invasive adenocarcinoma, or lepidic-predominant lesions). In fact, intraoperative pathologic confirmation of favorable histology was required (more on this to follow). Second, there was rigorous intraoperative pathologic analysis before accepting sublobar resection, which included evaluation of the surgical margin (5 mm or more), confirmation of the adenocarcinoma histology, and confirmation of the absence of “invasiveness” or more aggressive subtypes (Noguchi D, E, or F). Finally, the study combined wedge resection with segmentectomy; therefore, it cannot be determined if there was superiority with the more anatomic procedure of segmentectomy.

The lung is a vital organ; parenchyma-sparing procedures allow for preservation of pulmonary function^{2,5} and thus quality of life, which can be viewed as important as quantity of life, especially in elderly patients. With the availability of nonsurgical treatments for early-stage lung cancer that tout both preservation of lung function and effectiveness of cure, thoracic surgeons must be in the forefront of the constant pursuit to perfect the balance between lung preservation and cure. The current study by Suzuki and colleagues⁵ is an important step

toward achieving this, by determining the characteristics appropriate for sublobar resection, preserving pulmonary function, while providing maximum cure with surgery.

References

1. Fisher B, Anderson S, Bryant J, Margolese RG, Deutsch M, Fisher ER, et al. Twenty-year follow-up of a randomized trial comparing total mastectomy, lumpectomy, and lumpectomy plus irradiation for the treatment of invasive breast cancer. *N Engl J Med*. 2002;347:1233-41.
2. Ginsberg RJ, Rubinstein LV. Randomized trial of lobectomy versus limited resection for T1 N0 non-small cell lung cancer. Lung Cancer Study Group. *Ann Thorac Surg*. 1995;60:615-22.
3. Altorki NK, Wang X, Wigle D, Gu L, Darling G, Ashrafi AS, et al. Perioperative mortality and morbidity after sublobar versus lobar resection for early-stage non-small-cell lung cancer: post-hoc analysis of an international, randomised, phase 3 trial (CALGB/Alliance 140503). *Lancet Respir Med*. 2018;6:915-24.
4. Suzuki K, Koike T, Asakawa T, Kusumoto M, Asamura H, Nagai K, et al. A prospective radiological study of thin-section computed tomography to predict pathological noninvasiveness in peripheral clinical IA lung cancer (Japan Clinical Oncology Group 0201). *J Thorac Oncol*. 2011;6:751-6.
5. Suzuki K, Watanabe S, Wakabayashi M, Saji H, Aokage K, Moriya Y, et al. A single-arm study of sublobar resection for ground-glass opacity dominant peripheral lung cancer. *J Thorac Cardiovasc Surg*. 2022;163:289-301.e2.
6. Suzuki K, Saji H, Aokage K, Watanabe SI, Okada M, Mizusawa J, et al. Comparison of pulmonary segmentectomy and lobectomy: safety results of a randomized trial. *J Thorac Cardiovasc Surg*. 2019;158:895-907.

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Commentary: Is sublobar resection enough for ground-glass opacity–dominant lung adenocarcinoma?

Yang Zhang, MD, and Haiquan Chen, MD, PhD

For early-stage IA lung cancer, the current standard surgical procedure is still lobectomy, based on the results of the

Dr Yang Zhang (left), and Professor Haiquan Chen (right)

CENTRAL MESSAGE

In this new era of LDCT screening, this prospective trial provides timely and important evidence supporting sublobar resection for small-sized GGO-dominant lung adenocarcinoma.

randomized controlled trial (RCT) by the Lung Cancer Study Group in 1995.¹ However, the disease spectrum of lung cancer has changed significantly since 1995. With the wide

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application of low-dose computed tomography, an increasing number of lung ground-glass opacity (GGO) lesions have been detected, especially in East Asia.² Persistent GGO lesions are highly suspicious for early-stage lung adenocarcinoma, including adenocarcinoma in situ (AIS), minimally invasive adenocarcinoma (MIA), and invasive adenocarcinoma. As GGO-featured lung adenocarcinoma is generally indolent, the standard surgical procedure remains controversial.

