Editorial

Through the looking glass: a glance at lung cancer surgery at the Shanghai Chest Hospital in 2021

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Thoracic surgery has progressed substantially over the last several years. Minimally invasive techniques now encompass traditional video-assisted thoracoscopic surgery (VATS), completely thoracoscopic approaches, uniportal VATS, and robotic techniques. Advanced three-dimensional (3D) imaging has also gradually been introduced to assist with operative planning and intraoperative orientation. As a result, surgeons are performing ever more complex resections, including a variety of anatomic segmentectomies, either as individual or combined resections (1,2). With further improvements in anesthesia and pain management and with the introduction of standardized patient care pathways, complex resections are now often being performed as short 24-hour admission procedures (3,4).

Concurrently, significant advances have been made in non-operative lung cancer therapeutics: these include percutaneous ablation techniques using a variety of sophisticated energy delivery systems and stereotactic radiotherapy, both of which can destroy small tumors with high effectiveness and minimal side-effects (5). Therapeutic navigational bronchoscopy platforms are also under active development (6).

As a consequence, the options for dealing with early-stage lung cancer have been greatly expanded. As the diagnosis of small, early-stage lesions is increasing with the introduction of lung cancer screening programs (7,8), there is an increasing opportunity for cure, all the while tailoring treatments to individual patients in order to optimize their risk-benefit profile and improve overall outcomes.

The experience of the Shanghai Chest Hospital (SCH) (9) provides a unique glimpse at how thoracic surgery is evolving in this very particular context. When attempting to make a meaningful assessment of the current state of affairs, one usually has to draw on the pooled experience of many different institutions. This can be problematic for several reasons. First of all, practice patterns may vary across institutions. This may occur because of differences in vocation, such as exist between teaching hospitals, large urban centers, and smaller community hospitals. Both vocation and geographic location may in turn influence the availability of medical and technical expertise as well as access to financial and other resources, within the broader context of regional and national healthcare systems. And then there are patient factors, such as biologic and socio-economic factors as well as more specific issues related to the epidemiology of lung cancer histopathology, for example.

SCH concentrates an extremely large number of patients in one place. So large, in fact, SCH gives a whole new meaning to the expression "high volume" center! As such, SCH is relatively free of the potential disparities and biases described above, and therefore provides a unique

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lens through which to view the current state of thoracic surgery. The logistical challenges involved in safely and efficiently managing such a large number of patients must be staggering indeed, and I think this would warrant a whole discussion in and of itself. Nevertheless, I found it extremely illuminating to look at the types of lung resections being performed at SCH, where sublobar resections have now superceded lobectomy as the main type of lung resection being performed for lung cancer. Until relatively recently, lobectomy was still considered the "gold" standard while sublobar resections were reserved for cases inadmissible for lobectomy because of patient age, frailty, or pulmonary comorbidity. In other words, the default surgical option for lung cancer was lobectomy while sublobar resection was an exception that required some sort of justification. When I look at the numbers at SCH, it would seem that, at least to a certain extent, this view has now been turned on its head.

It is also intriguing that the experience at SCH seems to reflect the broader experience of surgeons who, over the last 20 years or so, have gradually transitioned from lobectomy to anatomic sublobar resection for early-stage lung cancer. Interestingly, this change occurred in the absence of level 1 evidence supporting sublobar resection versus lobectomy. In fact, it occurred despite the aegis of the Lung Cancer Study Group trial which remained the only published randomized trial on the subject for more than a quarter century (10). So why and how did this change occur? The argument can be made that it occurred, in part, as a result of forward-thinking surgeons who pushed the boundaries of technical development and surgical expertise. Armed with confidence in their surgical skills and the realization that they were achieving good patient outcomes with sophisticated, limited resections, they gradually began offering limited resections to a broader patient population, no longer restricting them to those representing the uppermost levels of operative risk.

At the same time, non-operative therapeutics were also achieving relatively good oncologic outcomes, and so any rationale supporting major resections for every case of lung cancer came under scrutiny. The dominion of the Lung Cancer Study Group trial began to gradually recede. One could say that two recent randomized trials (11,12) rather settled the issue by "rubber stamping" sublobar resection, at least for early-stage peripheral lesions. But I think that what is described above raises the question of what happens when what is considered "high quality evidence" actually lags behind clinical experience. Some would argue that perhaps randomized studies were long overdue, and perhaps they would be correct in that assessment. On the other hand, one could make the argument that in this case at least, clinical experience outpaced the "experimental evidence", and that in the end what the randomized controlled trials (RCTs) added to surgeons' empirically acquired evidence was fairly limited. The point here is that it wasn't RCTs that prompted a change in clinical practice, but rather it would seem that it was the other way around: it was clinical practice that prompted the RCTs. "Evidence-based medicine" can be tricky…

And so perhaps the SCH experience is an embodiment of how this played out. I would be curious to see a similar review from 10 years ago, because, as the authors point out, things were looking quite different even as recently as 2019 when the rate of sublobar resections was lower by an order of 4.4 times compared to 2021. This is certainly the case at our own institution, where the proportion of segmentectomies being performed has increased significantly. That having been said, perhaps most of all, I think that the SCH annual review captures another, yet more fundamental intuition: if there is a widespread realization that, for some tumours at least, sublobar resection is equivalent to lobectomy, what does that really tell us about lung cancer? Once again, we seem to be aiming at a conclusion somewhat "backwards"; rather than lung cancer biology guiding what we are doing, we are led to make inferences about lung cancer biology based on what we are doing and the outcomes that we are achieving. And so with various surgical and non-surgical options, and emerging pharmacological options, perhaps lung cancer surgery will eventually go the way of Halsted's radical mastectomy (13); whereas this was the "default" treatment for breast cancer a century ago, a completely revised understanding of the disease led to its being largely replaced by limited resections combined with a variety of complementary therapeutics, as part of a comprehensive oncologic armamentarium. Time will tell where lung surgery will go from here, but certainly a future review from SCH in 5 or 10 years is likely to speak volumes.

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