

Thoracoscopic tracheal resection and reconstruction using two ports approach

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Abstract: Tracheal resection and anastomosis for benign and malignant tracheal disease are a well-described procedure. Intra-thoracic tracheal lesions used to be addressed through sternotomy, thoracotomy, or via combined techniques. In the recent decade, minimal invasive surgical techniques have become an innovative trend in treatment of surgical thoracic conditions. Some recent papers have described and proven the feasibility and safety of tracheal and carinal surgeries via 3–4 port video-assisted thoracoscopic surgery (VATS) approaches. Even better results regarding morbidity and mortality were achieved using these new techniques. In this article, we publish a video that demonstrates our technique in tracheal resection and reconstruction using two portal thoracoscopic techniques.

Keywords: Video-assisted thoracoscopic surgery (VATS); tracheal resection and reconstruction; two portal approach; tracheal tumors

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Introduction

Although thoracotomy with or without sternotomy was historically considered the “gold standard” approach for intrathoracic tracheal tumor resections (1). The improvements of video-assisted thoracoscopic surgery (VATS) techniques, development of the technology of full HD endoscopic equipment, and new designed thoracoscopic instruments have recently changed this concept. Several reports on the feasibility and safety of thoracoscopic tracheal surgeries were published recently (2–6). Based on our experience in uniportal and multiportal VATS in a very high volume center we decided to perform a case of tracheal resection and reconstruction using two ports only, we herein describe our innovative technique in performing this procedure.

Patient selection and workup

Tracheal resection and reconstruction are a procedure which is commonly performed in benign tracheal conditions as post-intubation tracheal stenosis as well used to be performed for tracheal neoplasms. A 37-year-old female presented to

our department with history of worsening cough for the last 2 months in addition to increasing shortness of breath and wheezing. CT scan revealed 1.5 cm × 1 cm × 1.5 cm lesions in the distal part of the trachea just above the carina (*Figure 1*), no invasions to the surrounding structures or lymphadenopathy were noted. Trials to perform a bronchoscopic guided biopsies failed multiple times due to respiratory compromise during the procedure, thus a decision was made to resect the tumor via the minimal invasive approach.

Preoperative preparation

The operation was scheduled to be performed with a minimally invasive technique. The patient was intubated with a double lumen endotracheal tube (32 Fr), CVP line, arterial line, and urinary catheter was inserted before beginning of the surgery.

Equipment performance card

Full HD thoracoscopic camera (Karl Storz®), Cross-field

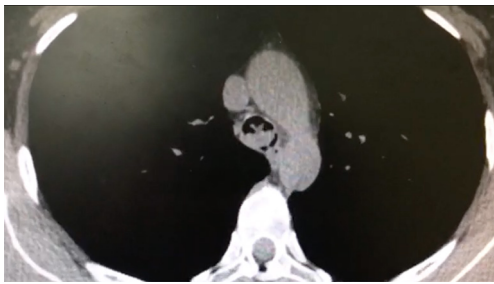


Figure 1 Preoperative CT scan showing a tumor in the distal part of the trachea



Figure 2 Two portal video-assisted thoracoscopic tracheal resection and reconstruction (7).

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ventilation tube special for this kind of surgery, special instruments designed for VATS surgery, wound protectors, Endo GIA staplers (Ethicon Inc., Someville, NJ, USA®), and Prolene Sutures.

Procedure (Figure 2)

After general anesthesia and endotracheal intubation, the patient was positioned on left lateral decubitus position, a 3.5 cm incision was performed at the mid axillary line of the 4th ICS. After inspecting the pleural cavity we divided the arch of the azygos vein using two (Endo GIA staplers (Ethicon Inc., Someville, NJ, USA®). The pleura were opened over the trachea which was then dissected and encircled. An additional 1.5 cm incision was performed at the anterior axillary line of the 2nd ICS. After cutting the distal part of the affected tracheal segment, the oral endotracheal tube was withdrawn and a cross-field ventilating tube was advanced into the trachea through the 1.5 cm incision (Figure 3). The affected tracheal segment

