



# Pros-cons debate about the role and evolution of uniportal video-assisted thoracic surgery (VATS)

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Uniportal video-assisted thoracic surgery (VATS) is the latest advancement in minimally invasive surgery, combining the advantages of triportal thoracoscopic surgery, such as less pain or paresthesia and faster recovery, with optimal cosmetic outcomes. The uniportal access was first described by Marcello Migliore and Gaetano Rocco for minor thoracic procedures like wedge resection (1,2) and nowadays, thanks to the gained experience in the past years, more complex cases are performed hence expanding the indications for single-incision thoracoscopic surgery.

Even if the enthusiasm surrounding this new approach is becoming contagious engaging more and more surgeons, there are still some concerns about the advantages of this new technique.

The use of a single surgical access is a great challenge that should never be underestimated, and the safety of the patient has to be always kept in mind as a priority. According to the Hippocratic “*primum non nocere*” it’s mandatory to perform the uniportal approach while maintaining the patient safety.

Even if specific training for the uniportal VATS can be successfully obtained in dedicated workshops and symposia worldwide, this could be not enough to assure patient safety in the operating room. Providing this training during residency by competent faculty should be a key point in order to improve resident experience (3). In addition to that, the hospital volume plays an important role because without an opportune case load exposure the learning curve will be difficult to complete.

The abovementioned technical challenge affects not only

the surgeon but also the camera-assistant who must be able to hold the camera steady for sometimes several hours. A survey in 2012 already showed ergonomic problems and complaints of physical discomfort, caused by thoracoscopic surgery, above all in the neck, shoulders and back (4). The study conducted in 2016 by Yoon and colleagues documented the physical stress experienced by a surgeon during thoracoscopic pulmonary lobectomy and mediastinal lymph node dissection for lung cancer by measuring the intraoperative electromyography. They observed muscle fatigue in muscles related to a static posture (splenius capitis, upper trapezius and lumbar erector spinae) during multiportal thoracoscopic lobectomy (5). These discomforts could be probably intensified in uniportal VATS.

Having 2 or 3 instruments in the same incision beside the scope causes, at least during the early phase of the learning curve, an overcrowding that can adversely affect the precision of the surgical dissection. And moreover, the scope must look down in the same direction of the instruments and thus the perspective must be changed.

The loss of the posterior port, very useful to insert the stapler or even to retract the lung when dissecting the hilum from the utility access, is the big disadvantage of the uniportal VATS. Sometimes the retraction of the lung could be very difficult and must be obtained with a combination of manoeuvring the lung and rotation of the operating table.

However, so far there isn’t any published paper with the evidence that the uniportal approach increase the intraoperative risks for the patients. It’s of course prerogative of each surgeon to be sure that is offering the

best and safest surgery to his patients.

As stated by McKenna *et al.* in 2008 “*a conversion should never be considered a failure but rather a step towards patient’s safety*” (6).

Along with the safety of the performed surgery, an additional crucial point is the efficacy in terms of clinical and oncological outcomes. A recent meta-analysis published in 2016 by Harris *et al.* showed that, when propensity-matched data were analyzed, there were no statistically significant differences in operation time, length of hospital stay, intraoperative blood loss, duration of postoperative drainage, rate of conversion to thoracotomy or overall morbidity (7). It has been proposed that post-operative pain is reduced after uniportal wedge resection or pleurectomy compared to patients having the same surgery but with a multiple port technique (8). Because only one intercostal space is involved, instead of multiple, the potential expected advantage is a reduction of post-operative pain and paresthesia. Although this could be related to the technique per se, it could also be associated to the fact that successful local anesthesia of a single interspace can probably be obtained more easily (9). In addition, using the camera and instruments in a plane that is parallel to the intercostal space (instead of transversal) greatly reduces the forces that are commonly applied to the intercostal nerve bundle during conventional VATS. Nevertheless, objective published data to support the assertion that uniportal VATS offers an advantage, in terms of reduced pain, is still lacking (10-12). Perna *et al.* showed in their prospective randomized study from 2016 no difference in postoperative pain scores between uniportal VATS and multiportal VATS. Moreover, according to other published papers, this study also demonstrated no difference in the perioperative outcomes like chest drain duration, length of hospital-stay and pain medication intake (13). Despite the effort of several authors to focus the attention on the post-operative pain, it must be admitted that is very difficult to establish a relationship between approach and post-operative pain due to many potentials bias (numbers of chest tubes used, use of pre-emptive multi-level intercostal blocks, use of rib spreader to take out the specimen, etc.). Until now the most used indicator of pain in the literature was the Visual Analog Score (VAS) score that probably has only limited statistical relevance due to the subjective nature of the parameter. Only few past studies, showing the superiority of multiportal VATS against the open surgery, provided more objective data based on validated quality-of-life assessments or inflammatory markers. Such studies are maybe nowadays

needed to convince the opponents of the uniportal VATS.

From an oncologic perspective, the clinical data regarding the survival after lung surgery performed with uniportal VATS are not yet published because the technique is relatively new. The most used benchmark of the procedure efficacy is the nodal dissection adequacy. In many studies even for multiportal or open techniques, large differences in overall performances and quality of lymph node dissection have been observed despite the existing concept on the importance of lymph node dissection. Performing lymph node dissection through the single-port approach seems to be challenging. One of the most heated argument against uniportal VATS for lung cancer is indeed that the approach could give a limited ability to perform an adequate mediastinal lymph nodes dissection in some stations, like the subcarinal area. Actually, in the published literature no difference was noted regarding the total number of lymph nodes removed demonstrating a non-inferiority of the uniportal VATS when compared to conventional VATS (14-17). Is this sufficient to claim that the two different approaches are comparable in terms of oncologic result? Probably not!

The most important measure of lung cancer treatment efficacy should be survival (18) and therefore new studies comparing survival after conventional versus uniportal VATS are impatiently awaited. Essential mainstay to produce good papers with convincing long-term survival rates should be the creation of shared national or even international databases after mutual agreement on definitions of all clinical parameters.

And last but not least, providing high-quality care while containing cost is a key point in order to ensure economic stability of the health care system.

Is the uniportal VATS more expensive than triportal VATS?

Actually, it depends on the surgeon! It’s possible to find on the market many instruments and energy devices dedicated for uniportal with the intention to make the procedure easier. Beyond any doubt, the use of special instruments and expensive energy devices along with high definition video tower could simplify the switch from the open or multiportal lobectomy to the uniportal approach. Following this path, the answer to the abovementioned question is “Yes, of course!” but maybe it could be better, especially in the early phase of the learning curve, to perform the uniportal approach using well known “old” instruments thus avoiding the weirdness arising from the simultaneous presence of a new technique with new

instruments.

In the light of the above, the uniportal VATS is non-inferior to the multiportal conventional approach and is a safe procedure in skilled hands but further studies, especially randomized controlled multicenter trials, are needed to enhance our knowledge about survival data. Moreover, in order to offer always the safest surgical procedure to our patients, a structured and rigorous training should be offered to all the surgeons willing to start the path of uniportal VATS.

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### Footnote

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

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