

# Spontaneous Pneumoperitoneum due to Intra-abdominal Drain- A Case Report

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## ABSTRACT

Pneumoperitoneum is most commonly caused by hollow viscus perforation which requires an emergency surgical intervention. However, this is not always the case. Pneumoperitoneum which is not due to hollow viscus perforation is called Spontaneous or “non-surgical” pneumoperitoneum. Rarely, it can present with peritonitis but non-surgical pneumoperitoneum usually follows a benign course and can be managed conservatively. A case of 53-year-old male, non-smoker, non-alcoholic, hypertensive known to have decompensated chronic liver disease, since one year with portal hypertension and ascites was presented. The patient underwent uneventful laparoscopic cholecystectomy for acute calculous cholecystitis and developed spontaneous pneumoperitoneum due to intra-abdominal drain one week postprocedure. Pneumoperitoneum was successfully managed conservatively. A thorough history, physical examination and imaging are crucial in identifying patients with non-surgical pneumoperitoneum and to prevent unnecessary laparotomies. In present case, pneumoperitoneum was due to intra-abdominal drain which resolved after removing the drain. So, it is of utmost importance to rule out non-surgical causes of pneumoperitoneum, especially in surgeries where drain are kept in-situ.

**Keywords:** Computerised tomography, Decompensated liver disease, Non-surgical pneumoperitoneum, Secondary bacterial peritonitis

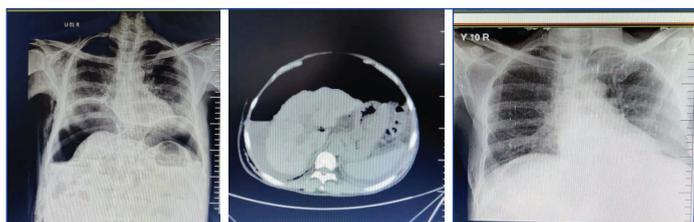
## CASE REPORT

A 53-year-old male, non-smoker, non-alcoholic, hypertensive known to have decompensated chronic liver disease since one year with portal hypertension and ascites presented with complaints of icterus since one week and abdominal pain since two days. Clinically, patient had right hypochondrium tenderness and guarding. Magnetic Resonance cholangiopancreatography showed acute calculous cholecystitis (distended, thickened walls with multiple calculi in fundus) with a small cystic duct calculi measuring 8 mm. The patient underwent laparoscopic cholecystectomy after COVID screening which was uneventful. A Romovac drain was kept intra-abdominally in Morrison pouch for ascites drainage. Postprocedure, the patient was managed with salt and fluid restriction, high protein diet, empirical antibiotics, IV albumin and diuretics. Patient was comfortable, tolerating soft diet orally with normal bowel and bladder habits. Suddenly, on postoperative day seven generalised abdominal distension and pain were developed. The patient was kept nil by mouth with nasogastric insertion and dependant drainage which did not show any improvement. Surgical emphysema was noticed around drain site on postoperative day eight. Hence, chest X-ray and Computerised Tomography (CT) abdomen and pelvis (plain and oral contrast) was done which showed gross pneumoperitoneum with cirrhosis and moderate ascites without any contrast leak from bowel [Table/Fig-1,2]. Since, drain consistency was clear fluid and patient had no systemic signs of sepsis, hollow viscous perforation was ruled out.

Clinically, patient was comfortable, vitally stable, and ambulatory with normal oral intake and bowel habits. The patient did not complain of any fever and chills. Decompression of pneumoperitoneum was tried by repositioning of the abdominal drain which reduced partially but later increased again. Ascites fluid tapping was done which showed raised neutrophil count (1200 cells/cubic mm) and culture grew *Stenotrophomonas maltophilia* suggestive of secondary bacterial peritonitis. Blood culture was negative. Antibiotics (Meropenem 1 gm thrice daily, Levofloxacin 750 mg once daily) were given according to the culture sensitivity. Ascites fluid analysis was repeated after a week which showed decreased quantity, neutrophils count (500 cells/cubic mm) and negative culture. After another week of antibiotics, cell count was normal. Romovac drain was changed to an Urobag to prevent any suction which was removed after two weeks. Abdominal distension resolved following that. On follow-up imaging showed settling of pneumoperitoneum [Table/Fig-3]. However, during the course of his hospital stay, the patient developed hepatic encephalopathy grade III with septic shock. In spite of best efforts, bradycardia and cardiac arrest was developed and the patient declared dead due to multiorgan failure.

