Editorial

Precise and fast video assisted thoracoscopic bronchial sleeve resection

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Abstract: Surgical management for lung cancer is basically a destructive one. The lung parenchyma removed is in the balance between the purpose of curative resection and the preservation of patient's lung function. Bronchial sleeve has been alternatively developed to achieve the same purpose, but through a different way—to save back healthy lung tissue through reconstruction of the central airway. Sleeve resection had been done with open technique for years, and just like the other thoracic operations, has continuously evolved into the era of minimally invasive surgery in spite of its difficulty. With rapid advancement and availability in technology—high resolution 3-D dynamic chest computed tomography (CT), PET-CT, and endobronchial ultrasound (EBUS), these tools are very helpful for us to have more precise tumor staging, and suitable for preoperative surgical planning. Under magnified 3-D endoscopic view and modified endoscopic suturing method, re-anastomosis of the airway could be easier and quicker, which would facilitate this innovative operation to accumulate experience in the not too distant future.

Keywords: Video assisted thoracoscopic surgery (VATS); bronchial sleeve resection

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Lung cancer surgery is fundamentally a destructive operative approach. From pneumonectomy to lobectomy and/or sub-lobar resection, the effort is directed towards removal of relevant lung tissue in order to preserve more functional capacity for the patients. With the lung cancer localized in the central region of the lung, a bi-lobectomy or even pneumonectomy is traditionally performed. As a result, lots of healthy lung distal to the tumor would be sacrificed; yet a sleeve resection procedure has emerged as another standard treatment of choice with similar oncological results, but with much better pulmonary reserve. In this particular type of surgery, it is no longer considered entirely destructive, but also reconstructive, and therefor it comes with the issues concerning technique and complications associated with the reconstruction procedure.

A successful sleeve resection is surgically challenging. The keys to success include an accurate preoperative configuration of tumor invasiveness and intra-operative delicate technique both for resection and reconstruction, especially the suturing technique on the bronchial anastomosis with major pulmonary vessels nearby. Accordingly, a sleeve resection was ranked high on the top skill-demanding surgery, and often being done in open surgery in the past. In the recently published articles by Dr. He's series (1,2), the technique for sleeve resection has evolved from open to hybrid and eventually video assisted thoracoscopic surgery (VATS); while the bronchoplasty sites varied from bronchus to half carina, and all these operations achieved satisfactory perioperative outcomes.

Endoscopic suturing technique is particularly important in sleeve resection. It is not uncommon to notice that in a thoracic training program, there are very limited opportunities for laparoscopic skills, especially the endoscopic suturing. In spite of this limitation, the thoracic surgeons often use a utility incision on the chest wall which allows the space for using traditional instruments; however,

endoscopic suturing sometimes works very well especially in a narrow space, as found in single port technique. Moreover, a modified traditional needle holder with extracorporeal ties may also work well. The traditional telescopic interrupted suturing is feasible and applicable via an open technique in the past. With the advanced experience from lung transplantation, a continuous suturing is now considered as an easier and less time-consuming way of doing the bronchial anastomosis as shown in Dr He's series. Through this technique, surgeons no longer need to pass the needle into the anastomosis site with so many threads nearby. The anastomosis related complications such as leakage or stenosis are also low. Another characteristic part of bronchial sleeve operation—covering the anastomosis site with muscle flap or pedicled pericardial flap, is controversial; as some surgeons consider sleeve resections without muscle flap are safe even after neoadjuvant therapy (3). The tissue glue or mesh is not yet well proven in protecting the anastomosis; however, its usage has been applied around the anastomosis during operation, and also used for managing anastomosis leakage after operation (4).

What have we achieved from transforming an open bronchoplastic procedure into a complete VATS technique? The benefits are like other VATS procedures for the patient, e.g., reduction of trauma and less pain, rapid regain of daily activities, and ability to receive adjuvant treatment whenever indicated; however, from the oncological point of view, a meticulous preoperative staging and a careful resection and reconstruction cannot be overemphasized. With advancement in technology, a dynamic high-resolution 3-D CT enables us to do accurate preoperative simulation for the patients (5), and an EBUS with magnified endoscopic view can detect tumor invasiveness inside the tracheobronchial tree before surgery. Many magnified 3-D image video systems available on the market would enable the surgeons to regain the distance difference lost in the traditional 2-D image system—just like the 3-D image equipped in a robotic system, but the cost is much lower. The total operation time could even been shortened if we use continuous suturing and absorbable sealing material such as tissue glue, without muscle flap wrapping around the anastomosis in selected cases. In summary, VATS bronchial sleeve resection could be done with a precise surgical planning; and it is possible to shorten the operation time with modified instruments and suturing techniques. We look forward to anticipate a good long-term oncological results and higher utilization rates of this technique within the chest surgery society in the future.

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