



Surgical evaluation of station 4L in patients with lung cancer: the Ugly Duckling

Alberto Cabañero[^], Cristina Cavestany, Sara Fra, Gemma M. Muñoz, Usúe Caballero, Nicolás Moreno

Thoracic Surgery Department, Ramón y Cajal University Hospital, Madrid, Spain

Correspondence to: Alberto Cabañero. Thoracic Surgery Department, Ramón y Cajal University Hospital, Ctra. de Colmenar Viejo km. 9,100 (28034) Madrid, Spain. Email: alberto.cabanero@salud.madrid.org.

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Currently, surgery is still the most effective treatment for early-stage non-small cell lung cancer (NSCLC) in operable patients. The standard recommended procedure consists in a pulmonary resection that includes the tumor and a lymphadenectomy of the hilar and mediastinal lymph nodes (LNs). In right tumors, the recommended mediastinal lymphadenectomy is the resection of stations 2R, 4R, 7, 8 and 9. Whereas in left tumors, it is the resection of stations 4L, 5, 6, 7, 8 and 9 (1,2).

Although this is what guides recommend, the resection of station 4L has always been very controversial. Its access from the left hemithorax requires reaching out to the paratracheal space dissecting through the aorta and the pulmonary artery, just where the recurrent laryngeal nerve (RLN) leaves the vagus nerve. With a delicate technique, it isn't difficult to avoid vascular injuries; but nerves are delicate structures and, in this particular case, the anatomy is whimsical (3). It is because of this reason, that us surgeons sometimes "forget" to resect this station. The consequences of a postoperative recurrent laryngeal nerve palsy (RLNP) are variable, they include dysphonia, dyspnea, difficulty to cough and choking. Sometimes, these consequences can be transitory or so mild that patients will only be aware of a hoarse voice, but they can also be permanent or as severe as to put life at risk.

Hanaoka *et al.* (4), describe their results about the

dissection of station 4L in 139 patients with tumors in the left upper lobe. LN dissection of station 4L revealed LN metastasis in 9 patients (6.47%). Among these nine node-positive patients at station 4L, 6 (66.7%) did not undergo mediastinoscopy, while the remaining 3 (33.3%) were node-negative on mediastinoscopy. Twenty patients had a RLNP (14.39%). Fourteen of them (70%) recovered spontaneously in an average of 5.71 months, whereas 3 (15%) required surgical intervention. Aspiration pneumonia associated with RLNP was observed in 4 patients (20%); however, none of the patients died. Other complications associated with RLNP were atelectasis in 2 patients and sputum retention in 1 patient. In their analysis, station 4L LN dissection was an independent risk factor for RLNP, and the use of an energy device near the RLN was a significant risk factor for this injury.

In modern surgery, not using an electric scalpel or energy device is almost unthinkable once you've tried its wonders. But as authors have described in their study (4), working with a monopolar electric scalpel in such a reduced space should be considered forbidden. The new energy devices (advanced bipolar, harmonic devices and other vessel sealing systems) have the advantage of being more versatile and scatter less heat, but they can also produce undesired effects even when in good hands (5).

If there is something we can learn from thyroid surgery,

[^] ORCID: 0000-0002-9617-9935.

is that the best way to avoid damages in the RLN is seeing it, but this dissection should be very painstaking (6). To help in this area, the intraoperative control of the RLN has been described, a technique specially carried out in thyroid surgery but also in tracheal (7) and esophageal (8) surgery. Nevertheless, its use does not always avoid RLN injuries (9) and its implementation in pulmonary resection with mediastinal lymphadenectomy surgeries has not been very well received (10,11).

On the other hand, it is known that the mediastinal LN infiltration in patients with NSCLC is a very important prognostic factor. It modifies the stage of the disease and adds the need for further treatments beyond surgery (1). In the present study, authors have confirmed that pathological N stage ≥ 2 was an independent prognostic factor for disease-free survival (4). However, the literature is ambiguous in so far as the prognosis of patients with positive 4L station (12-15). Nonetheless, and although we don't know the exact role lymphadenectomy plays in the long-term prognosis of NSCLC operated patients (16), the histological study of station 4L should be mandatory in all left tumors. However it is also true that certain authors recommend adopting a lobe-specific lymph node dissection policy in tumors smaller than 2 cm (17), thus avoiding 4L resection in small left lower lobe tumors; and others only in case there is confirmed affection of station 10L (14). As alternative methods for station 4L histological study from the hemithorax, we have endo-bronchial ultrasonography (EBUS), mediastinoscopy, video-assisted mediastinoscopic lymphadenectomy (VAMLA) and transcervical extended mediastinal lymphadenectomy (TEMLA); all of which have more or less possibilities of false negatives and risk of RLN injuries, apart from other specific risks to the techniques (18).

