Spontaneous Pneumoperitoneum in a High-Risk Elderly Patient Managed Conservatively: A Case Report and Review of Diagnostic Challenges

Raiesh Shrestha[1], MBBS; Abhishek Kumar Mallik[1], MBBS, MS General Surgery; Arbin Joshi[1], MBBS, MDGP, MS General Surgery; Dhan Vikram Karkee[1], MBBS, FRCSED (UK), DMAS (WALS), DMAS (IND); Sanjay Lakhey[2], MBBS, DTM&H, MD Internal Medicine

[1]Department of General Surgery, B&B Hospital, Gwarko, Lalitpur, Nepal

[2]Department of Internal Medicine, B&B Hospital, Gwarko, Lalitpur, Nepal

Address of Correspondence:

Dr. Raiesh Shrestha, MBBS

Department of General Surgery and Urology, B&B Hospital, Gwarko, Lalitpur

Email: doctor@raiesh.com

Phone: +977-9860319483

Pneumoperitoneum is most commonly associated with hollow viscus perforation, a condition typically requiring urgent surgical intervention. However, spontaneous pneumoperitoneum without gastrointestinal perforation is a rare phenomenon, often seen in high-risk patients. This case highlights the diagnostic challenges and the effectiveness of conservative management in a frail elderly patient. Our case, a sixty-eight-year-old woman with a medical history of hypertension, diabetes mellitus, ischemic heart disease, chronic kidney disease, and chronic obstructive pulmonary disease, presented with complaints of fever, dysentery, and abdominal pain. Clinically, she was looking ill but hemodynamically stable, with mild abdominal distension and no peritoneal signs. Initial laboratory tests revealed neutrophilic leukocytosis. Imaging, including abdominal X-ray and non-contrast computed tomography, confirmed pneumoperitoneum without evidence of gastrointestinal perforation or intra-abdominal fluid. Differential diagnoses included pneumatosis intestinalis, pneumatosis coli, sealed-off perforation, and air migration from pulmonary bullae. Given the absence of peritonitis, lack of free fluid, and the patient's comorbidities, the decision was made to manage the patient conservatively. An ultrasound-guided pigtail catheter was inserted, which drained only air, with

no fluid collection. The catheter was removed on day five, and the patient showed clinical and radiological improvement. This case underscores that conservative management can be a safe and effective strategy for spontaneous pneumoperitoneum in hemodynamically stable, elderly patients, particularly when there are no signs of peritonitis or sepsis. An individualized, multidisciplinary approach to diagnosis and management is critical to ensure favorable outcomes.

Keywords: conservative management, elderly patient, pneumoperitoneum, spontaneous pneumoperitoneum.

Pneumoperitoneum, defined as the presence of free air within the peritoneal cavity, is most commonly attributed to hollow viscus perforation.[1] However, spontaneous pneumoperitoneum (SP), where no gastrointestinal perforation is identified, is a rare and often challenging diagnosis, particularly in elderly patients with multiple comorbidities.[2] The classic management paradigm involves surgical exploration, but in certain patients, especially those who are hemodynamically stable and do not show signs of peritonitis, conservative management may be appropriate.[3]As emerging literature suggests, a tailored approach based on clinical stability, laboratory markers, and evolving imaging findings may reduce morbidity in high-risk populations.[4]

This case report highlights the clinical presentation, diagnostic challenges, and management of spontaneous pneumoperitoneum in a high-risk, elderly patient and discusses the rationale behind conservative treatment. The literature on this rare entity is reviewed, and recommendations for management in similar cases are provided.

Case Detail

A sixty-eight-year-old female with a significant medical history of hypertension (HTN), diabetes mellitus (DM), ischemic heart disease (IHD), chronic kidney disease (CKD), and chronic obstructive pulmonary disease (COPD) presented to the emergency department with complaints of fever, dysentery, and generalized abdominal pain. She had a history of recurrent episodes of mild abdominal discomfort but had not experienced prior gastrointestinal surgery or trauma.

On physical examination, the patient appeared ill but was hemodynamically

stable. Abdominal examination revealed mild distension without tenderness or rebound, guarding, or rigidity. There were no signs of peritonitis, bowel sounds were normal, and the patient was passing flatus and loose stool mixed with blood. Laboratory results showed neutrophilic leukocytosis, elevated levels of C-reactive protein, and procalcitonin.

An X-ray of the chest with upper abdomen **(Figure 1)** showed evidence of pneumoperitoneum. Subsequent plain computed tomography (CT) **(Figure 2)** of the abdomen and pelvis confirmed the presence of free air within the peritoneal cavity. Importantly, there was no evidence of intra-abdominal fluid collection or bowel wall disruption. The rest of the abdominal viscera appeared normal, without signs of inflammation, infarction, or abscess formation.