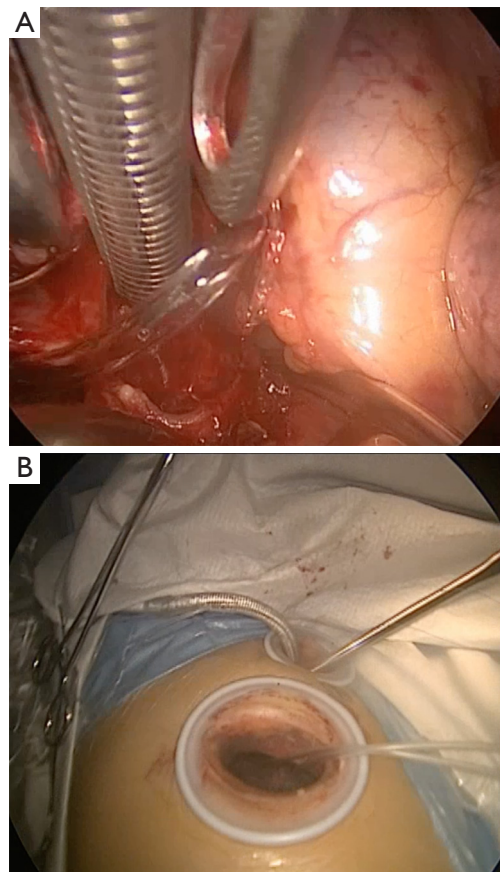


Figure 3 Cross-field ventilation tube.



Figure 4 Removal of the tumor with retrieval bag.

was excised and removed out of the thoracic cavity using a retrieval bag (Figure 4). The negativity of the surgical margins was confirmed by frozen section. Reconstruction anastomosis was started at the posterior wall of the trachea

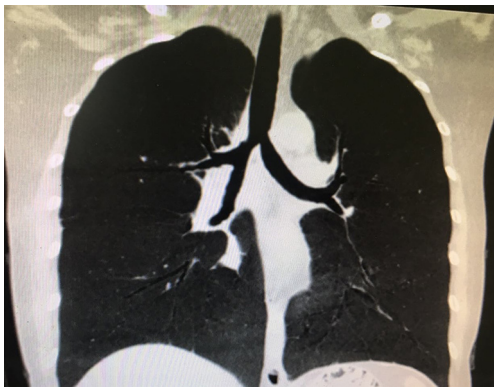


Figure 5 Postoperative CT scan (8 months after the surgery).

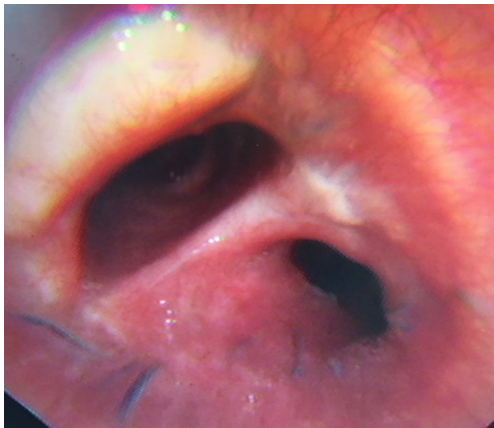


Figure 6 Postoperative bronchoscopy (8 months after the surgery).

using 3-0 prolene running sutures. Once the posterior wall of the anastomosis was completed the cross-field tube was removed, and the oral endotracheal tube was advanced to the distal part of the trachea. After completion of the anastomosis, an air leak test was performed to confirm the competency of the anastomosis. Two intercostal chest drains were inserted inside the pleural cavity, and the incision was closed in layers. Chin's stitch was performed in order to restrict the cervical movement and was removed five days after the operation.

Total operation time was (120 minutes), and the time of airway reconstruction was (30 minutes), estimated blood loss was (50 mL).

Post-operative management

Chest drains were removed in the POD 4, postoperative course was uneventful and the patient was discharged

home in POD 7. Follow up CT and bronchoscopy were performed 8 months after the operation (*Figures 5,6*) confirmed patent airway and no recurrence of the tumor. The patient was in a good general condition and asymptomatic in a clinic visit 8 months after the surgery.

Tips and tricks

- ❖ Excision of arch of the azygos vein facilitates the procedure providing much better exposure to the trachea;
- ❖ Placement of the cross-field ventilation tube is preferred to be in the 2nd ICS so as not to interfere with the instrumentation;
- ❖ Removal of the cross-field ventilation tube after the completion of the posterior wall anastomosis and then advancing the oral endotracheal tube can make the anastomosis of the anterior part easier.

Conclusions

Minimal invasive tracheal resection and reconstruction using 2-port VATS technique is feasible and safe, with excellent post-operative results. According to our knowledge, this procedure is the first reported tracheal resection using the 2-port technique.

Acknowledgements

None.

Footnote

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

Informed Consent: Written informed consent was obtained from the patient for publication of this manuscript and any accompanying images.

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