Unusual presentation of more common disease/injury

An unusual case of abdominal distension: pneumoperitoneum secondary to pneumomediastinum in a patient with chronic obstructive pulmonary disease

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Summary

A 68-year-old lady with end-stage chronic obstructive pulmonary disease presented with vomiting and abdominal pain. On examination her abdomen was grossly distended, diffusely tender and hyper-resonant. Imaging showed dilated loops of bowel and free air in the abdomen with no intestinal perforation. The free abdominal air had come down from the thorax by dissecting down around the oesophagus. A pneumomediastinum was present in her chest, secondary to her extensive emphysematous disease. She was treated conservatively and her pneumomediastinum resolved several weeks later, with subsequent resumption of intestinal motility and return to premorbid function. Surgical intervention would not have helped her condition.

BACKGROUND

Abdominal pain and distension is a fairly common acute surgical presentation, accounting for 6.5% of all presentations to the emergency department.¹ When this is associated with free intra-abdominal air a common differential diagnosis can be abdominal visceral perforation. This indeed is the case in 85–95% of cases² but there are other causes, including some that are not of abdominal provenance. This case presents abdominal distension but with an unusual cause: air dissecting down from the chest around the oesophagus. Very few cases have been reported of this without obvious traumatic or iatrogenic causes. Correctly identifying the cause of pneumoperitoneum is important as causes without visceral perforation do not necessarily require surgical intervention.

CASE PRESENTATION

A 68-year-old lady presented to A&E with a 3-day history of abdominal distension and 1-day history of abdominal pain and vomiting. She had not opened her bowels for a day, nor had passed flatus. Her significant medical history included an ischaemic stroke 5 years previously, and end-stage chronic obstructive pulmonary disease (COPD) for which she required 2 litres home oxygen. There had been no obvious cause for this episode; she had had no recent hospital admissions or procedures, nor any abdominal surgery.

On examination her abdomen was significantly distended and diffusely tender on palpation. There were no signs of peritonism, and bowel sounds were absent. She was afebrile, and routine blood tests revealed a white cell count of $11 \times 10^9/l$ and C reactive protein level of 30 mg/l.

INVESTIGATIONS

An abdominal x-ray and subsequent abdominal CT were performed which showed free peritoneal air, retroperitoneal

air, distended loops of bowel and subcutaneous air in the anterior abdominal wall (figure 1A). There was no intestinal perforation or malrotation, no free fluid in the abdomen and no air in the mesenteric or portal veins. There was periesophageal air tracking down from the chest. A subsequent CT chest confirmed a pneumomediastinum without any oesophageal rupture or pneumothorax (figure 1B). Air was noted in the subcutaneous tissues in the neck. The pneumomediastinum was felt to be due to the extensive emphysematous disease noted throughout the lungs.

TREATMENT

The patient was treated conservatively with an insertion of a nasogastric tube on free drainage, intravenous fluids and intravenous antibiotics for abdominal infection (amoxicillin, metronidazole and gentamicin). Antibiotics were stopped after 5 days as there were no signs of infection. The size of her abdomen oscillated several times during admission with a sudden increase in abdominal distension noted after coughing fits. Although she was passing flatus and some small stool throughout admission she did not tolerate food and was placed on total parenteral nutrition within the first week, having not tolerated nasogastric feeding. After several weeks a repeat CT confirmed resolution of pneumomediastinum. After a total in-patient stay of 7 weeks her abdomen had stabilised at normal size, she had been built up to fully tolerate oral food and her bowels had opened. She was discharged home.

DISCUSSION

Air in the retroperitoneal or peritoneal space may be caused by abdominal visceral rupture from various causes, accounting for 85–95% of cases.² It can also be caused by other abdominal causes such as laparoscopic procedures,

Figure 1 (A) Abdominal CT showing free air in the abdomen, dilated loops of bowel and subcutaneous air in the anterior abdominal wall. (B) Thorax CT showing air around the oesophagus (demonstrated by arrow).

sepsis, trauma and air entering the urological or gynaecological tracts. The air can also come from the chest.

