Uniportal video-assisted thoracic surgery: a look into the future†

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If people aren’t laughing at your dreams, your dreams aren’t big enough.  
Robin Sharma (1965–present)

Uniportal video-assisted thoracic surgery (VATS) is a branch within the evolution of minimally invasive video-assisted thoracoscopic surgery, which began over a decade ago. While the early period of uniportal VATS (Fig. 1) development focused on the treatment of thoracic pathology requiring minor to intermediate surgical procedures, including sympathectomy, pleural decolulations, mediastinal biopsies, pericardial window, lung wedge resections and the like, many of these pioneered by Rocco [1], the more recent few years have seen uniportal VATS maturing and capable of complex major lung resections. In 2011, Gonzalez-Rivas et al. [2] reported the first uniportal VATS lobectomy for the treatment of an early-stage lung cancer of the left lower lobe, and since then in quick succession, pneumonectomy, segmentectomy, lung with associated chest wall resection, sleeve resection and even pulmonary artery reconstruction have been reported using the uniportal VATS approach through a small lateral chest incision.

At the same time, there have been numerous refinements in scope and instrument designs to allow surgery to be performed through the limitations of a single incision, with a smaller access wound and reduced instrument fENCing. This has been achieved primarily by reducing instrument size or diameter, and developing an angulated effector; be it a variable angled lens of a thoracoscopic or endostapler tip [3]. The possibility of remote wireless instruments that may be deployed within the chest cavity, which eliminates the constraints of a small access wound and the clutter of cables, is on the horizon. Furthermore, uniportal VATS has contributed to the interest in developing other forms of single-access instrument platforms, such as natural orifice transumbilical endoscopic surgery (NOTES) (or embryonic-NOTES), single-incision robotic surgery and electromagnetic navigational bronchoscopy, which may well have significant roles in the thoracic surgery of the future [2].

Despite the potential of less intercostal nerve injury by operating through one incision in uniportal VATS, postoperative intercostal neuralgia remains a significant problem that can reduce patient satisfaction and impact upon the quality of life following VATS. In 2012, Suda first reported performing uniportal VATS thymectomy via a 3–4 cm subxiphoid incision, which avoids the narrow intercostal space and potential nerve injury [4]. This midline approach also provides good access to both the left and right lateral aspects of the thymus. In the following year, Liu from Taiwan performed a uniportal left upper lobe lobectomy from a subcostal incision which has a similar advantage of bypassing the intercostal nerves [2]. Although more data are required to validate these approaches, in particular its efficacy in mediastinal lymph node dissection and its safety especially in managing major bleeding, the technique seems feasible and has the added advantage of being able to gain access to bilateral pleural space through a single incision.

Uniportal VATS has also led to increased opportunities for multidisciplinary collaboration. The minimally invasive nature of the uniportal procedure has reignited interest by surgeons and anaesthetists to perform non-intubated VATS lung resection [5]. This approach can potentially minimize the adverse effects of tracheal intubation and general anaesthesia, such as intubation-related airway trauma, ventilation-induced lung injury, residual neuromuscular blockade and postoperative nausea and vomiting, to achieve quicker postoperative recovery [6]. The difficulties of identifying small pulmonary nodules intraoperatively, especially through a single small incision during uniportal procedures, have led to increasing collaboration with radiologists for hybrid operating theatre cone-beam computed tomography image-guided VATS resections to improve surgical accuracy [7].

As with any novel technique, particularly one that is mostly used for the treatment of an oncological disease, safety and efficacy is paramount. Studies so far have shown the uniportal VATS approach to be at least as safe as conventional VATS [8]. Postoperative pain has been shown to be less following uniportal VATS lung resection when compared with VATS requiring more incisions [9]. 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 [10].

Despite the enthusiasm surrounding uniportal VATS and the encouraging results so far, we should avoid blindly championing the ethos of ‘unis sanando incisum’ and the craving for new technology to satisfy our egos. The future of uniportal VATS will depend
on robust data from prospective studies to confirm its clinical benefits and to dispel doubts from sceptics of this novel technique.

Conflict of interest: none declared.

REFERENCES