Without a doubt, the work done by Hanaoka *et al.* (4), brings us back to the dilemma of stage 4L. Even if the majority of the RLNP are temporary (neuroapraxia): does detecting more pN2 patients who are non-detected with other techniques justify having a greater amount of a complication that can be severe? In the present study, only 9 patients were diagnosed with pN2 and 20 RLN injuries were produced, most of them temporary and, fortunately, without repercussions in mortality (4). Maybe the wisest answer would be that station 4L biopsy or resection is only justified in patients with high probability of N2 (suspicious 4L in CT or PET-CT, central tumors or T>3 cm and positive N1), but others will say that in experienced hands, the biopsy or resection of 4L is safe and feasible, so the controversy is served (again). You move.

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References

1. NCCN clinical practice guidelines in Oncology. Non-Small Cell Lung Cancer. Version 5.2022. Available online: https://www.nccn.org/professionals/physician_gls/pdf/nscl.pdf (accessed on Oct 10, 2022).
2. Lardinois D, De Leyn P, Van Schil P, et al. ESTS guidelines for intraoperative lymph node staging in non-small cell lung cancer. *Eur J Cardiothorac Surg* 2006;30:787-92.
3. Ng C, Woess C, Maier H, et al. Nerve at risk: anatomical variations of the left recurrent laryngeal nerve and implications for thoracic surgeons. *Eur J Cardiothorac Surg* 2020;58:1201-5.
4. Hanaoka J, Yoden M, Okamoto K, et al. Mediastinal lymph node evaluation, especially at station 4L, in left upper lobe lung cancer. *J Thorac Dis* 2022;14:3321-34.
5. Phillips CK, Hruby GW, Durak E, et al. Tissue response

- to surgical energy devices. *Urology* 2008;71:744-8.
6. Jatzko GR, Lisborg PH, Müller MG, et al. Recurrent nerve palsy after thyroid operations--principal nerve identification and a literature review. *Surgery* 1994;115:139-44.
 7. Kadakia S, Mourad M, Badhey A, et al. The role of intraoperative nerve monitoring in tracheal surgery: 20-year experience with 110 cases. *Pediatr Surg Int* 2017;33:977-80.
 8. Huang CL, Chen CM, Hung WH, et al. Clinical Outcome of Intraoperative Recurrent Laryngeal Nerve Monitoring during Thoracoscopic Esophagectomy and Mediastinal Lymph Node Dissection for Esophageal Cancer. *J Clin Med* 2022;11:4949.
 9. Cleere EF, Davey MG, Young O, et al. Intraoperative nerve monitoring and recurrent laryngeal nerve injury during thyroid surgery: a network meta-analysis of prospective studies. *Langenbecks Arch Surg* 2022;407:3209-19.
 10. Zhao J, Xu H, Li W, et al. Intraoperative recurrent laryngeal nerve monitoring during surgery for left lung cancer. *J Thorac Cardiovasc Surg* 2010;140:578-82.
 11. Chai YJ, Lee JM, Seong YW, et al. Application of Continuous Intraoperative Neuromonitoring During VATS Lobectomy for Left Lung Cancer to Prevent Recurrent Laryngeal Nerve Injury. *Sci Rep* 2020;10:4636.
 12. Wang YN, Yao S, Wang CL, et al. Clinical Significance of 4L Lymph Node Dissection in Left Lung Cancer. *J Clin Oncol* 2018;36:2935-42.
 13. Deng HY, Li D, Qiu XM, et al. Dissection of 4L lymph node for left-sided non-small cell lung cancer: a meta-analysis. *ANZ J Surg* 2021;91:E696-702.
 14. Wang CX, Xu C, Li C, et al. Significance of risk factor analysis and dissection for station 4L lymphatic metastasis in left lung cancer: a systematic review and meta-analysis. *Transl Cancer Res* 2021;10:1656-66.
 15. Wo Y, Li H, Zhang Y, et al. The impact of station 4L lymph node dissection on short-term and long-term outcomes in non-small cell lung cancer. *Lung Cancer* 2022;170:141-7.
 16. Mokhles S, Macbeth F, Treasure T, et al. Systematic lymphadenectomy versus sampling of ipsilateral mediastinal lymph-nodes during lobectomy for non-small-cell lung cancer: a systematic review of randomized trials and a meta-analysis. *Eur J Cardiothorac Surg* 2017;51:1149-56.
 17. Deng HY, Wang T, Tang X. Should the left lower paratracheal lymph node always be dissected in patients with left-sided lung cancer? *Eur J Cardiothorac Surg* 2020;58:404.
 18. Lozekoot PWJ, Daemen JHT, van den Broek RR, et al. Surgical mediastinal lymph node staging for non-small-cell lung carcinoma. *Transl Lung Cancer Res* 2021;10:3645-58.

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