely anatomical; it is logistical, experiential, institutional. We do not need rigid standardization - surgery resists being fully algorithmized - but we do need structured reflection. Above all, we must recognize that resectability is not a binary variable, and that declaring a tumor "unresectable" should never be taken lightly.

These considerations are not merely theoretical. Every thoracic surgeon in their career has had to evaluate a "second opinion" patient initially deemed unresectable or inoperable who was successfully managed following a focused multidisciplinary re-evaluation and a personalized surgical strategy. These are not outliers, but rather representative examples of how thoracic surgery must remain a discipline characterized by adaptability, interdisciplinary dialogue, openness to individualized decision-making, and a willingness to keep asking the right question: *is this cancer truly unresectable?*

References

1. Goldstraw P, Chansky K, Crowley J, et al. The IASLC Lung Cancer Staging Project: proposals for revision of the TNM stage groupings in the forthcoming (Eighth) edition of the TNM classification for lung cancer. J Thorac Oncol 2016;11:39-51.
2. Furrer K, Weder W, Eboulet E, et al. Extended resection for potentially operable patients with stage III non-small cell lung cancer after induction treatment. J Thorac Cardiovasc Surg 2022;164:1587-602.e5.
3. Mynard N, Nasar A, Rahouma M, et al. Extent of resection influences survival in early-stage lung cancer with occult nodal disease. Ann Thorac Surg 2022;114:959-67.
4. Fadel E, Missenard G, Court C, et al. Long-term outcomes of en bloc resection of non-small cell lung cancer invading the thoracic inlet and spine. Ann Thorac Surg 2011;92:1024-30.
5. Provencio M, Nadal E, Insa A, et al. Neoadjuvant chemotherapy and nivolumab in resectable non-small-cell lung cancer (NADIM): an open-label, multicentre, single-arm, phase 2 trial. Lancet Oncol 2020;21:1413-22.
6. D'Amours M, Wu FTH, Theisen-Lauk O, et al. Surgically resectable non-small cell lung cancer: a contemporary approach. Eur Respir J 2024;64:2400332.
7. Kim S, Cooke D, Kidane B, et al. The Society of Thoracic Surgeons expert consensus on the multidisciplinary management and resectability of locally advanced non-small cell lung cancer. Ann Thorac Surg 2025;119:16-33.
8. Zaidi M, Wright G. Locally advanced non-small cell lung cancer: the place of specialist thoracic surgery in the multidisciplinary team. Transl Lung Cancer Res 2020;9:1680-9.
9. Ray M, Akinbobola O, Fehnel C, et al. Surgeon quality and patient survival after resection for non–small-cell lung cancer. J Clin Oncol 2023;10;41:3616-28.
10. Birkmeyer JD, Stukel TA, Siewers AE, et al. Surgeon volume and operative mortality in the United States. N Engl J Med 2003; 349:2117-27.

Received: 11 May 2025; Accepted: 3 October 2025; Early view: 7 October 2025.

Conflict of interest: the author had no conflict of interest in relation to this letter.

Ethics approval and consent to participate: not required.

Informed consent: not applicable.

Patient consent for publication: not applicable.

Availability of data and materials: not applicable.

Declaration of generative artificial intelligence and artificial intelligence-assisted technologies in the writing process: the author used Ludwig (Ludwig.guru) exclusively for language and grammatical correction. No generative AI tools were used to generate scientific content, analyse data, or interpret results.

Publisher's note: all claims expressed in this article are solely those of the authors and do not necessarily represent those of their affiliated organizations, or those of the publisher, the editors and the reviewers. Any product that may be evaluated in this article or claim that may be made by its manufacturer is not guaranteed or endorsed by the publisher.

This work is licensed under a Creative Commons Attribution-NonCommercial 4.0 International License (CC BY-NC 4.0).

OPEN ACCESS