CASE REPORT

Two similar cases of elderly women with moderate abdominal pain and pneumoperitoneum of unknown origin: a surgeon's successful conservative management

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SUMMARY

Patients presenting with abdominal pain and pneumoperitoneum in radiological examination usually require emergency explorative laparoscopy or laparotomy. Pneumoperitoneum mostly associates with gastrointestinal perforation. There are very few cases where surgery can be avoided. We present 2 cases of pneumoperitoneum with unknown origin and successful conservative treatment. Both patients were elderly women presenting to our emergency unit, with moderate abdominal pain. There was neither medical intervention nor trauma in their medical history. Physical examination revealed mild abdominal tenderness, but no clinical sign of peritonitis. Cardiopulmonary examination remained unremarkable. Blood studies showed only slight abnormalities, in particular, inflammation parameters were not significantly increased. Finally, obtained CTs showed free abdominal gas of unknown origin in both cases. We performed conservative management with nil per os, nasogastric tube, total parenteral nutrition and prophylactic antibiotics. After 2 weeks, both were discharged home.

BACKGROUND

Pneumoperitoneum in abdominal imaging often leads, even in the absence of sepsis and peritonitis, to explorative laparotomy or laparoscopy. Pneumoperitoneum on X-ray was first described at the beginning of the 20th century as a diagnostic sign for detection of gastrointestinal (GI) perforation. Nowadays, chest X-ray and plain abdominal radiograph are still used as a first-line diagnostic tool with an overall maximal sensitivity of 78%.^{1 2} After a non-conclusive X-ray and clinical examination, subsequent CT scanning is often performed to detect or specify pneumoperitoneum. An abdominal CT scan has a sensitivity range from 96% to 100% in detection of free gas.²⁻⁴ Existing data from the literature suggest GI perforation in about 90% as a cause of pneumoperitoneum.^{5 6} However, for all remaining patients no intestinal perforation can be found intraoperatively and they may undergo unnecessary surgery. Causes for pneumoperitoneum other than intestinal perforation are described as non-surgical causes. They are defined as part of a thoracic, abdominal, gynaecological, iatrogenic and idiopathic group.^{5 6} The idiopathic group represents a very small segment and the diagnosis of idiopathic or spontaneous pneumoperitoneum has mostly

been described retrospectively after explorative laparotomy.⁷⁻¹¹ In the era of CT scans, it is very rarely that the localisation of a GI perforation cannot be found and the diagnosis of idiopathic pneumoperitoneum is made.^{12 13}

We report two cases of elderly patients with pneumoperitoneum treated with conservative management in a Swiss reference centre for abdominal surgery.

CASE PRESENTATION

Case 1: An 89-year-old woman was admitted to our emergency unit, with a 4-day history of abdominal pain and chronic constipation. She had stable vital parameters and temperature within normal limits. Physical examination revealed normal bowel movements, a soft abdomen and slight tenderness in the lower left abdomen, but no signs of peritonitis and no other clinical abnormalities. Her surgical history showed former laparoscopic cholecystectomy and abdominal hysterectomy, years prior. Furthermore, she had a medical history of treated hypertension and cerebrovascular disease.

Case 2: This 87-year-old woman presented with a 3-day history of abdominal pain in the epigastrium radiating to the back and shoulders. She reported vomiting 2 days before, but no nausea. Medical and surgical history work up revealed a chronic reflux disease and an abdominal hysterectomy, also years ago. Her temperature and vital parameters were unremarkable. On abdominal examination, she had slight tenderness in the epigastrium, but a soft abdomen and no peritonitis. A colonoscopy performed 6 months prior showed pandiverticulosis, but no history of diverticulitis was reported.

INVESTIGATIONS

Case 1: Laboratory studies showed a slight increased C reactive protein of 35 mg/L, but no other signs of inflammation. Plain abdominal radiograph revealed free abdominal air under the right diaphragm and no signs of intestinal obstruction (figure 1). Chest X-ray showed slight pleural effusion, but no other pathological signs. Consequently, an abdominal CT was performed, and free air in the middle and upper abdomen on both sides confirmed (figure 2). There were signs of neither diverticulosis, nor cholecystitis, nor abscess and, in

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Figure 1 Upright plain abdominal radiograph showing free air under the diaphragm.

particular, no significant extraluminal fluid collections were found.

Case 2: Blood analyses on admission showed no abnormalities. Initially, a thoracoabdominal CT was performed due to radiating pain described in the back and shoulders. CT showed free air in the upper and lower abdomen (figure 3). There was a slight extraluminal fluid collection. Furthermore, a remarkable abdominal vascular sclerosis and cholecystolithiasis were detected, but no diminished abdominal perfusion and no cholecystitis were noted, and this was confirmed by abdominal sonography. In addition, a diverticulosis without signs of

Figure 2 Axial section (lung window) of abdominal CT demonstrating perihepatic and perigastric free air.

inflammation was described. Thoracic CT scan did not show any pathological finding.

TREATMENT

After CT scans showed no clear origin of the pneumoperitoneum, and when laboratory and clinical findings were found to be unremarkable, we decided to carry out conservative wait-and-watch management to avoid risks in these elderly patients. Non-operative treatment was performed with a nasogastric tube, intravenous antibiotics, parenteral nutrition, nil per os and regular surveillance.