## DISCUSSION

Pneumoperitoneum can be surgical and non-surgical. In about 90% cases, it is associated with the perforation of the hollow viscera (peptic ulcer perforation, perforated appendicitis, diverticulitis) where surgery is the only treatment while remaining 10% cases, the causes are various: thoracic, abdominal, gynaecological, iatrogenic or very rarely, it can be idiopathic. Few non-surgical causes include pneumatosis cystoides intestinalis, clostridium infection, penetrating wound abdomen, gas-containing pyogenic liver abscess, jejunal, duodenal and sigmoid diverticulosis, pneumomediastinum (caused by oesophageal or pulmonary pathology), aerophagia etc., [1,2]. Post-laparoscopy procedure the pneumoperitoneum disappears within a week and anything beyond that period should raise suspicion and be investigated [3]. In present case, grossly distended abdomen was noted on postoperative day seven. Hollow viscus perforation and diverticulosis were considered as differentials. CT scan was



[Table/Fig-1]: Chest X-ray showing gas under diaphragm.

[Table/Fig-2]: CT scan abdomen showing gross pneumoperitoneum on POD7.

[Table/Fig-3]: Chest X-ray showing resolution of pneumoperitoneum after 2 weeks. (Images from left to right)

done which showed gross pneumoperitoneum and cirrhosis with ascites without any evidence of perforation or diverticulosis. Clinically, the patient was stable with normal bowel habits. Hence, hollow viscus perforation and diverticulosis were ruled out. Had it been hollow viscus perforation or diverticulosis, the patient would require emergency laparotomy followed by resection anastomosis. Prognosis would depend on site of perforation and degree of peritonitis. Later, the patient developed secondary bacterial peritonitis which was evident on ascites fluid analysis. Secondary bacterial peritonitis was managed conservatively. Once the abdominal drain was removed after two weeks, the pneumoperitoneum was reduced. Similar to Kulgod SY and Ammanagi AS, spontaneous pneumoperitoneum in present study patient is thought to be due to air entry through the abdominal drain and getting trapped into abdominal cavity due to flap valve mechanism of skin [4]. Pitiakoudis M et al., reported a case that underwent an emergency exploratory laparotomy but was non-diagnostic, although there was evidence for surgical pneumoperitoneum [1]. A retrospective study performed from January 2014 to May 2017 by Gupta R, reported spontaneous pneumoperitoneum in paediatric patients which were managed conservatively [5]. Vinzens F et al., described two similar cases of elderly women with moderate abdominal pain and pneumoperitoneum of unknown origin which was successfully managed conservatively [6]. Abdelmohsen S and Osman MA, described a case of a neonate with a massive pneumoperitoneum who obtained a surgical intervention but the cause of pneumoperitoneum remained unclear [7]. Sánchez AW et al., presented a case of a patient with massive spontaneous pneumoperitoneum and acute abdomen without hollow viscus perforation which was confirmed by diagnostic laparoscopy [8]. Overall, present case highlights the importance of careful consideration of clinical and radiographic findings in the diagnostic and therapeutic approach to pneumoperitoneum. Prognosis depends on comprehensive clinical and radiological assessment of pneumoperitoneum cases before proceeding with laparotomy.

## CONCLUSION(S)

Each of the idiopathic pneumoperitoneum should be assessed and categorised for conservative or operative treatment. Majority of cases can be managed conservatively. Only a small percentage of patients with compelling evidence of peritonitis and failure of conservative treatment need laparotomies. If features of peritonitis are absent, patient should be managed conservatively and perform exploratory laparotomy in cases of acute peritonitis. Still dilemma persists in the management of idiopathic/spontaneous pneumoperitoneum. Therefore, a comprehensive analysis of the patients based on history, physical examination and imaging is utmost importance before proceeding to unwanted laparotomies.

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