A novel cause of late bleeding after lobectomy: Erosion of the bronchial staple line in the chest wall

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CENTRAL MESSAGE

We present the first report of delayed hemothorax due to bronchial stapling after a right lower lobectomy for lung cancer.

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The use of staplers in thoracic surgery is widely accepted and considered safe. Bronchial stapling was first reported in the 1960s.¹ Its convenience and much shorter learning curve compared with manual suturing have led to its wide use; however, stapling failure and staple-related complications may occur. Although hemothorax caused by staples has been reported,²⁻⁵ delayed hemothorax caused by bronchial staples has not. Here we report a case of delayed hemothorax arising as a complication following the use of bronchial staples.

CASE DESCRIPTION

A 68-year-old man with lung cancer underwent right lower lobectomy. Surgery was performed using a posterolateral incision and a fifth intercostal thoracotomy. All blood vessels were ligated and dissected. Intraoperatively, a stapler was used at the bronchus and parenchyma to divide the middle and lower lung lobes. Bronchial stapling was done using an Echelon stapler (Ethicon Endo-Surgery, Cincinnati, Ohio) with a gold cartridge. On postoperative day 5, the pleural effusion was minimal (Figure 1, A); however, while preparing for discharge, the patient experienced hypovolemic shock, with a decrease in systolic blood pressure to as low as 58 mm Hg. His hemoglobin level was 11.0 g/dL, but decreased to 7.6 g/dL thereafter. Chest roentgenography showed a sudden increase in the amount of right pleural fluid (Figure 1, B).

Emergency thoracotomy was performed following a diagnosis of massive hemothorax, and 2451 mL of blood was drained. Projectile bleeding was seen from the intercostal artery present around the vertebral body (the segmental artery) in front of the eighth thoracic vertebra. A staple attached to the lower right bronchus stump was facing the vertebral artery. The staple at the end of the staple line was protruding (Figure 2), and we believed that it had injured the inner chest wall due to movement during

respiration, causing the bleeding. A Z suture was applied to the central and peripheral sides of the artery, and the bleeding was stopped. We performed blood transfusion during the surgery using 1120 mL of red blood concentrate.

Retrospectively, enhanced computed tomography performed before reoperation revealed that the staple was in contact with the artery in front of the thoracic vertebra (Figure 1, C). The postoperative course was uneventful, and the patient was discharged on the fifth postoperative day after the second operation.

The patient provided informed consent for publication of the study data.

DISCUSSION

Late-onset hemothorax due to misaligned stapling has been reported only rarely.²⁻⁵ In a study of 2030 patients, 36 (1.8%) developed stapling-related complications intraoperatively (31 patients) or postoperatively (5 patients).⁴ Intraoperative complications included air leakage, stapling failure, and bleeding. The incidence of reoperation for stapling-induced postoperative bleeding was 0.3% (4 of 1143 operations), and bronchial stapling caused hemothorax in only 1 of the 2030 patients who underwent surgery. Although hemothorax from an intercostal or inner thoracic artery injury caused by the staple on the edge of the lung

FIGURE 1. A, Roentgenography on postoperative day 5 showing postoperative pleural effusion (arrow). B, Roentgenography before the emergency thoracotomy showing an increase in the right pleural fluid level (arrow). C, Enhanced computed tomography scan showing the staple in contact with the segmental artery in front of the eighth thoracic vertebra (arrow).

FIGURE 2. The bleeding point is a segmental artery in front of the eighth thoracic vertebra, which faces a stump of the right lower bronchus divided by the stapler. The white arrow indicates the bleeding point; black arrow, the bronchus stump; black arrowhead, protruding staples.

parenchyma has been reported,^{2,3} delayed hemothorax due to bronchial staples, which is what we encountered, has not. In our case, the medial side edge of the stapling line was protruding from the bronchial stump and apparently eroded the pleura and eventually injured the artery. This problem might only occur with a lower lobectomy, because the right upper lobe or right middle lobe bronchial stumps generally would be forced anteriorly by the reexpanding remaining lobes, whereas the right lower lobectomy stump would be rotated posteriorly when the right upper lobe and middle lobe reinflated. Finally, in our case, bleeding occurred from the segmental artery in front of the eighth thoracic vertebra and eventually led to hemothorax.

Although bleeding due to staple injuries is rare during pulmonary resection involving bronchial stapling, caution is necessary while performing the stapling procedure. When the staple line comes in contact with the chest wall or a staple fails, the excessive projection of the staple may

be trimmed or buttressed with autologous tissue such as pleura, the thymus should be considered when the postresection geometry suggests this as a potential issue.

CONCLUSIONS

Although the use of a stapler during thoracic surgery has been accepted as a reliable and safe procedure, careful attention must be given to the excessive projection of a staple during surgery. Our findings will help prevent complications during surgery and reduce the postoperative healing time.

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