Single port video-assisted thoracic surgery: advancing scope technology

Calvin S.H. Ng*, Randolph H.L. Wong, Rainbow W.H. Lau and Anthony P. C. Yim
Department of Surgery, The Chinese University of Hong Kong, Prince of Wales Hospital, Shatin, Hong Kong, China

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We read with interest the article by Yang et al. [1] on the use of a flexible video endoscope for single-port video-assisted thoracic surgery (VATS) right upper lobectomy to improve space available for the operating surgeon and reduce fencing. The video endoscope their group described has great visual versatility, and can be utilized for multiple indications beyond those of thoracic surgery, for example as an aortic angioscope during aortic dissection surgery [2].

We had the experience of using both the flexible video endoscope and another type of wide-angled rigid thoracoscope (Endocameleon, Karl Storz, Germany) for single-port VATS lung resections [3]. The wide-angled rigid thoracoscope allows vision between 0° and 120° through a rotating prism mechanism at the tip that provides variable views. One disadvantage of the flexible video-endoscope design is that the curved scope tip can oc- casionally interfere with the instruments in the operating field, which may inadvertently damage the soft scope tip. Furthermore, unlike conventional thoracoscopes, the handle design for angle adjustment is more akin to a broncoscope, which may require a period of familiarization. The rigid 120° thoracoscope also has its shortcomings, being slightly wider than the flexible video endoscope for comparable visual resolution, hence occupying a larger proportion of the single incision. Although the choice of thoracoscope may play a role in facilitating single-port VATS lobectomy, to reduce instrument fencing and improve operating space during single-port VATS, the proper positioning of the instrument within the single incision and the maximal utilization of the 3D pleural cavity space with multiple angulated instruments may be more important [4].

Over the years, scopes have become narrower, and have more visual versatility and clarity to allow smaller surgical incisions and reduce interference with other instruments. The holy grail of scope design is a camera system that does not need to occupy the surgical incision, does not interfere with other instruments and provides multidirectional views. In the future, multiple small ‘remote’ wireless video cameras can be placed into the thoracic cavity, which are then held against the inner chest cavity by strong magnets, also known as magnetic anchoring and guidance systems (MAGS) camera, providing the ideal solution [5]. Although initially developed for single-incision laparoscopic surgery of the abdomen, ironically, MAGS may be more suited for surgery within the chest cavity because the rigidity of the chest wall provides more stability and less movement for magnetic anchorage when compared with the abdomen. We eagerly await further development and refinement of this technology.

REFERENCES


* Corresponding author. Division of Cardiothoracic Surgery, The Chinese University of Hong Kong, Prince of Wales Hospital, Shatin, N.T. Hong Kong SAR, China. Tel: +852-2632-2629; fax: +852-2637-7974; e-mail: calvinng@surgery.cuhk.edu.hk (C.S.H. Ng).


Reply to Ng et al.

Yunhai Yang, Feichao Bao, Zhehao He and Jian Hu*
Department of Thoracic Surgery, First Hospital, College of Medicine, Zhejiang University, Hangzhou, China

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We thank Ng et al. [1] for their insightful comments on our manuscript recently published in the European Journal of Cardio-Thoracic Surgery [2]. In the letter, Dr Ng and colleagues provided us with an in-depth view on advancing scope technology by addressing three important aspects of video-endoscopy, which we would like to discuss in detail.

The first issue mentioned was the choice of either the flexible video-endoscope or the rigid thoracoscope for single-port VATS lung resections. As mentioned in their Letter to the Editor, the flexible video-endoscope may occasionally interfere with other operating instruments, which may damage the soft scope tip; the authors also stated that a long period is required to gain sufficient familiarity with the flexible scope. Most of the thoracic surgeons—including camera assistants—in our centre have the advantages of professional skills and good experience in the aspect of bronchoscopy. Besides, we have performed lobectomy using a single-direction approach, which facilitates the procedure without repeated rotation of the scope and, during the procedure, the rigid part of the scope was at the incision, whereas the entire soft scope tip was put inside the thoracic cavity [3]. All of the above dramatically reduced the risk of damage to the soft scope tip by other instruments. Additionally, we prefer to use the flexible scope because its 5.4 mm diameter is considerably smaller than the 10 mm of our rigid one.

Another important issue is how to make best use of the single incision, as well as the three-dimensional pleural cavity space; this needs persistent innovation and improvement of surgical instruments. Apart from generally reducing their diameter, a multiple-angle stapler—facilitating the transection of vessels and bronchus—and a hollow scope that allows instruments to pass through, could make efficient use of the single incision.

In addition to this, proper positioning of the instruments at different stages of the operation makes it possible to conveniently carry out the resection via a single incision [4]. The inserted instruments were controlled by magnetic anchoring and guidance system (MAGS) through a coupling with an externally held magnet [5]. Preclinical in vivo models showed that MAGS greatly decreased surgeon workload and improved ergonomics, and was especially well suited to either single-port laparoscopic surgery or natural orifice transluminal endoscopic surgery (NOTES) [5]. We agree with Dr Ng’s team that MAGS promises show in thoracic surgery, few research work has been done on the subject; besides, further platform development and optimization are warranted—for example, in assessing the distance at which available instrument prototypes can be used and also to develop new ones that can work in overweight patients [6].