The decision was made to manage the patient conservatively due to the absence of peritonitis and the lack of radiological evidence for perforation. This approach was also influenced by her poor surgical fitness due to comorbidities, including IHD and CKD. The patient was treated with intravenous fluids and broad-spectrum antibiotics to cover potential infectious causes. Given the presence of pneumoperitoneum and to ensure no intra-abdominal collection was present, an ultrasound-guided pigtail catheter was

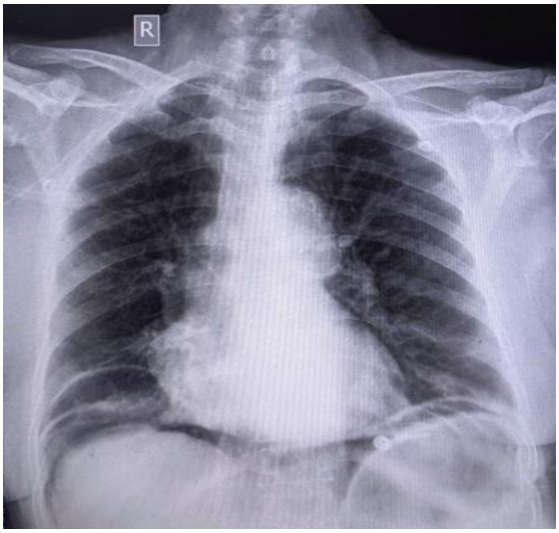

Figure 1. Chest X-ray before pigtail insertion

Figure 2. CT of abdomen showing pneumoperitoneum before pigtail insertion

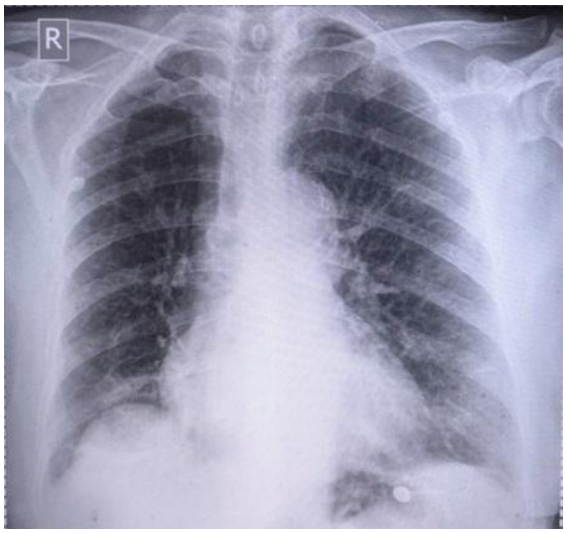

Figure 3. Chest X-ray on the third day after pigtail insertion

inserted into the peritoneal cavity. However, upon drainage, only air was noted, with no fluid collection.

A repeat X-ray of the chest, showing the upper abdomen **(Figure 3)** on the third day after pigtail insertion, confirmed a reduction in the amount of free air (almost none) under the diaphragm. After five days of conservative management, the patient's clinical condition improved significantly. Her fever resolved, and she reported less abdominal discomfort. The pigtail catheter was removed without complication on day five. The patient was discharged with a plan for follow-up endoscopy and colonoscopy in six weeks, as a final diagnosis for the pneumoperitoneum could not be made with certainty. At discharge, the patient was asymptomatic, and her overall condition had improved.

Discussion

Pneumoperitoneum is traditionally linked to gastrointestinal perforation, most commonly from peptic ulcer disease, diverticulitis, or trauma. However, SP where no obvious perforation is found is rare and typically involves non-surgical causes.[3] Given the radiological findings, the differential diagnosis for SP in our case included Pneumatosis intestinalis, Pneumatosis coli, sealed-off perforation, Adult necrotizing enterocolitis, and bullae rupture or hiatal hernia causing air to migrate into the peritoneum.

The etiology of SP remains debated. Rupture of pulmonary bullae or alveolar rupture allows air to travel through fascial planes to the peritoneum, which is often termed as Macklin effect.[3,5,6] This is more common in patients with COPD, as in our case. However, no pulmonary bullae were evident in the CT scan, ruling this out as the primary cause. Pneumatosis intestinalis or pneumatosis coli, in which persistent bullae in the abdomen may rupture into the peritoneal cavity without true perforation.[7,8] A small gastrointestinal perforation that self-seals due to surrounding tissue inflammation could be another possibility, although this is a rare and poorly understood phenomenon. Air may also enter the abdomen from the chest if there is a hiatal hernia or ruptured pulmonary bullae; however, this was unlikely in our case due to the lack of pulmonary findings.[9]

Management of SP depends on the patient's clinical status and underlying cause. Surgical intervention is generally reserved for cases with significant abdominal pain, signs of peritonitis, or suspicion of gastrointestinal perforation.[10] However, in the absence of these signs, conservative management along with supportive care, including fluid resuscitation and antibiotics, regular abdominal girth charting, and intra-abdominal pressure charting, is appropriate.[3,11,12] For patients like ours, the elderly with significant

comorbidities, minimally invasive interventions, such as the pigtail catheter, can be considered to drain free air for symptomatic relief and to monitor for the drained material.[4,13] We recommend planning further management depending on the characteristics and quantity of the drain fluid.[14] In our case, there was nothing in the drain till day five; abdominal girth and intra-abdominal pressure charting remained stable. Hence, a decision for drain removal was made.

As in this case, a multidisciplinary team involving gastroenterologists, surgeons, intensivists, and radiologists is crucial for an individualized approach to diagnosis and treatment, especially in high-risk patients. Frequent reassessment of clinical status, including repeat imaging if symptoms worsen, is essential.[15,16]

Conclusion

Spontaneous pneumoperitoneum remains a rare but challenging condition that can often be managed conservatively in hemodynamically stable patients, especially when no signs of peritonitis are present. Early and thorough investigation, including CT imaging and clinical monitoring, is essential to rule out gastrointestinal perforation and guide treatment. Conservative management, including supportive care and catheter drainage when appropriate, can be effective in select cases, particularly in elderly patients with multiple comorbidities. Further research and documentation of such cases will help refine treatment protocols for this rare condition.

Conflict of Interest: None.

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