Important Technical Details During Uniportal Video-Assisted Thoracoscopic Major Resections

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KEYWORDS

• VATS • Single port VATS • Uniportal VATS • Lobectomy • Operative setup • Instrumentation

KEY POINTS

- Since it was first performed in 2010, lobectomy via a single port—uniportal video-assisted thoracoscopic surgery (VATS)—has become increasingly popular among surgeons.
- The uniportal approach requires a different skill set compared to conventional VATS. The parallel instrumentation achieved through this access mimics the maneuvers performed during open surgery.
- Surgeons experienced with a 2-port technique or with anterior thoracotomy approach will probably adopt the uniportal concept faster.

Video content accompanies this article at http://www.thoracic.theclinics.com.

INTRODUCTION

Since the first uniportal video-assisted thoracoscopic surgery (VATS) major pulmonary resection was performed in 2010,[1] the technique has been spreading worldwide.[2–4] As with other minimally invasive approaches, the uniportal VATS technique for all patients with resectable lung cancer follows the oncological principles of open surgery by anatomic dissection of individual vascular and bronchial structures, and by complete radical lymphadenectomy.[5]

The uniportal approach allows a direct visualization of the target tissue and of the pulmonary hilum from the front side. The parallel instrumentation achieved through this access mimics the maneuvers performed during open surgery, and this makes the movements of the surgeon more comfortable.[6–8] Therefore, surgeons experienced with the 2-port technique or with the anterior thoracotomy approach will probably adopt the uniportal concept more readily than those surgeons more used to the 3-port technique.

Because only 1 intercostal space is involved without rib spreading or muscle disruption, and because the incision is usually placed more anteriorly than with conventional VATS, some authors reported less postoperative pain, faster

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postoperative recovery, reduced duration of hospital stay, and potentially earlier administration of adjuvant therapy when necessary.[9,10]

However, there are several important technical details that must be learned to achieve successful outcomes. In this article, we analyze some common difficulties that thoracic surgeons could find in their common practice of this technique. We provide practical tips and tricks, and summarize the most important technical details to accomplish optimal exposure for an oncologic procedure.

GENERAL ASPECTS AND BASIC SURGICAL PRINCIPLES

Evolution in Instrumentation and Camera Placement

In recent years, the uniportal technique has evolved considerably, not only in the growing range of complex cases performed, but also in the fine details of the instrumentation. Initially, when we described the technique in 2010, the camera was not always in the same position within the uniport and multiple instruments often had to be used via the uniport at the same time because dedicated uniportal instruments were not then available.[1] The result was constant interference and fencing with the camera. Also, the incision was of a larger size (4–5 cm) to accommodate the multiple instruments.

Thanks to gained experience, the introduction of bespoke instruments and improvement in the image systems, we have refined the technique to produce a concept called "advanced instrumentation." It consists of simplifying the instrumentation using the fewest number of instruments: most of the surgery is now performed using a long, curved suction device in the left hand, and an energy device in the right hand. The shape of the long, curved suction device is ideally suited for use via a small uniport, allowing compression of structures, blunt dissection, retraction of tissues, and even support and movement of the lymph node package during lymphadenectomy. A dedicated endoscopic surgery energy device (using ultrasonic and/or diathermy energy) is fantastic, and can be used to dissect vessels, retract tissues, coagulate and cut structures, and even grasp organs in some occasions. This evolution in the instrumentation has allowed the size of the incision to be reduced considerably (2–3 cm at present) without interfering with the operating time or results (Fig. 1).

Experience also now confirms that one of the basic principles of uniportal VATS is to keep the camera always located at the top of the incision, and to introduce the instruments and staplers below the camera via the lower part of the wound.[11] Because human eyes are normally above the level of the hands, this arrangement allows for a more natural and ergonomic surgery: the camera provides a "top-down" view of the operative field, and the instruments are visualized coming into the field from the lower sides of the monitor view.

How to Localize the Correct Intercostal Space: Tips About the Incision

As a routine, the best location is usually in the fifth intercostal space, between the mid and anterior axillary lines.[11] For upper lobectomies—especially on the left—an incision that is too high (fourth intercostal space) gives a difficult angle for the insertion of the stapler for superior pulmonary vein division. The slightly anterior position of the incision provides a more anatomic instrumentation for the surgeon standing in front of the patient, and reduces the possibility of postoperative pain because of the naturally wider intercostal space anteriorly. On the right side, the fifth intercostal space

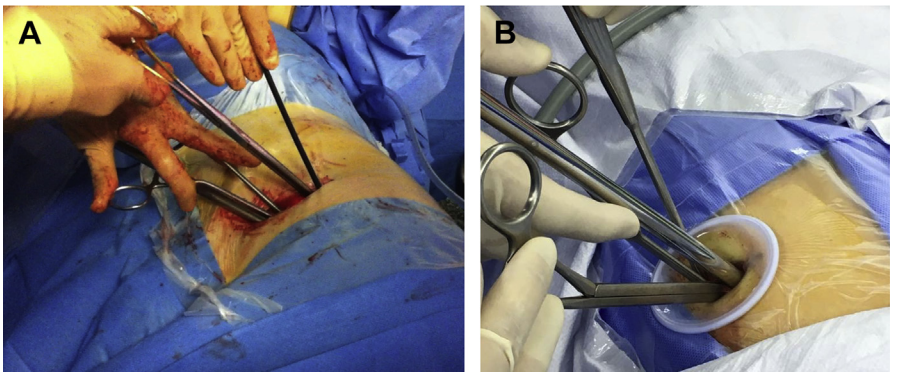

Fig. 1. External view of surgical technique during (*A*) the early period (2010), and (*B*) after 7 years of experience using advanced instrumentation (2017).