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

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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 versus 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 (VATS) and robotic-assisted thoracoscopic surgery (RATS), 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 adequate margins (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, DLCO, and in selected cases cardiopulmonary exercise testing (VO₂ 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 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 PET-CT, 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 ESTS and IASLC 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 his 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?"*

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