

Kehr's Sign in Postoperative Digestive Surgery: A Radiological Red Flag for Pneumoperitoneum

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Abstract

A 59-year-old male presented with acute abdominal pain and referred left shoulder pain (Kehr's sign), suggestive of diaphragmatic irritation. Imaging studies confirmed pneumoperitoneum, leading to the diagnosis of an anastomotic leak following a complex surgical procedure for locally advanced gastric adenocarcinoma. The patient's initial surgery included a distal gastrectomy, right colectomy, and atypical hepatectomy. Post-operatively, he developed significant complications, including recurrent infections and pneumoperitoneum, necessitating multiple surgical interventions. This case highlights the diagnostic significance of Kehr's sign in identifying diaphragmatic irritation and the critical role of imaging in confirming pneumoperitoneum. Prompt surgical management was essential in addressing life-threatening complications and achieving patient stabilization. These findings underscore the need for vigilance in post-operative monitoring and a multidisciplinary approach to managing complex oncologic surgical cases.

Keywords: Kehr's Sign; Pneumoperitoneum; Postoperative Complications; Gastrointestinal Perforation

Introduction

Kehr's sign, characterized by referred pain in the left shoulder due to diaphragmatic irritation, is a classic clinical finding often indicative of acute abdominal emergencies. This phenomenon occurs due to irritation of the phrenic nerve, which shares sensory innervation with the diaphragm, highlighting its diagnostic importance in conditions such as ruptured spleen, liver trauma, gastrointestinal perforations, and post-operative complications [1,2].

Pneumoperitoneum, commonly associated with gastrointestinal perforations or surgical leaks, serves as a critical imaging finding that warrants immediate investigation and intervention due to its potential for rapid deterioration. Post-operative complications, particularly anastomotic leaks following oncologic abdominal surgeries, pose significant challenges in patient management, often requiring a multidisciplinary approach [2].

In this case, the presence of Kehr's sign combined with imaging evidence of pneumoperitoneum led to the diagnosis of an anastomotic leak after a major abdominal surgery for advanced gastric cancer. This highlights the importance of early recognition of clinical and imaging findings, along with prompt surgical intervention, in managing complex post-operative complications.

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Case Report

A 59-year-old male with a history of gastric cancer, confirmed via Fibro-Optic Gastro-Duodenoscopy (FOGD) as a poorly differentiated adenocarcinoma infiltrating the gastric wall and surrounding structures, underwent a distal gastrectomy, right colectomy, and atypical hepatectomy for locally advanced gastric adenocarcinoma. The surgical procedure involved the creation of a Y-shaped gastrojejunostomy to restore gastrointestinal continuity.

Postoperatively, the patient developed significant complications, including an infection at the anastomotic site accompanied by fluid leakage. On postoperative day seven, he presented with acute clinical deterioration, characterized by severe abdominal pain, signs of peritonitis, and referred left shoulder pain (Kehr's sign), indicative of diaphragmatic irritation.

Laboratory evaluation revealed a markedly elevated C-reactive protein (CRP) level of 215 mg/L (normal < 5 mg/L), consistent with active inflammation and infection. Additionally, a white blood cell count of 15,000/mm³ (normal 4,000-10,000/mm³) with 85% neutrophils suggested a systemic inflammatory response.

Given the clinical presentation, an urgent CT scan was performed, which revealed free air under the diaphragm and within the peritoneal cavity, consistent with pneumoperitoneum. The imaging also identified significant air accumulation in the perisplenic region, raising concerns for a potential anastomotic leak. Furthermore, fluid collections were noted beneath the left diaphragm, suggestive of abscess formation, along with thickened peritoneal linings indicative of localized peritoneal inflammation (Figure 1 and 2).

The patient was taken to the operating room for urgent surgical exploration. Intraoperative findings confirmed an anastomotic leak, resulting in generalized peritonitis and an abscess beneath the left diaphragm. The anastomotic site was revised, and the abscess was thoroughly drained. Surgical debridement and lavage of the peritoneal cavity were performed to address contamination.

Postoperatively, the patient was managed in the intensive care unit with broad-spectrum antibiotics, including meropenem and vancomycin, to cover gram-negative, anaerobic, and resistant gram-positive organisms. He underwent close monitoring for additional complications, with serial CRP measurements used to evaluate the resolution of inflammation. Repeat imaging studies during follow-up showed gradual reduction in the size of residual fluid collections. The patient's condition stabilized, and he began showing signs of recovery, emphasizing the importance of early recognition, prompt surgical intervention, and multidisciplinary postoperative care in managing complex cases such as this.



Figure 1: (a, b) Axial and coronal view on a contrast-enhanced CT scan, showing pneumoperitoneum in the perisplenic region. Free air is visible under the diaphragm (blue asterisk), confirming the presence of gastrointestinal perforation.

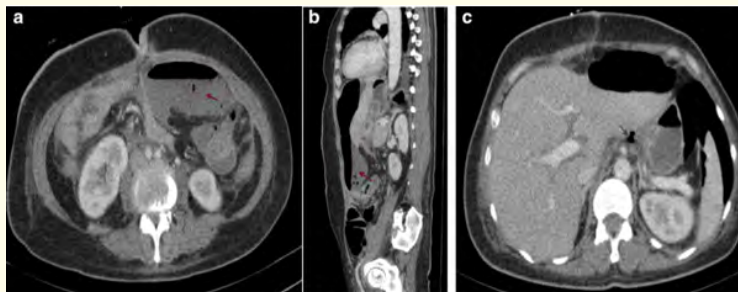


Figure 2: (a, b) Axial and sagittal view on a contrast-enhanced CT scan, showing a voluminous fluid collection in the peritoneal cavity, in contact with the jejunocolic anastomosis extending from the diaphragm to the umbilicus (red arrow). (c) Axial view on a contrast-enhanced CT scan, indicating a bubble of pneumoperitoneum near the gastro-duodenal anastomosis (green arrow).

