

# Uniportal VATS—a new era in lung cancer surgery

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*“To improve is to change; to be perfect is to change often.”*

**Sir Winston Churchill**

It is perhaps surprising that this quotation comes from a gentleman of tradition and conservatism. However, even one of the greatest prime ministers of Great Britain recognized that we live in a constantly evolving world and adaptation is the key to survival. In surgery for lung cancer, we are witnessing a significant revolutionary change in approach that has not been witnessed since the 1990’s when major lung resection became possible through minimally invasive “key-hole” surgery in the form of video-assisted thoracic surgery (VATS) instead of through a large open thoracotomy. In 2011, as we recognized the 20<sup>th</sup> anniversary of VATS lobectomy (1), another promising major advance in lung surgery, uniportal (single port) VATS lobectomy, was developed that has subsequently been more rapidly adopted than its parent procedure (2,3).

VATS lobectomy has been most commonly performed through several incisions or ports, usually three or four. Rocco was the first to challenge this by performing the first uniportal VATS lung resection (4). In 2006, the team from Duke University Medical Centre published their experience of performing almost 500 cases of VATS major lung resection using only two ports (5). To many surgeons, this was another big leap towards an even less invasive VATS approach. The article inspired Gonzalez-Rivas, a skeptical thoracic surgeon from Spain to visit Duke University, and who in his own words once said “it is impossible to perform lobectomy with only two ports”. It was perhaps ironic that in 2010, Gonzalez-Rivas successfully performed

the first uniportal VATS lobectomy for treatment of early stage lung cancer. Since then he and his team have enthusiastically championed and refined this approach, with subsequent publications of the first pneumonectomy, sleeve lobectomy and vascular sleeve lobectomy all performed by uniportal VATS. In the present era, even complex major lung resections that can be challenging through an open thoracotomy can now be performed by minimal invasive VATS using a single small incision of 5 cm or less. Furthermore, advances in uniportal technique and equipment allow for straight forward uniportal lobectomy procedures to be performed through an ultra-mini 2.5 cm single incision (6).

As with any novel technique, particularly one which is mostly used for the treatment of an oncological disease, safety and efficacy is paramount. Studies have shown the uniportal VATS approach to be at least as safe as conventional VATS (7,8). Post-operative pain has been shown to be less following uniportal VATS when compared with conventional 3-port technique in certain procedures. Furthermore, data have so far shown at least equivalent disease-free survival at intermediate follow-up for patients with early stage non-small cell lung carcinoma who received uniportal VATS surgery, although long term outcomes are still pending (8).

Apart from weighing the success of a new technique by purely clinical outcomes, rarely is one able to assess a modification of surgical approach by its wider impact on the whole specialty. The introduction and evolution of uniportal VATS has driven thoracic surgeons to reconsider alternative access routes to operate inside the chest. Furthermore,



**Figure 1** Non-intubated hybrid operating room image-guided uniportal VATS wedge resection of lung nodule using 3-dimensional variable angle thoracoscope. VATS, video-assisted thoracic surgery.

the success of the uniportal strategy has reignited interest by industry to design instruments and equipment to facilitate this procedure. The development of subcostal single incision access to the thoracic cavity to avoid intercostal nerve injury, “scarless” embryonic natural orifice transumbilical endoscopic thoracic surgery (e-NOTES), and robotic thoracic surgery through a single incision have all at least in part been fueled by the uniportal VATS evolution. Angulated and narrower instruments and thoroscopes, as well as remote wireless instrument platforms are rapidly being developed and introduced into minimal invasive thoracic surgery, which will further facilitate uniportal VATS procedures (9). Furthermore, the spirit for reinvention has extended into multidisciplinary collaboration with the anesthetists in the form of non-intubated uniportal VATS lung resection to achieve quicker postoperative recovery (10), and also with radiologists in the hybrid operating theatre using cone beam CT for guided uniportal VATS procedures to improve surgical accuracy (11). Our experiences so far on the non-intubated single port VATS approach to major lung resections have been encouraging with earlier resumption of normal diet and less nausea following surgery, as well as improved postoperative mobility allowing for shorter hospital stay (*Figure 1*). The approach has also been modified to retain the single interspace philosophy and to improve the ability to train residents (12).

In the same way that when conventional VATS was introduced more than two decades ago, uniportal VATS for major lung resection also have its sceptics, some of whom

are immediately dismissive. As a Chinese Philosopher, Confucius (551-479 BC) once said, “*I hear and I forget. I see and I remember. I do and I understand*”. For thoracic surgeons who have experienced and converted to uniportal VATS, they fully understand the potential impact of this new era in thoracic surgery on lung cancer management.

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### Footnote

*Conflicts of Interest:* The authors have no conflicts of interest to declare.

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