Closure of a Postpneumonectomy Main Bronchus Fistula Using Video-Assisted Mediastinal Surgery*

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Disruption of a mainstem bronchus is a rare but dreaded complication of pneumonectomy. After an anatomic study on cadavers, we successfully used a video mediastinoscope to close a postpneumonectomy main bronchus fistula via a cervical incision.

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Although the incidence of postpneumonectomy bronchopleural fistula has decreased in recent years, this life-threatening complication remains a major challenge. It requires early diagnosis, leads to prolonged hospitalization, and is often fatal despite extensive and sometimes multiple surgical procedures.1

The conventional therapeutic strategy is chest tube drainage followed by one of the following procedures: suture of the fistula through the previous thoracotomy incision;1 open window thoracotomy;2 intrathoracic transposition of extrathoracic skeletal muscle3 or of the omentum; anterior transpericardial closure of the main bronchus via a sternotomy in patients with a bronchial stump; and irrigation of the pleural cavity via two chest tubes.6

After an anatomical and experimental study on cadavers designed to test the technical feasibility of left and right main bronchus fistula closure using video-assisted mediastinal surgery (VAMS), we used this technique successfully in a patient with a fistula of the left main bronchus. To our knowledge, this is the first such case reported to date.

CASE REPORT

A 68-year-old man underwent left pneumonectomy via a standard posterolateral thoracotomy for squamous cell carcinoma of the upper lobe of the left lung which was invading the distal main bronchus.

Twenty-two days after the operation, he was admitted to our emergency care unit after he experienced profuse vomiting suggestive of a bronchopleural fistula. After insertion of a chest tube to drain the pleural cavity, bronchoscopic examination was done and showed partial disruption of the left main bronchus closure. Because there was a 2-cm long left bronchial stump, we elected to close the main bronchus fistula by VAMS.

After connection of the chest tube to a 15 mm Hg suction pump, single-lumen tube intubation was performed, and general anesthesia was administered. Via a short cervical incision similar to that used for mediastinoscopy, the trachea was dissected down to the carina. Using a video mediastinoscope (Karl Storz; Tuttingen, Germany), we released the posterior part of the main bronchus and the carina. We stapled the left bronchial stump using an endostapler TA 30 suture device (Autosuture Products [USSC]; Norwalk, CT [Fig 1]).

Video thoracoscopy was then performed to toilet the pleural cavity and to insert an irrigation drainage system. The cervicotomy was closed in the usual manner. Recovery was uneventful. The pleural space was irrigated daily with saline solution and an antiseptic solution.

Key words: bronchopleural fistula; mediastinoscopy; video-assisted surgery

VAMS=video-assisted mediastinal surgery

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Figure 1. Closure of a left bronchial stump using an autosuture device (Endo TA 30) via a short cervical incision similar to that used for mediastinoscopy. Ao=aorta; RPA=right pulmonary artery; LMB=left main bronchus.
One month after the procedure, closure of the fistula was confirmed by bronchoscopy, and the drainage system was removed after pleural cultures showed no growth of pathogens. Six months later, the patient was doing well without any evidence of recurrence.

COMMENT

The mediastinal cervical approach to the distal trachea and mainstem bronchi for closure of postpneumonectomy bronchial fistulas has several advantages over the transpericardial approach through a sternotomy incision or the conventional lateral approach through a thoracotomy incision. First, dissection of the trachea is performed through a natural route of access that is widely used for mediastinoscopy, in relatively unscarred tissue, facilitating mobilization and closure of the bronchial stump. This VAMS technique is possible thanks to the existence of the endostapler TA 30 but requires extensive training in endoscopic procedures. Second, the operative field is sterile and at completion of fistula closure is closed off from the contaminated pleural space. This reduces the risk that infection might jeopardize healing of the bronchial closure, as occurs with the open thoracotomy technique. Third, as compared with sternotomy, the VAMS technique induces considerably less tissue trauma and does not carry a risk of bone infection. Fourth, successful fistula closure simplifies subsequent management of the pleural space.

Unfortunately, repair via the mediastinal cervical approach may not be feasible in all patients with postpneumonectomy fistula because it requires a bronchial stump length of more than 12 mm. Accurate measurement of bronchial stump length is therefore crucial when evaluating the feasibility of this approach. Furthermore, it is conceivable that in some patients rigid fibrosis and tight adhesion of the inflammatory pleural membrane to the lower trachea and carina may render use of a stapling device difficult or impossible.

CONCLUSION

We conclude that closure of a main bronchus fistula using VAMS in patients with a short bronchial stump is a promising technique that deserves further development. However, the emphasis should remain on strict observance of the classic rules of thoracic surgery to prevent this dreaded complication.

REFERENCES