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10th International Workshop on Surgical Exploration of the Mediastinum and Systematic Nodal Dissection



ROBOTIC SYSTEMATIC NODAL DISSECTION IN LUNG CANCER

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The assessment of lymph nodes is a critical component in any lung resection procedure, playing a vital role in the pathological staging of lung cancer. However, the extent of lymph node resection—whether limited to sampling, lobe specific dissection or extending to radical lymphadenectomy—remains a topic of ongoing debate.¹

Historically, studies examining the survival benefits of mediastinal lymph node dissection (MLND) have produced inconclusive results, failing to elucidate if there is (or not) a clear oncological advantage.^{2,3} Advocates of extensive lymph node removal argue that it reduces the likelihood of recurrence by eliminating occult N2 disease, potentially improving disease-free survival.^{4,5,6}

The Japanese Clinical Oncology Group (JCOG) randomized trial (JCOG1413)⁷ evaluates the clinical benefits of lobe-specific nodal dissection (compared to systematic dissection) in stage I-II non-small cell lung cancer (NSCLC). Its primary endpoint is overall survival, with secondary endpoints including relapse-free survival, local and regional lymph node recurrence rates, and adverse events.

Its results will be crucial in clarifying these issues, particularly in anticipation of the upcoming revisions to the TNM-9 staging system where data have been compiled to update the nodal status descriptors.⁸ Data analysis has shown that single-station N2 involvement (N2a) has a better prognosis than multi-station N2 (N2b) in both clinical and pathological contexts, with significant prognostic implications. This distinction underscores the value of systematic dissection in detecting occult N2 disease, even when confined to a single station or even a micro metastasis in one single node,⁹ moreover taking into account that the rapidly advancing field of neo or adjuvant immunotherapy, which has shown promise in improving overall and event-free survival, further underscores the importance of precise staging to ensure patients are appropriately stratified into treatment groups.^{10,11}

Robotic assisted thoracic surgery (RATS) is rapidly becoming a standard of care in oncological thoracic surgery. Clear advantages have been reported namely, enhanced visualization, the ability to dissect into the mediastinum, segmental resection, and lymph node dissection.¹² These advantages, allow for lymphadenectomy to be performed in various ways depending on surgeon preferences, but most importantly, they enable the preservation of the basic principles of the thorough and systematic lymphadenectomy technique used in open surgery¹³, which is sometimes limited with the VATS approach.

Three randomized trials—RAVAL¹⁴, ROMAN¹⁵, and RVLob¹⁶—have directly compared RATS with conventional VATS in lung resection procedures.

The RAVAL trial primarily focused on assessing the health-related quality of life following RATS lung cancer resection. Additionally, the RATS group had a greater number of lymph nodes sampled, and the procedure was deemed cost-effective, allowing the authors to conclude that RATS offers comparable short-term health outcomes to VATS, with potential advantages in lymph node dissection strategies.

The ROMAN study also compared RATS and VATS in lung cancer patients, it failed to demonstrate advantages on adverse events, but it did demonstrate a significantly greater extent of lymph node assessment in the RATS group. This was evident in the higher median number of sampled nodal stations, hilar lymph nodes, and mediastinal lymph nodes.

Similarly, the RVlob trial found that the RATS group had a higher number of lymph nodes harvested, particularly N1 nodes, and more nodal stations examined.

While robotic surgery is still in its early stages, these trials suggest that RATS may offer advantages in lymph node dissection and potentially lower postoperative complications compared to VATS, particularly in systematic lymph node dissection. However, further research is needed to fully understand the long-term benefits, cost implications, and survival outcomes associated with RATS, especially in comparison to traditional open surgery. As robotic techniques continue to evolve, they may also offer intraoperative superiority for intersegmental and segment-specific lymph node dissections, particularly in early-stage lung cancers^{12,17}.

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