Thoracic causes of pneumoperitoneum include barotrauma, interstitial lung damage, pneumothorax, tracheal rupture and poststernotomy. A literature search on EMBASE and MEDLINE revealed 30 cases of pneumomediastinum causing a pneumoperitoneum reported in adults in literature, 22 of which were secondary to trauma or iatrogenic procedures. Only five cases were reported where the pneumomediastinum was caused by lung disease. Four were caused by asthma attacks and one from fume inhalation causing wheeze (table 1). The presentation of this case was unusual because there was no evident causative event for her pneumomediastinum and she did not report any exacerbation of her lung disease, although she did cough frequently. An obvious event does not inevitably have to have taken place: any scenario which increases the pressure in the lung has the potential to cause injury. Even simple Valsalva manoeuvres such as straining at stool have been shown to cause barotrauma.³ Lungs with underlying pathology like this patient's have been shown to suffer trauma at significantly lower pressures than normal.³

As the patient had extensive emphysematous change to her lungs, the likely rupture of a pulmonary bleb allowed

air to escape in to the surrounding tissue. Such air moves into the underlying perivascular sheaths and dissects towards the mediastinum. Here, as well as entering the subcutaneous tissues of the neck and chest, it can track down to the retroperitoneal space, and finally on to the peritoneum.²⁻⁵ Pleuritic and diaphragmatic defects can also allow the air to pass straight from the chest cavity to the peritoneal space.²⁻⁶ The presence of subcutaneous emphysema with mediastinal emphysema in our patient almost certainly confirm that the air originated in the chest, rather than from perforated abdominal viscus.⁷

Management of cases of pneumoperitoneum without visceral perforation frequently does not require surgery. This highlights the importance of the correct diagnosis, as an unnecessary laparotomy was carried out in 23% of reported patients who had a non-surgical cause of pneumoperitoneum.² This high percentage of unnecessary operations only goes to show how difficult it can be to find the exact pathology. Early senior review is fundamental in this diagnostic task, as exemplified in our case. When the free abdominal air was reported on our patient's abdominal CT by the out-of-hours team, it was initially felt to be abdominal in origin. Given the patient's end-stage COPD, surgery was never considered and she was treated conservatively. It was only after senior

Table 1 Previous reported cases of air in the abdomen due to lung disease⁷⁻¹¹

Age, sex	Presenting complaint	Underlying pathology	Radiological findings	Treatment	Length of inpatient admission	References
26, M	Dyspnoea, wheezing, coughing	Asthma	Pneumopericardium, pneumoretroperitoneum, pneumorrhachis	Conservative	7 days	Van der Klooster <i>et al</i> ⁸
71, M	Asthma exacerbation	Asthma	Mediastinal emphysema, intra-abdominal air beneath diaphragm	Conservative	Resolved within 7 days	Sekiya <i>et al</i> ⁹
19, M	Nausea, vomiting, epigastric pain	Asthma, peptic ulcer disease, Hiatus hernia	Free peritoneal air, retroperitoneal air, air in the mediastinum, subcutaneous emphysema	Thoracotomy and laparotomy—no abnormality detected	Unknown	Silbergleit <i>et al</i> ¹⁰
20, M	Asthma exacerbation	Asthma	Pneumomediastinum, subcutaneous emphysema of the neck, free intra-abdominal gas	Intubation, non-surgical	6 days	Lantsberg <i>et al</i> ¹¹
23, M	Wheeze, dyspnoea, cough	Toxic fumes inhalation	Subcutaneous emphysema, mediastinal emphysema, pneumoperitoneum	Conservative	7 days	Hillman ⁷

M, male.

radiologist review of the images that the thoracic cause of this air was suggested, and subsequent confirmatory CT chest was ordered.

Learning points

- ▶ When seeing pneumoperitoneum on CT consider the pathophysiology: a cause other than intestinal perforation occurs 5–15% of the time.
- ▶ These other causes may well not require an emergency laparotomy.
- ▶ Air from the abdomen can be caused from air in the chest, so underlying thoracic pathology should always be considered.
- ▶ Senior radiological opinion should be sought if there is any question over the provenance of the pneumoperitoneum to ensure the correct cause is identified.

Competing interests None.

Patient consent Obtained.

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