Case Report

Successful Use of Mediastinal Repositioning Employing PTFE Sheet for Right-Sided Post-Pneumonectomy Syndrome

Masao Chujo, MD,1 Kentaro Anami, MD,1 and Katsunobu Kawahara, MD2

Post-pneumonectomy syndrome (PPS) is a rare late complication of pneumonectomy, and diverse treatments have been employed. We herein present a useful technique for right-sided PPS. The patient was a 53-year-old female who underwent a right pneumonectomy for locally advanced squamous cell lung cancer (pT2N2M0). Mild dyspnea and stridor developed and progressed 1 year after surgery. A chest roentgenogram and computed tomography (CT) scan showed a right-sided mediastinal shift. Under local anesthesia, a chest tube with a balloon was inserted into the right thoracic cavity, and the balloon was inflated with air. Dyspnea and stridor improved and disappeared as the balloon expanded. Then, mediastinal fixation was performed under general anesthesia. Mediastinal fixation involved a PTFE (polytetrafluoroethylene) sheet which was sewn on the sternum and costal cartilage anteriorly, on the vertebra posteriorly, and covered the azygos vein level superiorly and two thirds of the pericardium inferiorly using nonabsorbable sutures. A post-operative chest roentgenogram and CT scan showed improvement of the right-sided mediastinal shift. The post-operative course was uneventful, and dyspnea and stridor were improved and became stable. In conclusion, the presented method is a useful procedure for right-sided PPS.

Keywords: post-pneumonectomy syndrome, mediastinal repositioning, mediastinal fixation

Introduction

Post-pneumonectomy syndrome (PPS), a rare, late complication of pneumonectomy, is characterized by shift and rotation of the mediastinum to the pneumonectomy side, which leads to stretching and compression of the remaining bronchus. In the past, diverse treatments were employed. We herein present the useful technique of mediastinal repositioning using a PTFE (polytetrafluoroethylene) sheet for right-sided PPS.

Case Report

The patient was a 53-year-old female who underwent a right pneumonectomy through a thoracotomy for locally advanced squamous cell lung cancer at 51 years of age. The post-operative classification was pT2N2M0 (stage IIIA). Post-operative recovery was uneventful. However, mild dyspnea and stridor developed approximately 1 year after surgery, and her symptoms progressed. A chest roentgenogram and CT scan showed a right-sided mediastinal shift compared with the X-ray taken 1 year previously. Under local anesthesia, a 20-mm incision in the seventh intercostal space at the right middle axillary line was made and a chest tube with a balloon was inserted into the right thoracic cavity, and the balloon was inflated with air. Dyspnea and stridor improved and disappeared as the balloon expanded. Then, mediastinal fixation was performed under general anesthesia. Mediastinal fixation involved a PTFE (polytetrafluoroethylene) sheet which was sewn on the sternum and costal cartilage anteriorly, on the vertebra posteriorly, and covered the azygos vein level superiorly and two thirds of the pericardium inferiorly using nonabsorbable sutures. A post-operative chest roentgenogram and CT scan showed improvement of the right-sided mediastinal shift. The post-operative course was uneventful, and dyspnea and stridor were improved and became stable. In conclusion, the presented method is a useful procedure for right-sided PPS.
Chujo M, et al. (Phycon Inc., Oklahoma, USA) was inserted into the right thoracic cavity employing an open technique. The closed trocar technique was avoided because this method risks injuring the shifted mediastinum. The balloon was inflated with air while monitoring the central venous pressure. The central venous pressure was monitored to avoid overcorrection of the mediastinal repositioning. The balloon size was checked by fluoroscopy. Dyspnea and stridor improved and disappeared as the balloon expanded. A chest roentgenogram showed resolution of the mediastinal shift (Fig. 1b). Due to the fact that pressing of the mediastinum with the balloon was effective for symptom improvement, mediastinal fixation was performed under general anesthesia. Intratracheal tubing was performed while the inflated balloon was inserted into the thoracic space, and the patient was placed in a left decubitus position. The chest tube with balloon was removed. A right mini lateral thoracotomy was performed. The extended pericardium was sewn and shortened. Mediastinal fixation was performed employing a PTFE sheet (2.0 mm in thickness), which was sewn on the sternum and costal cartilage anteriorly, on the vertebra posteriorly, and covered the azygos vein superiorly and two thirds of the pericardium inferiorly using nonabsorbable sutures (Fig. 3). As the left main bronchus was visualized on flexible fiberoptic bronchoscopy, improved airway patency was demonstrated bronchoscopically. The chest tube with balloon was inserted again, and the operation was completed. A post-operative chest roentgenogram and CT scan showed the improvement of the right-sided mediastinal shift (Fig. 2b). The post-operative course was uneventful, and dyspnea and stridor improved and became stable after the chest tube with balloon was removed. However, the lung cancer was recurrent, and she died about 6 months after the operation for mediastinal fixation.

Fig. 1 (a) Chest roentgenogram showing right-sided mediastinal shift. (b) Chest roentgenogram showing resolution of the mediastinal shift.

Fig. 2 (a) Computed tomography (CT) scan showing right-sided mediastinal shift. (b) CT scan showing improvement of the right-sided mediastinal shift on balloon inflation.
Mediastinal Repositioning for Post-pneumonectomy

Discussion

PPS is a rare clinical entity characterized by compression of the distal trachea or proximal bronchi against the descending aorta or thoracic spine. PPS usually appears months or even years after surgery. It is exceptionally observed and the reasons for its occurrence in some patients are unknown. It is generally believed that PPS occurs more frequently in children and young adults because of increased mobility of the mediastinum and higher elasticity and compliance of the remaining lung, allowing hyperinflation.

A wide variety of treatment options have been described for these patients, ranging from simple bronchial stent insertion to aortic division and bypass grafting, in addition to mediastinal repositioning. Currently, the most common approach involves a thoracotomy, mediastinal repositioning, and the insertion of saline-filled prostheses. In regard to bronchial stenting, consideration should be given to the possibility of future stent migration or erosion. In addition, the use of self-expanding stents for benign conditions often leads to further complications with obstruction secondary to granulation tissue. The repositioning and placement of intrapleural prostheses seem to be superior to other methods of correction. Published reports describing the use of prostheses appear in most often use approximately 1 liter of fluid. However, consideration should be given to the possibility of infection, or the deterioration or migration of prostheses. Caution is particularly necessary if large-volume prostheses appear to be required to maintain the mediastinal position.

We performed mediastinal repositioning using a PTFE sheet in this case. There is no anxiety over the migration of prostheses because our presented method does not use expandable prostheses. At first, the chest tube with balloon was inserted under local anesthesia in this method. This first procedure does not require general anesthesia, and can be used to evaluate the mediastinal flexibility and improvement of symptoms easily. If there is no mediastinal flexibility or improvement of symptoms, mediastinal fixation is not indicated. However, if there is mediastinal flexibility and symptom improvement, mediastinal fixation is performed, along with the insertion of saline-filled prostheses. It is straightforward to perform this procedure under general anesthesia because the mediastinal shift is corrected by the chest tube with an inflated balloon.

Soll, et al. reported fixation of the mediastinum with a xenopericardial graft, an infection of the pericardial patch occurred, and the patch was removed 5 months later. In our case, the patient died due to the recurrence of lung cancer about 6 months after mediastinal fixation. Therefore, the long-term effect of this procedure is uncertain.

In conclusion, the presented method is a useful procedure for right-sided PPS, and may be an alternate procedure for it.

Disclosure Statement

We declare that there are no conflicts of interest associated with this report.

References