

History and indications of uniportal pulmonary wedge resections

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The occasion for writing this manuscript originates from the first world meeting on Uniportal VATS held in Naples on October 26, 2012. At that time, some of the world experts in the use of VATS and single-port VATS in the management of intrathoracic conditions convened to establish the status quo and the possible future perspectives of uniportal VATS as a possible adjunct to current minimally invasive techniques in the thoracic surgical armamentarium.

The concept of single port VATS dates back to 1924, when Singer presented his thoracoscope meant to help introducing more instruments through the same incision (1). Since early 2000, the current author devised a VATS technique for uniportal wedge pulmonary resection (2,3): (I) One small incision only; (II) Simultaneous introduction of instruments parallel to the videothoracoscope through an ideal cylinder wide as a surgeon's fingerbreadth (i.e., 2.5 cm) and no further dissection of the intercostal space; (III) Enhanced hand-eye coordination to visualize and operate the thoracoscope-instruments ensemble; In particular, handling the videothoracoscope is done so as to visualize the position of the instruments at any time during the procedure with simple zooming in or out of the operative field. Accordingly, in uniportal VATS pulmonary wedge resection, there is a more dynamic interpretation of the function of the thoracoscope-instruments ensemble later to be found in robotic surgery; (IV) A sagittal, caudo-cranial approach to the target lesion which allows for an increased depth of visualization. This geometric configuration renders uniportal VATS similar to the open approach and avoids the latero-lateral (i.e., baseball diamond) triangulation to address the target area in the lung. In fact, it is the creation of a dihedral or torsion angle that impedes in depth visualization by conventional, three port VATS and the uniportal approach enables the surgeon to overcome this issue (4);

(V) The use of articulating instruments, both endograspers and endostaplers, described for the first time for thoracoscopic use together. In fact, cranial suspension of target parenchymal area and lateral as well as back-to-front displacement become of crucial importance to perform wedge resection.

Since its description in 2004 (2), uniportal VATS wedge resection has been used for several diagnostic or therapeutic pulmonary indications, including spontaneous pneumothorax, interstitial lung disease, and, peripheral (i.e., outer third) pulmonary nodules (5-7). Drs Brunelli and Salati will address the results of the former two indications in a separate contribution in this special issue (8). In a forthcoming publication, Rocco *et al.* will present the outcome of uniportal VATS wedge resections for pulmonary nodules in 162 patients over a 10-year period with excellent results in terms of duration of chest drain, hospital stay, and, postoperative pain (9). A no drain policy is being increasingly adopted in selected patients with the attendant repercussions on the duration of hospitalization (9). In this setting, uniportal VATS wedge resections are meant to facilitate fast tracking of patients by becoming an outpatient procedure (10). In this context, wedge resection through uniportal VATS for pulmonary nodules and pneumothorax has been recently described in the non intubated patient (11,12). Moreover, in the current biomolecular era, the availability of a procedure to obtain tissue diagnosis with the features provided by uniportal VATS wedge resection is likely to become an important adjunct both to on and off trial settings (13). To this purpose, a valuable addition to diagnostic protocols will be represented by the reliable identification of pulmonary nodules through an endoscopic ultrasound probe during uniportal VATS (14). In addition, the predominant views on lung cancer management emphasize the suitability of wedge resection for suspicious ground glass opacities, often preluding at the histological evidence of minimally invasive adenocarcinoma or adenocarcinoma in situ portending per se a favorable prognostic outlook (15). In this context, the impact of uniportal VATS in solving diagnostic dilemmas seems obvious.

In conclusion, uniportal VATS wedge resection of the lung is a versatile procedure which can be performed with very short hospitalizations and reduced postoperative morbidity and pain. From the very early days of thoracic surgery, the concept of single incision is evolving through uniportal VATS to be adapted

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to the new diagnostic and therapeutic challenges of the future.

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