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## Case Report

# Infected intraperitoneal collection mimicking pneumoperitoneum<sup>☆,☆☆</sup>

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### ARTICLE INFO

#### Article history:

Received 23 March 2023

Revised 6 June 2023

Accepted 8 June 2023

#### Keywords:

Pneumoperitoneum

Pseudo pneumoperitoneum

Acute abdomen

### ABSTRACT

Acute abdomen is an emergent condition that requires immediate evaluation and prompt treatment. Pneumoperitoneum is defined as the presence of air or gas in the peritoneal cavity. There are various potential causes of pneumoperitoneum, as well as conditions that can mimic or pseudo pneumoperitoneum. We encountered a case of a 26-year-old woman who had a history of postexploratory laparotomy, left ovarian cystectomy, left ovarian reconstruction, right salpingoophorectomy, and infracolic omentectomy for bilateral mucinous cystadenoma and mature cystic teratoma. On the eighth day following her operation, she developed progressive abdominal distension.

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## Introduction

Pneumoperitoneum refers to the presence of air or gas within the peritoneal cavity, which is the space in the abdomen that contains the abdominal organs. This condition can occur due to various reasons, including perforation or rupture of a gastrointestinal organ, iatrogenic injury during surgery, trauma, or certain medical conditions. About 10% of pneu-

moperitoneum is not associated with hollow organ perforation [1].

It is crucial to differentiate genuine pneumoperitoneum from mimickers or pseudo pneumoperitoneum, which are conditions that can appear similar to pneumoperitoneum on imaging but do not involve actual gas within the peritoneal cavity. There are many causes of pseudopneumoperitoneum, including subphrenic abscess, colon volvulus, and Chilaiditi syndrome [1,2]. Distinguishing between pneumoperitoneum

\* Acknowledgments: The authors would like to express their deepest gratitude to all the staffs from Imaging unit of Universiti Sains Malaysia and to all those directly or indirectly involved in this case write up. There is no financial support received for the study.

☆☆ Competing Interests: The authors declare that there is no conflict of interest.

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<https://doi.org/10.1016/j.radcr.2023.06.016>

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**Fig. 1 – Abdominal radiograph shows large luency suspicious of a football sign (massive pneumoperitoneum).**

and pseudo pneumoperitoneum can be diagnostically challenging.

### Case presentation

A 26-year-old woman with post-exploratory laparotomy and left ovarian cystectomy and ovarian reconstruction, right salpingoophorectomy, and infracolic omentectomy for bilateral mucinous cystadenoma and mature cystic teratoma presented on day 8 post-operation with progressive abdominal distension associated with nausea, vomiting, and diarrhea.

She denied fever or abdominal pain. On examination, no documented increase body temperature. The abdomen was grossly distended. Otherwise, the wound was intact, and no discharge.

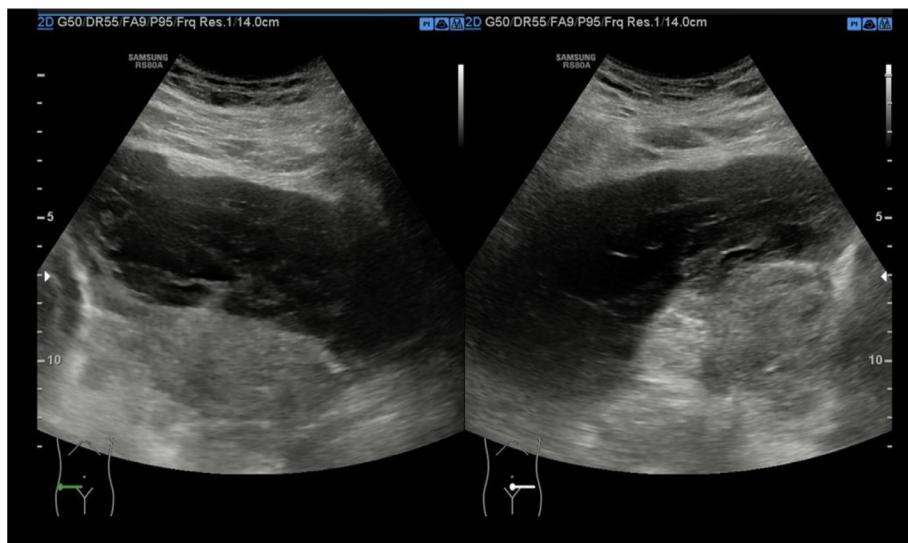
Patient then preceded with few investigations. The abdominal radiograph (Fig. 1), showing a large luency suspicious of a football sign may indicate a massive pneumoperitoneum. Subsequent ultrasound of the abdomen (Fig. 2) was done shows moderate ascites with multiple internal septations suggestive of complex ascites or collection. The computed tomography of the abdomen and pelvis showed a large well-defined, intra-abdominal collection with air-fluid level with peripheral peritoneal enhancement (Fig. 3). The collection extends bilaterally into both paracolic gutters down to the pelvis, as well as into the lesser sac, pericholecystic, subhepatic, and anterior pararenal space. These findings associated with large bowel wall thickening and mural thickening of small bowels suggestive of enterocolitis. Otherwise, no abnormal bowel loops dilatation.

