Video-Assisted Thoracoscopic Resection of Fractured Ribs to Prevent Descending Aorta Injury in Patient with Chest Trauma

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Blunt chest trauma frequently leads to various complications such as pneumothorax, hemothorax, and lung contusion. Since neighboring organ injury caused by a rib fracture with chest trauma could be fatal when a great vessel is involved, immediate diagnosis and treatment including surgery are important. Here, we present a case of chest trauma, in which we performed video-assisted thoracoscopic rib resection to prevent injury to the descending aorta by the fractured rib tip.

Keywords: chest trauma, VATS, rib resection

Introduction

A rib fracture is one of the most frequent complications of blunt chest traumas. Lung injury, as well as pneumothorax and/or hemothorax from such a fracture, is usually managed with chest tube drainage. It has been reported that a fractured rib can injure neighboring organs including the descending aorta, which is a life-threatening complication.1,2 However, no preventative management strategy has been presented. Here, we report the utility and safety of a VATS approach for rib resection, which may be less invasive, as compared to a conventional open thoracotomy in patients with traumatic damage.

Case Report

A 66-year-old woman was admitted with a blunt chest trauma that occurred in a traffic accident. She had dyspnea with chest pain and SpO2 was slightly decreased to 93% with room air, while hemodynamic measurements were stable. Chest roentgenogram findings upon admission demonstrated left pneumothorax with moderate pleural effusion. Chest computed tomography (CT) scanning showed multiple left rib fractures, hemo-pneumothorax, and a left lower lobe contusion. Whole body examinations revealed no other trauma outside of the chest area. We immediately performed pleural drainage, and 200 mL of sanguineous fluid was drained, though continuous inspiratory and expiratory air leakage was noted. One week after admission, her condition became stable, and air leakage had stopped. Follow-up chest CT scanning showed migration of a fractured rib tip in close proximity to the descending aorta (Fig. 1), which we considered to indicate surgery because of risk of aortic injury.

An emergency operation was performed using video-assisted thoracoscopic surgery (VATS) to resect the fractured rib. Under general anesthesia with differentiated ventilation, the patient was gently placed into a left lateral decubitus position. Camera and working ports were made at the 3rd and 6th intercostal spaces, respectively, of the mid-clavicular line. Thoracoscopic findings showed some retained blood effusion, a small laceration on the left lower lobe with a small clot, a loose fibrous adhesion between the lung parenchyma of the left lower lobe, and parietal pleura near the fractured ribs. We found that the 7th and 8th ribs had fractured in the posterior portions, and the sharp tip of the 8th rib
Discussion and Conclusion

Based on our present experience, we present several crucial points to consider when treating a patient with rib fracture caused by chest trauma, especially in the left posterior site near the descending aorta. First, rib deformity in the fracture site should be carefully evaluated using CT scanning during hospitalization. An aortic injury caused by a rib fracture can occur immediately after chest trauma and also later. For example, Kigawa, et al. reported a case of late onset aortic injury that occurred during a body-position change. In the present case, follow-up CT findings revealed that the fractured rib had migrated to near the descending aorta as compared with the initial CT results obtained at admission. A preventive operation is recommended in cases with the risk of injury of a neighboring organ such as a great vessel or lung. During surgery, we found that the fractured rib tip could be easily moved; thus, there was a risk of aortic injury from position change or mechanical positive pressure ventilation. In addition, patient position should be changed gently, for the avoidance of aortic injury by a fractured rib tip. Second, the camera and working port sites should be made in the anterior chest far from the fractured rib to avoid intraoperative injury by direct pressure used to make the access ports. Third, a Kerrison bone punch was useful during a rib resection, in the present case. Although the utility of Gigli’s saw has been reported for rib resections with a VATS approach, we consider that the Kerrison bone punch is another available option. Furthermore, an additional assist port to hold the rib was not necessary for rib resection with this device.

In conclusion, the possibility of organ injury by a fractured rib tip should be considered in all patients with chest trauma including delayed onset. A preventive rib resection with a less invasive VATS approach may be indicated in such cases.

Disclosure Statement

The authors have no conflicts of interest to declare.

References