CASE REPORT

Pneumothorax as a presentation of perforated duodenal ulcer

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SUMMARY

A young man presented with a sudden onset of severe abdominal pain and vomiting. He also had shortness of breath with right-sided pleuritic chest pain. On examination he was found to have a rigid and diffusely tender abdomen. Auscultation of the chest revealed reduced air entry into the right lung. An erect chest X-ray confirmed the presence of pneumoperitoneum and a right-sided pneumothorax. He underwent placement of a right intercostal drain followed by urgent laparotomy. The intraoperative findings were consistent with a small duodenal perforation, which was managed by a simple omental patch closure. His postoperative course was uneventful. Pneumothorax is a rare complication of perforated duodenal ulcer and should be kept in mind while assessing patients who present with abdominal pain and dyspnoea. We have discussed various possibilities that should be considered in patients who present with a concomitant pneumothorax and pneumoperitoneum.

BACKGROUND

Pneumothorax is a rare complication of perforated duodenal ulcer and should be kept in mind while assessing patients who present with abdominal pain and dyspnoea.

CASE PRESENTATION

A 29-year-old man with no previous medical illness presented with 1 day history of sudden onset of severe abdominal pain with repeated vomiting. He also reported shortness of breath with right-sided pleuritic chest pain. There was no preceding history of trauma. On examination he was found to be tachypnoeic and tachycardic. The abdomen was rigid and diffusely tender. The bowel sounds were absent. On chest auscultation he was found to have reduced air entry into the right lung.

INVESTIGATIONS

Total leukocytic count was $15.2 \times 10^3/\mu\text{L}$. Other routine laboratory results were within the normal range.

Erect chest X-ray showed free air under the diaphragm and a right-sided pneumothorax (figure 1). Abdominal X-ray also confirmed the presence of free air under the diaphragm (figure 2). A bedside ultrasound revealed the absence of lung sliding sign, which is also indicative of the presence of pneumothorax (figure 3, video 1).

Figure 1 Abdominal X-ray showing free air under the diaphragm.

TREATMENT

The patient underwent insertion of a right intercostal drain, after which he was taken for an urgent laparotomy. He was found to have a small anterior perforation (measuring 0.5 cm) in the first part of the duodenum and the abdominal cavity contained around 1 L of purulent fluid. A simple omental

Figure 2 Erect chest X-ray showing a right-sided pneumothorax with free air under the diaphragm.

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Figure 3 Bedside ultrasound scan showing the absence of 'lung sliding sign'.

patch closure of the defect was performed. He was given a 5-day course of intravenous antibiotics.

OUTCOME AND FOLLOW-UP

Postoperatively he had an uneventful course of stay in the hospital and was discharged after 6 days without any complications. He was discharged on a course of *H pylori* eradication therapy.

DISCUSSION

A concomitantly occurring pneumothorax and pneumoperitoneum is a rare and unusual combination of findings which can be explained by three different possibilities.

The first possibility is when the two conditions coexist due to entirely unrelated pathologies.

The second possibility is when a case of pneumothorax becomes complicated by a pneumoperitoneum. This usually occurs in the settings of barotrauma in patients undergoing mechanical ventilation. High pressure air from ruptured alveoli enters the pleural cavity which then dissects into the peritoneal cavity.^{1 2}

The last possibility is when a case of pneumoperitoneum (secondary to a perforated viscus) becomes complicated by a pneumothorax or even pneumomediastinum. Our case probably illustrates one such example. Pneumothorax has been reported as a rare complication of perforated diverticulum,^{3 4} perforated gastric ulcer,⁵ perforated duodenal ulcer^{6–8} and even iatrogenic colonic perforations following endoscopic procedures.^{9–12}

Many theories have been proposed to explain this last possibility. One of the postulated mechanisms is that free

intraperitoneal air that is under tension diffuses through the inflamed peritoneal membrane and into the pleural cavity.¹³ Another explanation is that retroperitoneal free air dissects through the fascial planes to enter the mediastinal cavity from which it gains access to the pleural cavity. Alternatively, free intraperitoneal air can pass through the small diaphragmatic fenestrations to gain access to the pleural cavity.¹⁰

Emergency physicians commonly encounter a myriad of presentations for various clinical conditions. It is important for them to keep in mind that surgical emergencies such as perforated viscus can present with rare complications such as pneumothorax and pneumomediastinum.

This case also highlights the role of rapid assessment of other organ systems during evaluation of patients who present with acute abdomen.

Learning points

- ▶ A concomitantly occurring pneumoperitoneum and pneumothorax is an unusual combination of findings that requires special consideration.
- ▶ Pneumothorax is a rare complication of perforated duodenal ulcer.
- ▶ It is important to rapidly assess other systems during evaluation of patients who present with acute abdomen.

Competing interests None.

Patient consent Obtained.

Provenance and peer review Not commissioned; externally peer reviewed.

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Video 1 Bed-side ultrasound scan showed the absence of 'lung sliding sign'.

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