Case report

Video-mediastinoscopic resection of a long bronchial stump and reclosure of bronchial insufficiency after pneumonectomy

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Abstract

Bronchial stump insufficiency after pneumonectomy is a severe problem and there is still debate about the appropriate method (transthoracic or transsternal) for reclosure. Access through a sterile operative field for a successful redo-procedure seems to be important so an alternative to the open methods could be the video-mediastinoscopy as it allows approaching the bronchial stump via the mediastinum. Previously in 1996 Azorin performed the first mediastinoscopic reclosure by stapling an early insufficiency after left pneumonectomy. We report the first case to our knowledge of resection and reclosure in bronchial stump insufficiency via mediastinoscopy. An HIV-positive man presented with late bronchial stump insufficiency after left pneumonectomy for lung cancer. The cause was a long bronchial stump and there was no sign of tumour recurrence. Decision was made for a video-mediastinoscopy and resection and reclosure successfully performed by using an endostapler device. Postoperative bronchoscopy at six months revealed a well-healed stump and two years postoperatively the patient is doing well. The mediastinoscopic approach is a novel option in highly selected patients. It warrants minimal surgical trauma; however, one has to be prepared to convert to an open technique immediately.

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1. Introduction

Bronchial stump insufficiency after pneumonectomy is a severe problem with high mortality rates. The risk of dehiscence increases with the length of the residual bronchial stump because blood supply is provided via bronchial arteries coming from the trachea. Therefore resection of the bronchus close to the tracheal level is mandatory. However, if bronchial insufficiency has occurred, reoperation with resection of a long stump and reclosure is warranted. There is still debate about the appropriate method (transthoracic or transsternal), but authors who favour transternal closure stress the importance of access through a sterile operative field for successful redo-procedure [1]. As the associated infection is generally limited to the chest cavity, approaching the bronchial stump via the mediastinum seems to be an alternative.

Video-mediastinoscopy has developed into an operative procedure that nowadays offers more than just staging of lung cancer. For the skilled surgeon with excellent anatomical knowledge many operations in the mediastinum are possible. Azorin et al. [2] were the first to describe a mediastinoscopic approach for closure of a bronchopleural fistula early after pneumonectomy by stapling, a technique also used by Venissac et al. in 2006 [3]. We report the first case to our knowledge of resection and reclosure in bronchial stump insufficiency via mediastinoscopy.

2. Case report

A 65 year old, HIV-positive man presented with empyema of the left thorax. Eighteen months prior to admission he had undergone left pneumonectomy with chest wall resection for squamous cell carcinoma (pT3N0R0G3) in another hospital. Fifteen months later, bronchial stump insufficiency was diagnosed. Reoperation was tried but resulted in laceration of pericardium with ventricular fibrillation and resuscitation, so only a thoracic drain was placed. At presentation at our hospital, the drain was still in place. Laboratory values indicated ongoing severe infection as well as a high HIV virus load. Bronchoscopy revealed a 5 cm long bronchial stump with insufficiency at the level of the former lower lobe bronchus whereas the upper lobe bronchus had healed well. To control the infectious situation an open window thoracostomy with resection of the chest wall patch was performed. This resulted in normalisation of laboratory values, virus load and CD4/CD8 titer as well as weight gain over the next months.
He was readmitted for closure and resection of the long bronchial stump. Because initially neither mediastinoscopy was performed nor the main bronchus or its lymph nodes were dissected according to the operative report, we decided for a mediastinoscopic approach and a staged thoracomyoplasty. Informed consent was achieved from the patient who was thoroughly informed that this procedure has not yet been performed but that the operating surgeons had ample experience with video-mediastinoscopy.

Using the video-mediastinoscope (Richard Wolf Company; Knittlingen, Germany) with spreadable blades, dissection of the mediastinum was started along the trachea and oesophagus with removal of all lymph nodes. The pulmonary artery was widely freed from the bronchi and the carina. Neither the left main bronchus nor the carina showed any adhesions indicating former manipulations. They were released and the left main bronchus encircled with VATS instruments. A silicon tube placed around the bronchus facilitated the advancement of the stapling device. The left main bronchus was stapled using a 30 mm endostapler (EndoGIA Roticulator, Autosuture, Tyco Healthcare, Germany). In order to avoid opening of the mediastinum into the infected chest cavity, the stump was left in place. Recovery was uneventful without signs of mediastinitis. Bronchoscopies 2 and 4 weeks postoperatively showed a good result (Fig. 1). Pathology reported no lymph node involvement or recurrence of the tumour. Four weeks later, the residual bronchial stump was removed via the thoracostomy and thoracomyoplasty was performed (Fig. 2). The patient recovered well, bronchoscopy at three and six months revealed a well-healed bronchial stump. Two years postoperative the patient shows no recurrent infection and his HIV-virus load is still not measurable.

3. Comment

The high mortality of bronchial stump insufficiency following pneumonectomy has forced thoracic surgeons to think of ways of reclosure in order to save the patient’s life. Padhi and Lynn [4] in 1960 developed the transpericardial approach, in 1961 Abruzzini described the transsternal approach [5], which was made popular by Perelman and Ambajello [6] and gained wide acceptance, especially in Europe. Arguments against the transsternal closure were mainly related to the risk of spreading infection to the sternum and the invasiveness of the procedure. To reduce surgical trauma Spaggiari et al. in pathological studies developed a video-assisted variation of the Abruzzini technique with combination of video-mediastinoscopy, anterior mediastinotomy plus thoracoscopy [7]. In 1996 Azorin performed the first mediastinoscopic reclosure by stapling an early insufficiency after left pneumonectomy. With VATS debridement and irrigation of the pleural cavity the patient recovered well [2]. Venissac et al. were successful with similar mediastinoscopic stapling in one of two patients in 2006 [3].

Since the first description by Carlens in 1959 [8], mediastinoscopy has become a standard procedure in staging of lung cancer. The invention of the video-mediastinoscope with spreadable blades by Linder and Dahan in 1992 allowing bimanual preparation opened up new possibilities. Since then this new technique has been used extensively for exploration of the mediastinum, resection of cysts and tumours. Starting in 1999, Hürten developed the technique of VAMLA (video-assisted mediastinoscopic lymphadenectomy) by which a complete dissection of mediastinal organs is performed with subsequent resection of all lymph nodes [9]. We have used VAMLA since 2001 [10] and with this wide experience decided on the unusual way of resection of a very long bronchial

Fig. 1. Well-healed bronchial stump 2 weeks after mediastinoscopic closure.

Fig. 2. Surgical specimen of the resected residual bronchial stump (lower edge shows the staple line from the mediastioscopic closure, upper edge the orifices of the former upper and lower bronchus).
stump in this particular patient. Because of his former experience with the rethoracotomy, he was reluctant to undergo another major surgical procedure (sternotomy) and also the risk for the operating team in this HIV-positive man called for a less invasive approach. Positive factors influencing our decision were the virgin mediastinum that had not received surgical dissection and that no radiation therapy had been applied. Immediate sternotomy would have been possible anytime during the procedure as alternative option for resection or in the case of haemorrhage.

The mediastinoscopic approach for bronchial stump closure and resection after pneumonectomy is a novel option in highly selected patients. It warrants minimal surgical trauma, however, the skilled surgeons with ample experience in mediastinoscopy have to be prepared to convert to an open technique immediately.

References


