Editorial

What is the optimal way to succeed in uniportal VATS?

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The video-assisted thoracoscopic surgery (VATS) approach is currently recommended as the surgical approach of choice for lung resection in early-stage non-small cell lung cancer (NSCLC) in international guidelines (1,2). The benefits of VATS technique are well described compared to thoracotomy including less pain, shorter hospital-stay, better quality of life, better cosmesis, an attenuated inflammatory-immune response and even better overall survival (3).

Since the first publication by Migliore (4,5) in 2000, the uniportal VATS (UVATS) has arisen as a convincing alternative to the multiport VATS (MVATS) approach to patients with NSCLC (6-8), especially soon after Gonzalez-Rivas carried out the first UVATS lobectomy (9) in 2010. From that time, thoracic surgeons have succeeded to perform more and more challenging thoracic procedures (10,11) and have included this approach as an additional resource to the conventional 4, 3 or 2 port VATS technique. It is therefore inevitable that providing more surgical options has complicated the debate on the optimal approach to lobectomy and consequently, UVATS has been under the spotlight and scrutiny.

Those who endorse the technique argue that UVATS potential advantages include less pain from fewer intercostal space incisions, reduced morbidity and accelerated functional recovery when compared to conventional MVATS. Despite the publication of retrospective studies comparing UVATS and MVATS, high level evidence, particularly in the form of randomized trials is lacking (8,12-14). Thus, questions about the real advantages and the treatment efficacy of this approach remain unanswered.

It is remarkable that since UVATS was first described for anatomical pulmonary resection in 2011, the quantity and quality of evidence to support its use in lung cancer surgery remains limited. Among the articles identified as potentially relevant to UVATS lung cancer surgery, there are almost twice as many commentaries, editorials or letters than there are studies providing original data (12). In addition, case series and "how to do it" articles far exceed comparative studies with regards to UVATS for lung cancer. Far from being controversial, these data should be cautiously interpreted and put into context. First, being a relatively young technique, it seems logical that the initial publications consisted of case series and technical descriptions. Second, we believe that when it comes to cancer-related outcomes, follow-up is crucial in assessing the effectiveness of technique. Hence, taking into account the rather recent existence of the UVATS, it is not surprising that prospective studies on medium- and long-term survival are scarce.

That being said, what is the evidence one decade later? In a review and meta-analysis published in 2019 (8), there were no statistical differences found as for survival and recurrence, lymph node evaluation and pathological upstaging, length of hospital stay or cost-effectiveness. However, UVATS was associated with a decreased risk of adverse events when compared to MVATS, even if with respect to specific complications (rates of pneumonia, atelectasis and wound infection) there was no significant difference between both VATS modalities. At this point in time, the quality of the lymphadenectomy is still in the

spotlight (15,16). For that matter, even if fragmentation is sometime inevitable, we strongly advocate systematic lymphadenectomy by having each lymph node station removed *en-bloc*, namely the paratracheal and subcarinal stations. With regards to pain control, UVATS has been acclaimed by its advocates as the best approach to reduce post-operative pain (17,18). However, post-operative pain assessment may be easily biased by many potential misleading factors that are rarely taken into account when pain scores are documented. Unfortunately, instruments' diameter, location of the ports, whether they are in front or in the back, pre-peri and postoperative analgesic strategy how scores on a pain scale are been explained to patients, or the impact that enhanced recovery after surgery (ERAS) (19) programs might have, amongst other features, remain in the shadows. Finally, even there are no robust data reporting clear benefits of UVATS *vs.* MVATS, there is an important interest in to propose the least minimal invasive approach for lung cancer patients. However, this minimally invasive surgical approach demands a different dexterity compared to even conventional MVATS.

Like in other minimally invasive approaches, the UVATS for resectable NSCLC obeys the oncological principles of open surgery by means of anatomic dissection of individual vascular and bronchial structures and by complete radical lymphadenectomy (20).

In general, UVATS is the natural result of a gradual evolution from classical 4 or 3 port VATS, through 2 port VATS, to eventually UVATS (21). In fact, the breach between a conventional 3 port approach to a UVATS is big, resulting in several technical implications. First, the instruments and the scope are handled in a parallel fashion, mimicking the direct visualization that characterizes the classic open surgery. And second, both hands handle instruments coaxially via the same utility incision therefore it is essential to learn how to prevent conflict between instruments, notably to obtain an adequate retraction and exposure. Last but not least, the surgeon should realize how to apply the stapler always from the utility incision while maintaining an adequate exposure of targeted structures. Probably this last skill is the hardest to acquire, which leads us to believe that mentoring would decrease the number of difficult situations and would as well lighten the learning curve. However, although it is not usual, there are those who directly and successfully transitioned from classic open posterolateral thoracotomy to UVATS as reported by Aragón *et al.* (22). In his series the conversion rate was acceptable (9.8%) and mostly occurred during the first year, while obtaining excellent post-operative outcomes. Despite the transition from both open surgery or MVATS to UVATS is reported as safe and feasible, we believe that this passage involves some noteworthy difficulties. In our experience the most critical aspect in UVATS is exposure. Because there is only one incision the small tips and tricks result in big steps improving operative field (including the use of a 30° high definition thoracoscope and dedicated instruments). It is therefore a logical evolution to proceed in stages to master the skills one by one, making the surgeon gain experience and confidence, as well as making it safer for the patient. Accordingly, we feel that progressive adaption from multiport to UVATS seems the safest way to proceed.

Along the same lines, the recent contribution by Al-Ameri reports their experience of transition from MVATS to UVATS lobectomy in 122 patients (23). The major finding of this study was that UVATS lobectomy for lung cancer patients was feasible and could be safely implemented into the treatment program of lung cancer patients based on the premise of having previous MVATS experience. The postoperative complications were very rare regardless of surgical approach. However, as the latest reviews demonstrated (8,12), significant clinical advantages were not found in terms of complications or length of stay.

As a supplement to the aforementioned, we would like to dedicate a few lines to training. We strongly advocate to attend courses in high volume centers permitting whether to familiarize with the technique or to learn a specific skill in a short period of time. We believe that at the very beginning, it is better to learn from a mentor than from one's own mistakes which could lead to a premature cessation of the technique. Thus, we recommend inviting an experienced UVATS surgeon to provide on-site mentoring. It would allow to gain confidence and make technical progress while performing major pulmonary resection with no detriment to the patient.

And to conclude, a brief comment on numbers. We think that the surgical volume matters when adopting and mastering a new technique. Recently, the Uniportal VATS Interest Group of the European Society of Thoracic Surgeons, claimed that high-volume is mandatory for obtaining outstanding surgical outcome and advocates that a surgeon should perform at least 50 cases to gain adequate technical proficiency, and that at least 40 cases should be performed annually to maintain effective skills (24). Bearing

in mind that whether learning or mastering UVATS requires substantial commitment, and that is indivisibly linked to the number of surgeries performed, we recommend it's practice in high-volume centers.

Conclusions

Even to this day there is no strong evidence to support that transitioning to UVATS is worthwhile. It is very likely that forthcoming studies will shed light on and validate what many of us can currently foresee but not categorically claim, that is to say, that UVATS is equal (if not superior in certain aspects) to MVATS approach. The evolving approach from multiport to UVATS seems to be the key for the safe adoption of this least invasive technique. However, we believe that the effort required to learn UVATS may not be cost-effective for the surgeon if a high surgical practice is not guaranteed.

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Footnote

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