

# Pneumoperitoneum Secondary to Ruptured Gas-Forming Splenic Abscess: A Rare Mimicker of Hollow Viscus Perforation

**Dr. Najeebuddin Patel<sup>1</sup>, Dr. Umair Syed Shah Hasan Qadri<sup>2\*</sup>,**

<sup>1</sup>Department of Radiology, Dr. D.Y. Patil Medical College, Hospital & Research Centre, Dr. D.Y. Patil Vidyapeeth, India

<sup>2</sup>Department of Radiology, Dr. D.Y. Patil Medical College, Hospital & Research Centre, Dr. D.Y. Patil Vidyapeeth, India

**\*Corresponding Author:**

Dr. Umair Syed Shah Hasan Qadri, Department of Radiology, Dr. D.Y. Patil Medical College, Hospital & Research Centre, Dr. D.Y. Patil Vidyapeeth, India.

E-mail: [umairsshq@gmail.com](mailto:umairsshq@gmail.com)

---

## Abstract

### Background

Pneumoperitoneum is most commonly associated with perforation of a hollow viscus and is generally considered a surgical emergency. However, rare non-gastrointestinal causes may occasionally produce free intraperitoneal air and mimic bowel perforation. Splenic abscess is an uncommon clinical entity with potentially fatal complications if diagnosis is delayed. Rupture of a splenic abscess resulting in pneumoperitoneum is exceedingly rare and sparsely documented in literature.

### Case Presentation

A 72-year-old female presented with epigastric pain for 3–4 days associated with nausea and intermittent fever with chills. Clinical examination revealed guarding on per abdominal examination. Contrast-enhanced computed tomography demonstrated marked architectural distortion of the spleen with a large subcapsular hypodense infective collection involving the mid and lower poles, measuring 9.8 × 5.3 × 8.4 cm. Multiple internal gas foci were present within the collection. Focal discontinuity of the splenic capsule along the inferior aspect with minimal fluid tracking beyond the splenic margin suggested rupture of the abscess. Associated perisplenic fat stranding was noted. Free intraperitoneal air was identified anterior to the liver and extending inferiorly in the midline up to the umbilical level, consistent with pneumoperitoneum. The imaging findings established the diagnosis of ruptured gas-forming splenic abscess causing pneumoperitoneum.

### Conclusion

Ruptured splenic abscess is a rare but important non-hollow viscus cause of pneumoperitoneum. Awareness of this entity and careful evaluation of the spleen on cross-sectional imaging are essential to avoid misdiagnosis and facilitate timely management.

**Keywords:** Splenic abscess, pneumoperitoneum, splenic rupture, gas-forming abscess, computed tomography

**How to cite this article:** Patel N, Qadri U S S H., Pneumoperitoneum Secondary to Ruptured Gas-Forming Splenic Abscess: A Rare Mimicker of Hollow Viscus Perforation. *Int J Drug Deliv Technol.* 2026;16(43s): 617-620; Doi: 10.25258/Ijddt.16.43s.63

---

## Introduction

Splenic abscess is a rare but life-threatening infectious process with an incidence rate of between 0.05% and 0.7% based on autopsy studies. In 1987, Nelken et al. explained that splenic abscess is a difficult diagnostic disease due to the non-specific nature of the illness and different manifestations of symptoms [1]. Ooi and Leong (1997) went further to emphasize the need for early diagnosis using radiology methods such as ultrasonography and CT scans, which led to an increase in survival rates in infected individuals [2].

The risk factors for splenic abscess are diabetes mellitus, infective endocarditis, trauma, immunosuppression, hematogenous spread, and splenic infarction. Chang et al. (2006) conducted a study involving 67 patients who had splenic abscess, and found that gas-forming abscesses were associated with aggressive microorganisms, and resulted in worse outcomes [3]. Tung et al. (2006) further stated that splenic abscess was easily ignored clinically since the classical triad of fever, left upper quadrant pain, and leukocytosis was not consistently seen [4].

## Pneumoperitoneum Secondary to Ruptured Gas-Forming Splenic Abscess: A Rare Mimicker of Hollow Viscus Perforation

While splenic abscess is relatively infrequent, its rupture leading to pneumoperitoneum is extremely rare. In most cases, pneumoperitoneum results from the perforation of hollow viscera occurring in about 85-95% of instances, requiring urgent surgery. Nonetheless, there are a few instances where the cause is non-gastrointestinal in nature. In one report, Sreekar et al. (2008) reviewed a case of spontaneous rupture of a splenic abscess resulting in acute abdomen and diffuse peritonitis [5]. Similarly, Ferraioli et al. (2009) emphasized the expanding significance of image-guided drainage and CT scanning in managing splenic abscess [6]. On the other hand, Lee et al. (2011) later elaborated on a case of ruptured splenic abscess, a life-threatening complication that leads to generalized peritonitis and sepsis [7]. Notably, Chou et al. (2018) documented an unusual case of pneumoperitoneum following a gas-forming splenic abscess rupture, resembling perforation of a hollow viscus [8].

