Local anaesthetic thoracoscopy for intractable pneumothorax in a high-risk patient

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Abstract

The management of high-operative-risk patients with a pneumothorax is complicated. The case of a 79-year old man with an intractable secondary pneumothorax, who had taken oral steroids to control asthma, is presented. Since the patient could not tolerate general anaesthesia because of poor cardiac function, thoracoscopic surgery was performed under local anaesthesia. A successful lung fistula closure was achieved and the continuous air leakage disappeared immediately after the surgery.

Keywords: Pneumothorax • Thoracoscopy • Local anaesthesia

INTRODUCTION

Surgical intervention is the first choice treatment for a pneumothorax that does not improve with conservative treatment. Because most such cases involve a secondary pneumothorax caused by potentially lethal conditions, surgical treatment poses a significant risk, particularly in patients with poor cardiopulmonary reserve. A case of intractable left pneumothorax with a high operative risk, successfully treated by video-assisted thoracic surgery (VATS) under local anaesthesia, is reported.

CASE REPORT

A 79-year old male, who had been on long-term oral steroids to control asthma, was admitted to our hospital with a 5-day history of a gradually deteriorating wheeze. He had recovered from a cardiopulmonary arrest induced by a severe aortic valve stenosis and myocardial infarction that had occurred while being treated for pneumonia 3 years earlier. A chest X-ray showed a left pneumothorax, and chest computed tomography (CT) showed diffuse emphysema and multiple apical bullae with adhesions to the chest wall. Although chest drainage improved his wheeze, suction pressure was gradually increased from 0 to 10 cmH2O because the collapsed lung did not expand, and subcutaneous emphysema occurred. When there was a small amount of re-expansion, pleurodesis was performed several times with autologous blood, minocycline and OK432, because the patient was judged to be unable to tolerate general anaesthesia due to severe aortic valve stenosis (pressure gradient 63.9 mmHg) and poor cardiac function (left ventricular ejection fraction 40%). However, it had no effect. Finally, an additional drain tube was inserted and suction pressure was changed from 0 to 20 cmH2O according to the degree of expansion of the collapsed lung. It resulted in failure and deterioration in his activities of daily living and nutritional status. Additional pleurodesis was eventually abandoned, and VATS under local anaesthesia was performed on the fifth day after starting the administration of human factor XIII. Before the operation, the vital signs were: blood pressure (BP) 108/71 mmHg, heart rate (HR) 67 bpm and SpO2 96% by nasal cannula with 1.5 l of oxygen. The patient was placed in the right lateral position under 5 l of oxygen by a face mask. The two chest drains were withdrawn one by one, and two 5-mm trocars were inserted after local anaesthesia with 1% lidocaine. The left collapsed lung could not maintain oxygenation (SpO2 85%) and 10 l of oxygen by a face mask was needed (SpO2 94%). Next, a 5-mm rigid thoracoscope was introduced through one trocar, and the left lung was manipulated by thoraco-cotton through the other trocar. Because the pain around the trocar increased the BP to 130/90 mmHg and the HR to 110 bpm (sinus tachycardia) with no ST changes on electrocardiogram, we attempted to gently manipulate the endoscopic tools directly through the chest wall, not through the trocar. The intraoperative haemodynamic changes were gradual. Initially, no air leakage was detected in some bullae confirmed on CT by spraying saline retrogradely through the endoscopic suction tube, even when the patient was asked to cough. Next, the attempt to confirm the air leakage by sucking air in the thoracic cavity from one port with thoraco-cotton (Kenmedico Co, Saitama, Japan) just beside the sucking air tube in order to maintain the visual field range was effective. By repeating this procedure, the air leakage was found to be at the apex. Finally, a fistula of ~5 mm at the bottom of the bulla that adhered to the chest wall in the apex was suspected (Fig. 1). A polyglycolic acid biomaterial (PGA)
sheet was attached to the fistula not only by fibrin glue, but also by 20 ml of autologous blood dripped through the endoscopic tube. The patient’s operative course was uneventful and the operative time was 55 min. A postoperative chest X-ray showed the full expansion of the left lung, and no air leakage was found through the chest drain. The chest drain was removed on the fifth postoperative day. The patient was discharged after rehabilitation without any recurrence of the pneumothorax.

COMMENT

Local anaesthetic thoracoscopy is a useful tool not only for the diagnosis of a parietal pleural disease with effusion such as tuberculosis and malignant mesothelioma, but also for treatment in talc pleurodesis and for dividing septations in the acute phase of empyema. For the treatment of the pneumothorax under local anaesthesia, Pompeo et al. [1] reported that awake bullectomy with pleural abrasion was feasible, and the outcome was equivalent to that of the treatment under general anaesthesia. However, the entry criteria were limited to a spontaneous pneumothorax in young patients with no comorbidity. From the fact that there was only one pneumothorax among the 384 cases of VATS under local anaesthesia performed by Katlic and Factork [2], VATS under local anaesthesia for the secondary pneumothorax with a high surgical risk might be challenging. Generally, in patients with cardiac comorbidities, general anaesthesia often induces intraoperative and postoperative complications because of the suppression of cardiac function. However, local anaesthesia is deemed safer because patients can talk about their condition at any time and recover earlier from the operation if intraoperative stress and pain, which can induce cardiac ischaemia and cardiac failure, are well controlled. In this case, the intercostal trocar acted as a fulcrum for the manipulation and increased the pain; therefore, we attempted to gently manipulate the endoscopic tools directly through the chest wall, not through the trocar, in order to avoid adversely affecting the haemodynamic state.

Alternative non-surgical alternatives such as outpatient drainage and endobronchial valve placement were initially considered. Outpatient drainage was considered as a last resort, because deterioration to the empyema could occur and be more complicated. Endobronchial valve replacement was considered the next alternative treatment, because even if the local anaesthetic thoracoscopy surgery resulted in failure, the bronchus responsible for the pneumothorax would be identified when the fistula was detected.

Although the British Thoracic Society guidelines say that local anaesthetic thoracoscopy may be considered in high-risk patients with a secondary pneumothorax, because some cases are accompanied by pleural adhesions, a high level of surgical technique is sometimes required. Therefore, this phrase, ‘if undertaken by experienced practitioners’, was added to the guidelines [3]. In adhesion cases, because of the limited working space and unsatisfactory endoscopic view, complications such as lung injury and bleeding might occur; a conversion to general anaesthesia should be taken into consideration [4]. In this case, we considered that a conversion to general anaesthesia was limited in the case of severe bleeding that did not respond to conservative treatment. With severe desaturation and an unstable haemodynamic status, we planned to abandon the operation. With respect to the feasibility of the operative technique, closure of the lung fistula by a PGA sheet, fibrin glue and autologous blood is considered a safer procedure without touching the visceral pleura even in the limited working space caused by adhesions. As the PGA sheet attached only by fibrin glue was deemed unstable in this case, autologous blood, which itself has some weight and adhesive strength, was added. This might be potentially effective only if the target can be observed through the thoracoscope even in the limited space.

Conflict of interest: none declared.

REFERENCES


