

# Spontaneous Pneumoperitoneum: A Surgeon's Dilemma

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## Citation

S Sahu, M Husain, P Sachan. *Spontaneous Pneumoperitoneum: A Surgeon's Dilemma*. The Internet Journal of Surgery. 2007 Volume 15 Number 2.

## Abstract

Pneumoperitoneum or intra-abdominal free gas can be detected radiologically with as little as 1 cc of intraabdominal free gas. The most common cause of pneumoperitoneum is iatrogenic following laparotomy or laparoscopic procedures. Non-iatrogenic pneumoperitoneum usually indicates a perforated hollow viscus in 90% of cases; the 10% of cases of non-iatrogenic pneumoperitoneum without any perforation of hollow viscus are termed spontaneous pneumoperitoneum. Spontaneous pneumoperitoneum is a surgical dilemma, which requires proper assessment by thorough history and physical examination. Detection of this entity may help in avoiding a negative laparotomy.

## INTRODUCTION

Pneumoperitoneum or intra-abdominal free gas can be detected radiologically with as little as 1 cc of intraabdominal free gas. The most common cause of pneumoperitoneum is iatrogenic following laparotomy or laparoscopic procedures. Postoperative pneumoperitoneum may remain 4 weeks but usually resolves completely within 1 week. Iatrogenic pneumoperitoneum is also detected following peritoneal dialysis, peritoneal lavage, percutaneous liver or kidney biopsy, percutaneous cholangiography and percutaneous gastrostomy. Non-iatrogenic pneumoperitoneum usually reflects a perforated hollow viscus, which is a common surgical emergency and is detected radiologically in 85% of cases.<sup>1,2,3,4</sup>

liver function test and serum pancreatic enzymes were within normal limits. Blood gas analysis showed severe respiratory acidosis. Radiology of the chest showed evidence of severe COPD.

A plain abdominal radiograph was taken which showed intra-abdominal free gas under both domes of the diaphragm. (FIG-1)

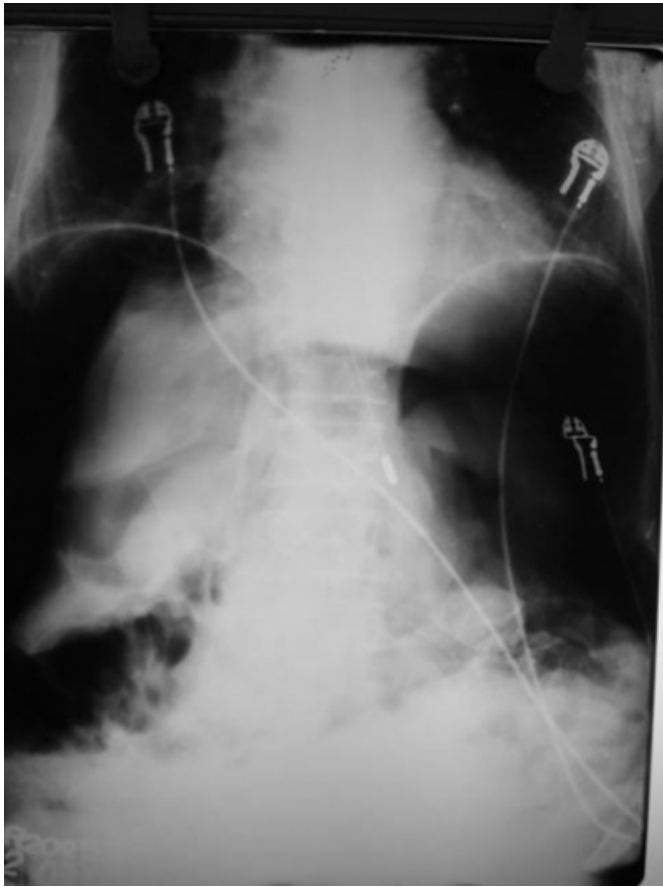
## CASE REPORT

A 56-year-old male was admitted with severe dyspnoea and pain in the upper abdomen since 4 days. He was a known case of chronic obstructive pulmonary disease due to chronic smoking and had a past history of myocardial infarction 2 years back. On examination, his vital parameter revealed a pulse of 109/min, a blood pressure of 90/60mmHg and a respiration rate of 31/min. Examination of the chest revealed diffuse rhonchi and crepitations bilaterally. Examination of the abdomen revealed generalized tenderness, obliteration of liver dullness and absent bowel sounds.