We present a rare case of ruptured gas-forming splenic abscess producing pneumoperitoneum in an elderly female, highlighting the pivotal role of CT in accurately identifying the source of free intraperitoneal air.

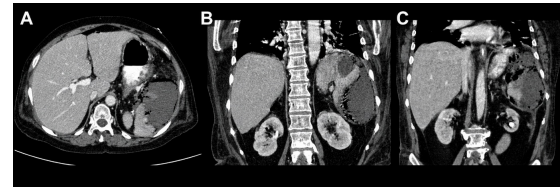
### Case Report

A 72-year-old woman reported to the Emergency Room with the history of epigastric pain for three to four days. She had nausea along with fever and chills. She did not have any history of trauma, previous surgery to abdomen, vomiting blood, passing of altered color of stool, or known peptic ulcers.

On physical examination, she looked septic with high body temperature. On per abdominal examination, she showed abdominal guarding with tenderness in upper abdomen.

In view of acute abdomen, contrast-enhanced CT of the abdomen and pelvis was performed.

CT revealed marked architectural distortion of the spleen with heterogeneous attenuation. A large subcapsular hypodense infective collection involving the mid and lower poles of the spleen was identified, measuring approximately  $9.8 \times 5.3 \times 8.4$  cm (CC  $\times$  AP  $\times$  TR). Multiple internal gas foci were seen within the collection. No definite peripheral rim enhancement was noted on post-contrast images, suggesting an evolving infective collection.

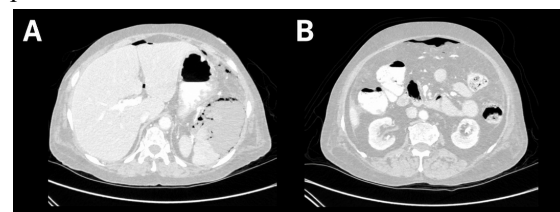


**Figure 1:** Contrast-enhanced CT images demonstrating a gas-forming splenic abscess with rupture.

(A) Axial portal venous phase image in soft tissue window showing a large hypodense subcapsular splenic collection with internal gas foci causing distortion of splenic architecture. (B) Coronal reformatted image showing the craniocaudal extent of the collection compressing the residual splenic parenchyma. (C) Coronal reformatted image showing focal discontinuity of the inferior splenic capsule with subtle perisplenic fluid tracking (arrow), consistent with rupture.

Focal discontinuity of the splenic capsule was identified along the inferior aspect of the spleen with subtle leakage of fluid beyond the splenic margin tracking minimally inferiorly, consistent with rupture of the abscess. Adjacent perisplenic fat stranding was present.

Additionally, free intraperitoneal air was noted anterior to the liver and extending inferiorly in the anterior midline up to the umbilical level, consistent with pneumoperitoneum. No obvious bowel wall defect, focal bowel thickening, or gastrointestinal perforation was identified on CT.



**Figure 2:** CT images demonstrating associated pneumoperitoneum.

(A) Axial CT image in lung window showing free intraperitoneal air anterior to the liver. (B) Inferior axial image demonstrating extension of free air in the anterior peritoneal cavity up to the umbilical level.

Based on the imaging findings, a diagnosis of ruptured gas-forming splenic abscess causing pneumoperitoneum was established.

The patient was started on broad-spectrum intravenous antibiotics and referred for emergency surgical management.

## Pneumoperitoneum Secondary to Ruptured Gas-Forming Splenic Abscess: A Rare Mimicker of Hollow Viscus Perforation

### Discussion

Despite advancements in diagnostic imaging and antimicrobial treatment, splenic abscess is still considered an infrequent disease. According to Nelken et al., the rarity of this disease can be attributed to its non-specific symptoms and diverse clinical presentation [1]. Ooi & Leong, on the other hand, stressed that advanced diagnostic imaging methods, especially CT, contributed to the earlier detection and lowered mortality rates of splenic abscess cases [2].

The pathogenesis of splenic abscess includes hematogenous dissemination from distant septic foci, infective endocarditis, trauma, splenic infarction, immunosuppression, or diabetes mellitus. Chang et al. (2006) identified diabetes mellitus and immunocompromised status as important predisposing factors and noted that gas-forming organisms such as *Escherichia coli* and *Klebsiella pneumoniae* are associated with more aggressive disease [3]. Tung et al. (2006) similarly highlighted that the disease may be clinically overlooked because symptoms are often nonspecific, particularly in elderly patients [4].

In contrast, the clinical triad of fever, abdominal pain, and leukocytosis is not always present, hence the importance of radiologic assessment. CT scanning will remain the preferred imaging method owing to its high sensitivity in the detection of abscess collections, intracapsular gas, septations, and possible complications. According to Ferraioli et al. (2009), the value of CT in not just diagnosing splenic abscesses but also performing drainage in select cases is well established [6].