The patient underwent immediate exploratory laparotomy washout and lavage. Peritoneal fluid was sent for culture and sensitivity (C&S) and came back as Methicillin-resistance coagulase-negative staphylococci (MR cons). The tissue was also sent for culture and sensitivity (C&S) and came back as *Pseudomonas aeruginosa*.

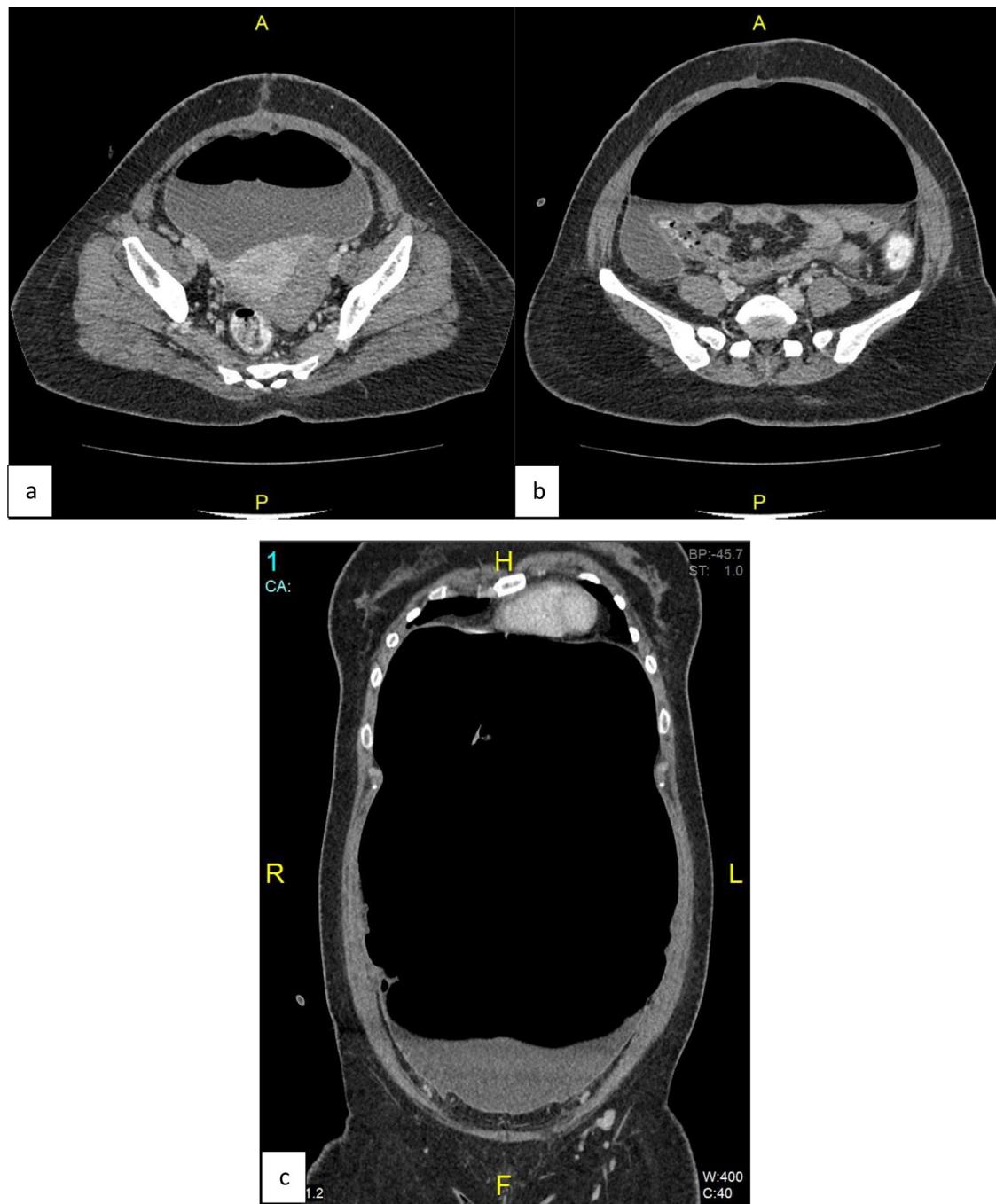
The patient was treated with intravenous Tazocin for 1 week and intravenous ciprofloxacin for 2 weeks. The surgery was complicated with wound breakdown and underwent secondary suturing after 3 weeks post-operation. The patient had good post-operative recovery and discharge well after completed intravenous antibiotic.