OUTCOME AND FOLLOW-UP

In both patients, regularly performed blood tests were within normal limits and both patients could be discharged home after 2 weeks of hospitalisation and successful food intake.

Two weeks after admission of patient 2, a gastroscopy was performed, which revealed no evidence of past gastroduodenal perforation. A follow-up abdominal CT at the same time showed no abdominal free air and no fluid. Both patients were followed up by a telephone interview >1 year after discharge. Patient 1 described persistent flatulence but no other GI symptoms. Patient 2 had experienced no further intestinal symptoms. A colonoscopy was recommended in both cases but not carried out.

DISCUSSION

Pneumoperitoneum in combination with clinical signs of peritonitis or sepsis is undisputedly pathognomonic for GI perforation and calls for surgical exploration, even without clear radiological evidence. Absence of these clinical signs potentially

Figure 3 Sagittal section (lung window) of abdominal CT illustrating a large amount of free air in the upper and lower abdomen.

leads to negative emergency laparotomy/laparoscopy and unnecessary perioperative risk exposure to patients. Surgeons must weigh between perioperative risk and the risk of later entering secondary peritonitis.

Plain radiograph is popular due to its rapid availability and low radiation exposure for orientation in suspected intestinal perforation. As already described above, studies have shown a maximum of 78% sensitivity for abdominal free air in perforations distally of the duodenum even below 30%.^{1 2 14} Abdominal CT is superior to plain radiograph with respect to sensitivity, and is able to detect the site of perforation in 82.5–86% of cases.^{15 16}

Besides pneumoperitoneum, various radiological signs such as extraluminal faeces, fluid collections, bowel wall thickening, discontinuation and oral contrast extravasation can help to localise the GI perforation. If no such signs are present, the volume and location of the pneumoperitoneum can give an idea of the site of perforation. Upper GI perforations tend to have large amounts of abdominal free air, in contrast to lower GI perforations, which tend to have rather small amounts.¹⁷ Kumar *et al* retrospectively examined patients with pneumoperitoneum and subsequent surgery due to highly suspected perforation. They found colon perforations as a leading cause of pneumoperitoneum in 34%, appendix in 18%, small bowel in 14% and gastroduodenal perforations in 10%. This is in contrast to studies from the past, where gastroduodenal perforations represented the main cause.^{3 18} Surprisingly, no diagnosis could be established in 24% of patients operated on.²

Most common causes of non-surgical pneumoperitoneum are iatrogenic as postoperative, which usually are quickly explained by the temporal correlation.¹² Sometimes, abdominal free air is radiologically detected up to 3 weeks postoperatively, but can only be utilised diagnostically in comparison with previous images.^{19 20} The rate of perforation after diagnostic and therapeutic colonoscopy is <0.1%, but a few case reports described a benign pneumoperitoneum after colonoscopy showing itself to be asymptomatic and may have resulted in a negative surgical exploration.^{21 22} Pneumatosis intestinalis cystoides, consisting of gaseous cysts in the wall of the GI tract, represents the most common non-surgical abdominal cause. It is associated with rheumatic diseases, colonoscopies and immunosuppressants. Perforated cysts often lead to a massive pneumoperitoneum, but usually require no surgical treatment.^{23 24}

If neither iatrogenic nor abdominal causes have been identified, diagnostic work up should be extended to the thorax, to look for pneumomediastinum and pneumothorax, which can spread through microleakages into the pleura and peritoneum.^{5 25} Sedated and artificially ventilated patients, especially, represent a higher risk group. Pneumoperitoneum of unknown origin often leads to an explorative surgery in the intensive care unit setting.²⁶ Gynaecological causes for pneumoperitoneum, such as sexual intercourse after hysterectomy or exercises postpartum, also exist.^{27 28}

In our two patients, we could radiologically not find any clear cause of pneumoperitoneum and we provided idiopathic pneumoperitoneum as a diagnosis of exclusion. Diagnostic laparoscopy was considered, but not performed due to the patients' ages, and moderate clinical and laboratory signs. Both patients were almost 90 years old at presentation in our emergency department, and a high perioperative risk was estimated. To avoid secondary peritonitis if microperforation was present but not detected, we did protect the GI tract with nasogastric tube, nil per os, parenteral nutrition, and antibiotics consisting of piperacillin and tazobactam.

In general, we suggest considering conservative management only in patients with absence of clinical signs of peritonitis and systemic inflammatory response syndrome (SIRS). For young patients who meet these criteria, we would first consider a diagnostic laparoscopy; however, in elderly patients with polymorbidity, the first choice would be conservative management. We use laparotomy in unstable patients with septic complications, or in patients with adhesions due to previous surgery. Otherwise, we try primarily to use a diagnostic laparoscopy in patients with pneumoperitoneum and to treat it with a laparoscopic procedure. In our opinion, a strict algorithm is difficult to create and we believe that every patient must be assessed individually.

In summary, both patients benefited from conservative management.

Learning points

- ▶ CT should be used in stable patients to detect the site of perforation and look for other pathology.
- ▶ Pneumoperitoneum and abdominal pain do not always mean gastrointestinal perforation.
- ▶ Conservative management in patients with pneumoperitoneum is possible in the absence of clinical signs of peritonitis or sepsis.

Contributors FV and VZ were involved in the conception and design of the study, collection and assembly of the data, and manuscript writing. CB and CA were involved in the conception and design of the study. All the authors gave their approval for the final version of the manuscript.

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