The JCOG0201 study defined “radiologically non-invasive” lung cancer (no lymph node involvement or vascular invasion) as ≤ 2 cm in size and consolidation tumor size (CTR) ≤ 0.25 . This prospective JCOG0804 study³ was designed to confirm the feasibility of sublobar resection for “radiologically non-invasive” lung cancer. Analysis of 314 patients undergoing sublobar resection (258 wedge resections and 56 segmentectomies) showed the 5-year relapse-free survival was 99.7%, and there was no local relapse.

In this new era of low-dose computed tomography screening, this prospective trial provides timely and important evidence supporting sublobar resection for small-sized GGO-dominant lung adenocarcinoma. Sublobar resection has the advantage of lung parenchymal preservation over lobectomy. Wedge resection without lymph node dissection can also preserve the normal structure of the hilum and mediastinum. Sublobar resection may lead to a better quality of life compared with lobectomy. However, there are several aspects that need further investigation. First, the evaluation of CTR is subjective, which limits the generalizability of these results. A more standardized and objective radiologic definition of “noninvasive” lung cancer is required. Second, in this study, lung adenocarcinoma subtypes were classified according to the Noguchi’s classification rather than the current World Health Organization classification. It can be inferred that the majority of tumors were AIS/MIA. Radiologically, GGO component does not necessarily correspond to the

lepidic pattern in pathology. It is not uncommon that GGO-dominant lesions turn out to be invasive adenocarcinoma in pathology.⁴ Whether sublobar resection is sufficient for “ ≤ 2 cm and CTR ≤ 0.25 ” invasive adenocarcinoma should be validated in further studies. Frozen section pathology may be required to intraoperatively differentiate invasive adenocarcinoma from AIS/MIA.⁵ Third, if the oncologic outcome is equivalent, non-anatomic wedge resection should be the preferred procedure over anatomic segmentectomy. Future studies are warranted to investigate the feasibility of wedge resection alone.

Is sublobar resection enough for GGO-dominant lung adenocarcinoma? Theoretically, RCT provides the best evidence. However, considering the extremely good survival of patients with GGO-dominant lung adenocarcinoma, RCTs comparing different surgical procedures require extensive sample size and are very difficult or even impossible to be conducted. Therefore, single-arm prospective studies like this JCOG0804 trial are encouraged to determine the individualized surgical management of GGO-dominant lung adenocarcinoma.

References

1. Ginsberg RJ, Rubinstein LV. Randomized trial of lobectomy versus limited resection for T1 N0 non-small cell lung cancer. Lung cancer study group. *Ann Thorac Surg.* 1995;60:615-22; discussion 622-3.
2. Zhang Y, Jheon S, Li H, Zhang H, Xie Y, Qian B, et al. Results of low-dose computed tomography as a regular health examination among Chinese hospital employees. *J Thorac Cardiovasc Surg.* 2020;160:824-31.e4.
3. Suzuki K, Watanabe S, Wakabayashi M, Saji H, Aokage K, Moriya Y, et al. A single-arm study of sublobar resection for ground-glass opacity dominant peripheral lung cancer. *J Thorac Cardiovasc Surg.* 2022;163:289-301.e2.
4. Fu F, Zhang Y, Wen Z, Zheng D, Gao Z, Han H, et al. Distinct prognostic factors in patients with stage I non-small cell lung cancer with radiologic part-solid or solid lesions. *J Thorac Oncol.* 2019;14:2133-42.
5. Liu S, Wang R, Zhang Y, Li Y, Cheng C, Pan Y, et al. Precise diagnosis of intraoperative frozen section is an effective method to guide resection strategy for peripheral small-sized lung adenocarcinoma. *J Clin Oncol.* 2016;34:307-13.