

Since the first successful segmentectomy (lingulectomy) performed by Churchill and Belsey in 1939, controversial debate has persisted regarding the surgical indications and strategies for treating thoracic malignancy through segmentectomy. Advocates have emphasized its advantages of being parenchymal sparing and less invasive to cardiopulmonary reserved function, having oncologic security equivalent to that of standard lobectomy, and being an alternative surgical application for patients with physical impairment. However, although opponents have criticized limited resection of segmentectomy for being complicated by a potentially inadequate safety margin, a randomized controlled trial study by the Lung Cancer Study Group (LCSG) in 1995 presented evidence of an additional local recurrence rate and strongly recommended that segmentectomy for non-small cell lung carcinoma (NSCLC) be limited to patients with marginal cardiopulmonary function.

However, the spectrum of thoracic malignancy has shifted and surgical techniques have evolved. Currently, a growing number of ground glass opacity (GGO) pulmonary lesions have been detected through low-dose high-resolution computed tomography scans in an increasing number of cases of peripheral smaller noninvasive lung adenocarcinoma. In addition, various innovations and surgical applications have been developed, including 3D CT configuration, preoperative localization, and intraoperative identification of tiny radiographic abnormalities and segmental structures; all of which have been combined with the development of minimally invasive surgery, such as video-assisted thoracic surgery (VATS), uniportal or single skin incision VATS, and robotic-assisted thoracoscopic surgery (RATS), to cooperate systemically and lead a new era of segmentectomy application.

Although anatomic segmentectomy is acknowledged to be more technically complex than lobectomy because of frequently encountered anatomic variation and deeply buried intra-parenchymal segmental branches, recently increasing evidences indicate that segmentectomy is a reasonable treatment option for patients with NSCLC (≤ 2 cm) when a sufficient segmental margin is obtainable, particularly in patients of advanced age, with poor performance status, or with poor cardiopulmonary reserve.

Furthermore, through minimally invasive procedures—whether classical VATS, uniportal VATS, or RATS—radically anatomic segmentectomy can achieve less invasive resection of a smaller volume of lung tissue; equivalent oncological outcomes; and the benefits of less postoperative pain, shorter lengths of stay, reduced rates of morbidity, and even lower costs.

On the basis of the discussion and summary, we recommend that readers maintain interest in and concern about current segmentectomy to realize comprehensively the rapidly shifting spectrum of thoracic malignancy and surgical innovations.

Finally, ongoing, well-designed prospective RCTs should receive continuing attention regarding the different outcomes of open, thoracoscopic, and robotic segmentectomy, such as CALGB140503 and JCOG0802/WJOG4607L, for further clarifying the role of segmentectomy in treating NSCLC.

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