A rupture is a life-threatening complication that occurs in splenic abscesses. Spontaneous rupture leading to acute abdomen and generalized peritonitis was described by Sreekar et al. (2008) [5]. Lee et al. (2011) pointed out that, with the ruptured condition, splenic abscesses usually lead to rapidly developing sepsis requiring emergency surgery [7].

A pneumoperitoneum due to a ruptured splenic abscess is a rare entity. As the causative mechanism of this unusual complication, there is the presence of gas-forming bacteria in a ruptured splenic capsule, thus causing the leakage of the formed gases into the abdominal cavity. Hence, the source of the intraperitoneal gas is extraintestinal. This condition has been described by Chou et al. (2018) [8].

In this particular patient, CT imaging showed a substantial accumulation of gas in the subcapsular region of the spleen, accompanied by capsular

discontinuity and a small amount of fluid around the spleen, indicating the presence of rupture. Although the presence of pneumoperitoneum at the initial stages led to a consideration of possible bowel perforation, no bowel defects were found.

Differential diagnoses for gas-containing splenic lesions include infected splenic infarction, emphysematous infection, post-traumatic infected hematoma, and infected splenic cysts. However, the presence of extensive inflammatory changes, evolving collection, capsular breach, and clinical sepsis strongly supported ruptured splenic abscess in this patient.

Management depends on abscess size, hemodynamic status, and presence of rupture. While uncomplicated splenic abscesses may occasionally be managed with antibiotics and image-guided drainage, ruptured abscesses with pneumoperitoneum and peritonitis generally necessitate emergency splenectomy.

---

### Review of Literature

Auth or	Ye ar	Key Findings	Management
Ooi LL, Leon g SS	19 97	Described splenic abscess as a rare condition with nonspecific presentation and emphasized CT diagnosis.	Antibiotics with splenectomy/percutaneous drainage
Chan g KC et al.	20 06	Reported gas-containing splenic abscesses associated with diabetes and aggressive organisms.	Splenectomy and antibiotics
Ferra ioli G et al.	20 09	Highlighted role of imaging-guided drainage in selected	Percutaneous drainage

## Pneumoperitoneum Secondary to Ruptured Gas-Forming Splenic Abscess: A Rare Mimicker of Hollow Viscus Perforation

Author	Year	Key Findings	Management
Lee WS et al.	2011	Discussed rupture of splenic abscess causing generalized peritonitis.	Emergency splenectomy
Chou YP et al.	2018	Reported pneumoperitoneum secondary to ruptured gas-forming splenic abscess mimicking bowel perforation.	Surgical management

The available literature suggests that pneumoperitoneum secondary to splenic abscess rupture is exceedingly uncommon, with only isolated case reports documented. Most reported patients underwent emergency surgery because of clinical suspicion of hollow viscus perforation.

### Conclusion

Ruptured gas-forming splenic abscess is a rare but important cause of pneumoperitoneum. Although pneumoperitoneum usually suggests hollow viscus perforation, radiologists and clinicians should be aware of uncommon extraintestinal causes. Careful assessment of the spleen and adjacent structures on CT can help identify the true source of free intraperitoneal air. Early recognition is essential because delayed diagnosis may result in overwhelming sepsis and increased mortality.

### Learning Points

- Splenic abscess is a rare but potentially fatal infective condition.
- Gas-forming splenic abscesses may produce pneumoperitoneum following rupture.

- Pneumoperitoneum does not always indicate hollow viscus perforation.
- CT is crucial for identifying the source of free intraperitoneal air and detecting splenic capsular rupture.
- Early diagnosis and prompt surgical management significantly improve outcomes.

### References

1. Nelken N, Ignatius J, Skinner M, Christensen N. Changing clinical spectrum of splenic abscess. A multicenter study and review of the literature. *Am J Surg.* 1987;154(1):27-34.
2. Ooi LL, Leong SS. Splenic abscesses from 1987 to 1995. *Am J Surg.* 1997;174(1):87-93.
3. Chang KC, Chuah SK, Changchien CS, Tsai TL, Lu SN, Chiu YC, et al. Clinical characteristics and prognostic factors of splenic abscess: a review of 67 cases in a single medical center of Taiwan. *World J Gastroenterol.* 2006;12(3):460-464.
4. Tung CC, Chen FC, Lo CJ. Splenic abscess: an easily overlooked disease? *Am Surg.* 2006;72(4):322-325.
5. Sreekar H, Srinivasan K, Pai CG. Spontaneous rupture of splenic abscess presenting as acute abdomen. *Trop Gastroenterol.* 2008;29(2):104-106.
6. Ferraioli G, Brunetti E, Gulizia R, Mariani G, Marone P, Filice C. Management of splenic abscess: report on 16 cases from a single center. *Int J Infect Dis.* 2009;13(4):524-530.
7. Lee WS, Choi ST, Kim KK. Splenic abscess: a single institution study and review of the literature. *Yonsei Med J.* 2011;52(2):288-292.
8. Chou YP, Lai YC, Wang CJ. Pneumoperitoneum caused by ruptured gas-forming splenic abscess mimicking hollow viscus perforation. *Case Rep Surg.* 2018;2018:1-4.