

## Cometh the hour, cometh the surgery

There is a great momentum of progress in thoracic surgery today, driven by the explosion of innovative minimally invasive in recent years (1,2). The future holds many exciting developments for our specialty, and the forces in play are complex and myriad.

One of the most significant of these developments from the patient's perspective may be the re-evaluation of the extent of resection necessary for lung malignancy.

For the past several decades, the lobectomy was considered the gold standard for curative resection of primary non-small cell lung cancer. Although the first anatomic segmentectomy was described in 1939 by Churchill and Belsey for the treatment of benign lung conditions (3), its application for pulmonary neoplasms has been limited. The 1995 randomized trial by Ginsberg and colleagues was instrumental in stigmatizing sublobar resection as an 'inadequate' treatment modality (4). Its role was therefore largely reserved for patients unable to tolerate lobectomy because of compromised cardiopulmonary function or significant medical comorbidities. However, accumulation of clinical experience in recent years have demonstrated that anatomic pulmonary segmentectomy can be effective in the resection of small lung primary lung tumors (5). 'Intentional' segmentectomy—and maybe even wedge resection—has been suggested to offer equivalent therapy as lobectomy for selected lesions (namely small lesions with completely or predominantly ground-glass opacity appearances). The potential attraction of preserving more lung functional lung parenchyma is that patients should have better pulmonary function and better quality of life after surgery.

Interest in such intentional sublobar resections has been amplified by two complementary developments in lung cancer management. Firstly, it is becoming recognized that modern developments in CT imaging have made this an effective screening tool for early stage lung cancer that can directly impact on patient survival (6). The upshot of this is that increasing use of CT screening will corresponding increase rates of detection of asymptomatic, small, ground glass opacity (GGO) lesions in the years ahead—precisely the lesions that may benefit most from sublobar resection. Secondly, surgical approaches for lung neoplasm resection have evolved at a remarkable pace over the last 20 years. Conventional open surgery has been replaced by video-assisted thoracic surgery (VATS) as the preferred approach for early stage lung cancer, and conventional VATS has in turn evolved into 'next generation' techniques such as robot-assisted surgery, Uniportal VATS, subxiphoid VATS, and non-intubated thoracic surgery (1,2). This minimization of surgical access forms a natural synergy with the minimization of surgical extent through sublobar resection. Despite the anatomical challenges, it has been shown that segmentectomy is entirely feasible through these 'next generation' approaches and that this will produce a package for patients that is better than the sum of its parts.

Nevertheless, many technical questions remain regarding sublobar resection, such as in the areas of ideal operative strategy, lesion localization, and so on. Future prospective studies will also be required to compare treatment effectiveness of intentional sublobar resections versus lobectomy. More importantly, we believe that sublobar resection should not replace lobectomy as the gold standard, but rather supplement lobectomy in the surgeon's armamentarium. Those future studies need to precisely identify tumor-specific indications and patient-specific criteria for applying the sublobar strategy.

This book offers a magnificent compilation of articles demonstrating the technique and demonstrating the outcomes of sublobar resection, authored by some of the most experienced specialists in this field. It is hoped that these articles will not only show how and why sublobar resection is performed, but what work still needs to be done to define its ultimate role in the management of patients with lung neoplasms.

## References

1. Gonzalez-Rivas D. Uniportal thoracoscopic surgery: from medical thoracoscopy to non-intubated uniportal video-assisted major pulmonary resections. *Ann Cardiothorac Surg* 2016;5:85-91.
2. Sihoe ADL. The evolution of minimally invasive thoracic surgery: implications for the practice of uniportal thoracoscopic surgery. *J Thorac Dis* 2014;6:S604-S617.
3. Churchill ED, Belsey R. Segmental pneumonectomy in bronchiectasis: the lingula segment of the left upper lobe. *Ann*

- Surg 1939;109:481-99.
4. 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.
  5. Sihoe AD, Van Schil P. Non-small cell lung cancer: when to offer sublobar resection. Lung Cancer 2014;86:115-20.
  6. The National Lung Screening Trial Research Team. Reduced lung-cancer mortality with low-dose computed tomographic screening. N Engl J Med 2011;365:395-409.

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