Routine hematological investigation revealed: hemoglobin 11g/dl, total leukocyte count 18450/cumm, differential leukocyte count: neutrophils 88%, lymphocytes 10% and eosinophils 2%. Random blood sugar, renal function tests,

**Figure 1**

Figure 1: Plain abdominal x-ray of the patient with copd showing free intraperitoneal gas under both domes of the diaphragm.



The patient was subjected to exploratory laparotomy. On opening the peritoneum, a gush of air was detected. No perforation was detected in any segment of the bowel and there was no intra-peritoneal or retroperitoneal fluid collection. The abdomen was closed with placement of intraperitoneal drains.

Post-operatively, the patient was shifted to the intensive care unit and was put on ventilatory support for acute respiratory distress. Feeding was commenced through the nasogastric tube from the 3<sup>rd</sup> post-operative day onwards and the drains were removed on the 4<sup>th</sup> post-operative day.

The patient developed atrial fibrillation on the 6<sup>th</sup> post-operative day, which was managed conservatively. On the 7<sup>th</sup> post-operative day, the patient developed acute myocardial infarction and expired due to cardiac failure.

## DISCUSSION

A correct radiological interpretation is required to detect pneumoperitoneum which depends upon the radiographic

position used and collection of free air at the most superior position possible. Over-distension of hollow viscera, undulating configuration of the diaphragm causing the basal lung to appear lying below the diaphragm, subdiaphragmatic extraperitoneal fat and interposition of the hepatic flexure of the colon between the right lobe of the liver and the diaphragm can all simulate pneumoperitoneum - causing pseudo-pneumoperitoneum. <sup>1</sup>

Non-iatrogenic pneumoperitoneum usually indicates a perforated hollow viscus in 90% of cases. However, in 10% of cases of non-iatrogenic pneumoperitoneum, where the cause is not due to any perforated hollow viscus, the term "spontaneous pneumoperitoneum" is used which may cause a surgical dilemma. <sup>4</sup>

The most common abdominal causes of spontaneous pneumoperitoneum are perforated pneumatosis cystoides intestinalis, infection by gas-producing organisms such as clostridium and penetrating wound in the abdomen. Gas-containing pyogenic liver abscess has also been reported in the etiology of this condition. Jejunal, duodenal and sigmoid diverticulosis have also been reported to cause spontaneous pneumoperitoneum. Endoscopic procedures and colon contrast examination can also cause this entity. Rare abdominal causes reported are pneumocholecystitis and postsplenectomy syndrome. <sup>5,6,7,8,14,15</sup>

On reviewing the literature, thoracic causes are the most common etiology of spontaneous pneumoperitoneum, due to alveolar rupture and subsequent movement of extra-alveolar air into the perivascular sheaths towards the mediastinum and retroperitoneal space, which may rupture intraperitoneally. Patients on mechanical ventilation with intermittent-positive-pressure ventilation are at a high risk for developing spontaneous pneumoperitoneum. Asthma, COPD, bullous emphysema, pulmonary tuberculosis, bronchopulmonary fistula, atelectasis, cardiopulmonary resuscitation, mask ventilation, bronchoscopy, blunt chest trauma and increased intrathoracic pressure following cough, retching and Valsalva maneuver have been described to cause spontaneous pneumoperitoneum. Quick decompression following scuba diving has also been reported to cause this entity. Spontaneous pneumoperitoneum due to thoracic causes is usually associated with pneumothorax and/or surgical emphysema of the head and neck region. <sup>4,9,14</sup>

The female genital tract communicates with the intraperitoneal space. Spontaneous pneumoperitoneum has

been described following pelvic examination, vaginal douching, air insufflation during hysterosalpingography, postpartal knee-chest exercise and in gas producing gynecological infections. Coitus and orogenital sex are also reported to cause this entity.<sup>9,10,14</sup>

Rarely, spontaneous pneumoperitoneum is reported following tracheostomy, adenotonsillectomy, dental extraction, aerophagia, scleroderma, amyloidosis and in cocaine addicts. Recurrent spontaneous pneumoperitoneum has also been reported in the literature.<sup>4,11,12,13,14</sup>

The management of spontaneous pneumoperitoneum is a surgical dilemma as a conservative approach is the rule in the management of this benign entity. Doubtful cases of visceral perforation should be excluded with contrast studies by gastrografen and or paracentesis with peritoneal lavage to determine intraperitoneal contamination due to a perforation. Using methylene blue through nasogastric tube can also aid in making an intraoperative diagnosis of this entity.<sup>2</sup>

### CONCLUSION

Spontaneous pneumoperitoneum is a surgical dilemma, which requires proper assessment by thorough history and physical examination. Detection of this entity may help in avoiding a negative laparotomy.

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