Discussion

Kehr's sign, characterized by referred pain in the left shoulder due to diaphragmatic irritation, is a well-documented clinical phenomenon resulting from shared innervation of the diaphragm and shoulder via the phrenic nerve (C3-C5). While typically associated with acute abdominal pathologies, its occurrence in the post-operative setting is rare but clinically significant, as it may signal life-threatening complications [1].

The most common etiology of Kehr's sign is splenic rupture following abdominal trauma, where subdiaphragmatic blood accumulation irritates the phrenic nerve [2]. Other reported causes include spontaneous rupture of the phrenic artery [3], infectious conditions like mononucleosis, and procedural complications such as colonoscopy [4], and, less commonly, extracapsular hepatocellular adenomas have been implicated [5]. To date, the occurrence of Kehr's sign in the context of post-operative pneumoperitoneum due to an anastomotic leak has not been documented.

In the present case, the patient presented with left shoulder pain during the post-operative period following gastrointestinal surgery. Imaging revealed pneumoperitoneum caused by an anastomotic leak. The accumulation of free air beneath the diaphragm was identified as the source of diaphragmatic irritation, leading to Kehr's sign [6]. This finding proved critical in raising suspicion for subdiaphragmatic pathology and guiding further diagnostic and therapeutic steps.

The pathophysiology underlying this association is well-supported. Any condition leading to the accumulation of air or fluid beneath the diaphragm—whether inflammatory, infectious, or mechanical—can directly irritate the phrenic nerve, resulting in referred shoulder pain [1,7]. Although typically associated with splenic or hepatic pathologies, this case demonstrates that Kehr's sign can also indicate gastrointestinal complications, such as anastomotic leaks. A thorough clinical history remains essential to guide the diagnostic process in such cases.

Imaging, particularly computed tomography (CT), was instrumental in this case. CT confirmed the presence of free air beneath the diaphragm (Figure 1), localized the anastomotic leak, and guided emergency surgical intervention. The free air in the perisplenic region was indicative of gastrointestinal perforation, which was later confirmed to result from an anastomotic failure. The patient underwent laparotomy, extensive peritoneal lavage, drainage, and reconstruction of the anastomosis. Post-operative management included broad-spectrum antibiotics and imaging surveillance to monitor for potential complications.

Pneumoperitoneum, defined as the presence of free air within the peritoneal cavity, is most often associated with gastrointestinal perforation [8]. Common etiologies include perforated peptic ulcers, bowel rupture, or post-operative anastomotic failure [9]. Surgical intervention remains the cornerstone of management, typically involving laparotomy or laparoscopy for defect repair and peritoneal lavage [10]. In this case, Kehr's sign served as a vital clinical clue, emphasizing its diagnostic value in detecting subdiaphragmatic complications.

This case highlights the importance of recognizing Kehr's sign as a radiological and clinical red flag for pneumoperitoneum in post-operative patients, particularly those with recent gastrointestinal surgeries. Early identification and targeted imaging are essential to ensure prompt diagnosis and appropriate intervention. Effective post-operative care, including infection control and vigilant monitoring, remains critical in minimizing morbidity and optimizing recovery.

Conclusion

Kehr's sign serves as a critical clinical clue in diagnosing pneumoperitoneum, especially in post-operative patients. This case underscores the importance of combining clinical findings, such as Kehr's sign, with imaging to confirm the diagnosis and guide early intervention. Surgical management, along with careful post-operative monitoring for complications like infection, is essential for successful outcomes in complex cases involving pneumoperitoneum.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

Bibliography

1. V Klimpel. "Does Kehr's sign derive from Hans Kehr? A critical commentary on its documentation?". *Der Chirurg* 75.1 (2004): 80-83.
2. Olivier A Pluut., *et al.* "Spontaneous, atraumatic rupture of the spleen in a young man". *Nederlands Tijdschrift voor Geneeskunde* 159 (2015): A8392.
3. Sutton CD., *et al.* "Kehr's sign - a rare cause: spontaneous phrenic artery rupture". *ANZ Journal of Surgery* 72.12 (2002): 913-914.
4. Steele DC., *et al.* "Splenic rupture following colonoscopy". *Digestive Diseases and Sciences* 62.1 (2017): 72-75.
5. Taj H., *et al.* "Extracapsular hepatocellular adenoma: a diagnostic dilemma". *Cureus* 12.6 (2020): e8928.
6. H Slimani., *et al.* "Kehr's Sign. A Clinical Sign that can Save!". *Annales Françaises de Médecine d'Urgence* 7 (2017): 205.
7. Söyüncü S., *et al.* "Traditional Kehr's sign: Left shoulder pain related to splenic abscess". *Turkish Journal of Trauma and Emergency Surgery* 18.1 (2012): 87-88.
8. Brandon C Chapman., *et al.* "Postoperative pneumoperitoneum: is it normal or pathologic?". *Journal of Surgical Research* 197.1 (2015): 107-111.
9. Tiffany Nicole Tanner., *et al.* "Pneumoperitoneum". *Surgical Clinics of North America* 98.5 (2018): 915-932.
10. Radu Seicean., *et al.* "Anastomotic leakage after gastrectomy for gastric cancer". *Journal of Gastrointestinal and Liver Diseases* 32.4 (2023): 526-535.

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