### Discussion

Perforation in the gastrointestinal system is the most common cause of air in the peritoneum, while it is less frequently seen in other intra-abdominal, gynecologic, or urologic causes.



**Fig. 2 – Ultrasound abdomen show complex ascites.**



**Fig. 3 – (A, B, and C):** CT abdomen show a large well-defined, intra-abdominal collection with air-fluid level with peripheral peritoneal enhancement.

In the post-operative period, pneumoperitoneum can resolve within a week, but it can persist for 10-24 days [3].

The causes of pneumoperitoneum are typically related to the disruption of the wall of a hollow organ. These include conditions such as perforated gastric or duodenal ulcers, perforated appendix, diverticulitis, necrotizing enterocolitis with perforation, inflammatory bowel disease or obstruction, blunt or penetrating trauma, or iatrogenic perforation. Another cause can be gas-forming peritonitis or rupture of an abscess [4].

Pseudopneumoperitoneum refers to the presence of gas or air within the abdominal cavity that mimics free intraperitoneal gas or pneumoperitoneum but is actually contained within an organ or capsule. There are several causes of pseudopneumoperitoneum, including specific gas patterns in the abdomen. Examples of these patterns include a distended stomach fundus, Chilaiditi's syndrome (interposition of the colon between the liver and diaphragm), diaphragmatic hernia, esophageal or gastric/duodenal diverticulum, incidental gas-containing cysts within the bowel wall (pneumato-

sis coli), or abscess. Lung base pathology, such as basal atelectasis, empyema, or pneumothorax, can also mimic pneumoperitoneum. Other causes of pseudopneumoperitoneum involve subdiaphragmatic intraperitoneal fat or the presence of omental fat between the liver and diaphragm [4].

Gas-forming organisms in intra-abdominal infections can lead to the development of pneumoperitoneum. Examples of such infections in adults include spontaneous bacterial peritonitis (SBP), secondary bacterial peritonitis, cholecystitis, salpingitis, perinephric abscess, rupture of a pyogenic liver abscess, and rupture of pneumatosus cystoides intestinalis. The most common causative organism for gas-forming bacterial peritonitis is Escherichia coli (43%), while Pseudomonas spp. is less commonly involved [1].

It's important to consider both genuine pneumoperitoneum and pseudopneumoperitoneum when evaluating a patient with suspected air in the peritoneum. A comprehensive assessment, including physical examination, imaging studies, and clinical context, is necessary to differentiate between these conditions and determine the appropriate management approach.

In this particular case, the patient presented with progressive abdominal distension after the operation. The abdominal radiograph showed a finding that resembled the shape of a football sign, raising suspicion of massive pneumoperitoneum. Post-operative pneumoperitoneum is a common phenomenon after abdominal surgery, however, it should be decreasing with time which raised suspicious of possible of others abnormality [3]. Subsequent CT scan of the abdomen and pelvis revealed that the actual cause was an intraabdominal collection containing both air and fluid, giving the appearance of pseudopneumoperitoneum.

In the doubtful condition, computed tomography of the abdomen is the next modality of choice to find out the cause of suspicious pneumoperitoneum. As in this case, we concluded as pneumoperitoneum on a plain radiograph; however, when we proceeded with a CT scan, it was found to be a large intraabdominal collection with an air-fluid level and not pneumoperitoneum.

## Conclusion

When encountering patients who are radiographically diagnosed with pneumoperitoneum, it is essential to conduct thorough history taking and detailed physical examinations. Abdominal or erect chest radiograph remains the first line in imaging when patient came in with acute abdomen symptoms or suspected abdominal perforation. When the diagnosis is uncertain, various imaging modalities such as CT scan can make a definite diagnosis.

## Patient consent

Written consent was obtained from the patient for publication of this case report and accompanying images.

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