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## Commentary: Subsegmentectomies—An operation for the elite, or a solution in search of a problem?

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Thoracic surgery continues to trend toward less-invasive techniques and less-extensive resections. The role of sublobar resection for treatment of lung cancer has expanded in recent years. Now, subsegmentectomies have emerged as a new option for tumors that do not require a full segmentectomy but cannot be safely wedged. Advances in 3-dimensional computed tomography simulation and inflation–deflation techniques have made these subsegmentectomies possible.<sup>1</sup> In this article, Obayashi and colleagues<sup>2</sup> present a surgical technique of an S4a subsegmentectomy for resection of a pulmonary metastasis located at the intersection of the major and minor fissure.

In the clinical summary, the authors provide a clear and logical explanation of their decision to choose subsegmentectomy over segmentectomy or wedge resection. They determined that an anatomical resection was necessary given the close proximity of the right middle lobe lesion to the artery, and that a subsegmentectomy was preferred over a segmentectomy to maximize the preservation of lung function. The authors state that the patient’s right middle lobe “was large enough to warrant a lung-sparing subsegmentectomy rather than a lobectomy” but do not provide any objective metrics that guided this decision.

The investigators should be commended on an absolutely virtuosic performance of minimally invasive lung surgery, as demonstrated by the surgical video accompanying the article.

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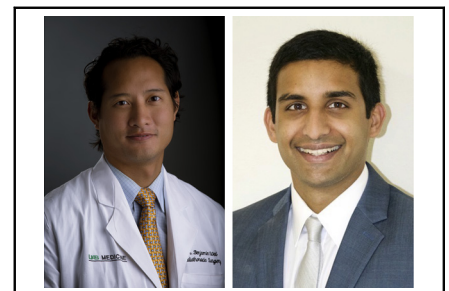
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### CENTRAL MESSAGE

S4a subsegmentectomy combined with wedge resections may be considered for certain situations, with careful review of preoperative imaging and using advanced thoracoscopic techniques.

Demarcating the line of parenchymal transection with jet ventilation, isolating and dividing hilar structures with suture and an energy device (rather than staplers), and dividing the subsegmental plane with electrocautery are among the techniques that facilitate this operation. Virtuosity aside, however, a right middle lobe segmentectomy is already an operation of unclear real-world benefit over middle lobectomy. What advantage, then, does a subsegmentectomy offer? How applicable is this technique to the typical general thoracic surgeon? Lung preservation is, of course, a laudable goal. If applied broadly, however, would subsegmentectomy lead to decreased margin distance, increased operative time, and/or a greater incidence of prolonged air leak? More dangerously, failure to identify the correct structures to be transected could occur, causing the lesion to be missed completely upon “resection.” Imperfect and inappropriate application of the operation of subsegmentectomy needs to be avoided.

As subsegmentectomies become more commonly used, the development of clear and objective guidelines for when to perform them will be imperative to ensure the best-possible patient results. Ideally, studies comparing both objective and subjective outcomes (eg, pulmonary function testing, dyspnea scores) after subsegmentectomy versus other types of parenchymal resection should be done to determine the true benefit of these operations. Finally, subsegmentectomy should ultimately be compared

with even less-invasive methods of managing pulmonary metastases, such as stereotactic radiosurgery.

Ultimately, this article provides a compelling case for considering subsegmentectomies in the rare situations in which anatomic or functional concerns limit more traditional surgical options. Recent literature has shown subsegmentectomies to be safe, with cancer recurrence rates that are similar to segmentectomies.<sup>1,3-5</sup> Although further studies are needed to establish best practice guidelines regarding subsegmentectomies, they can be considered by the expert minimally invasive thoracic surgeon when dealing with tumors in difficult locations, such as the intersection of the major and minor fissures.

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