

## Perforated Duodenal Ulcer Associated with an Incarcerated Hiatal Hernia: Report of a Case

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### Abstract

We report the case of a perforated duodenal ulcer and diffuse peritonitis associated with an incarcerated hiatal hernia. A 77-year-old woman with a 17-year history of rheumatoid arthritis treated with nonsteroidal anti-inflammatory drugs, who had also been receiving treatment for non-Hodgkin's lymphoma over 4 years, was referred to us for investigation of nausea and vomiting. An abdominal compute tomography (CT) scan showed an incarcerated hiatal hernia and free air in the hernia sac. Emergency laparotomy revealed an incarcerated hiatal hernia involving the stomach, transverse colon, and omentum. A perforated ulcer was also found in the posterior wall of the first portion of the duodenum. The combination of these disorders is thought to be rare in patients with a hiatal hernia and free air in its sac. As the reported mortality of perforated gastric ulcer associated with a hiatal hernia is high, early elective surgery should be performed in patients with a duodenal ulcer associated with a hiatal hernia.

**Key words** Hiatal hernia · Duodenal ulcer · Perforation

### Introduction

Gastric ulcers develop in 6%–8% of patients with a hiatal hernia, and it has been estimated that perforation occurs in about 7% of patients with a symptomatic gastric ulcer and a hiatal hernia.<sup>1</sup> However, to our knowledge, no article about perforated duodenal ulcer associated with incarcerated hiatal hernia has been published. This combined condition is thought to be extremely rare in patients with a hiatal hernia.

### Case Report

A 77-year-old woman with a symptomatic, sliding-type hiatal hernia was referred to our department for investigation and treatment of nausea and vomiting. The patient had a 17-year history of rheumatoid arthritis, treated with nonsteroidal anti-inflammatory drugs (NSAIDs) and steroids, and a 4-year history of receiving treatment for non-Hodgkin's lymphoma with several chemical regimens, including steroids. An initial physical examination in the emergency room revealed no signs of peritoneal irritation.

Abdominal roentgenogram showed slight accumulation of free air in the already known hiatal hernia sac (Fig. 1). An abdominal computed tomography scan showed a severely incarcerated hiatal hernia involving the stomach, transverse colon, and omentum, as well as a small amount of free air in the hiatal hernia sac (Fig. 2a,b). No obvious free air existed in the rest of the peritoneal space, apart from the hiatal hernia sac. A small amount of peritoneal fluid was also seen.

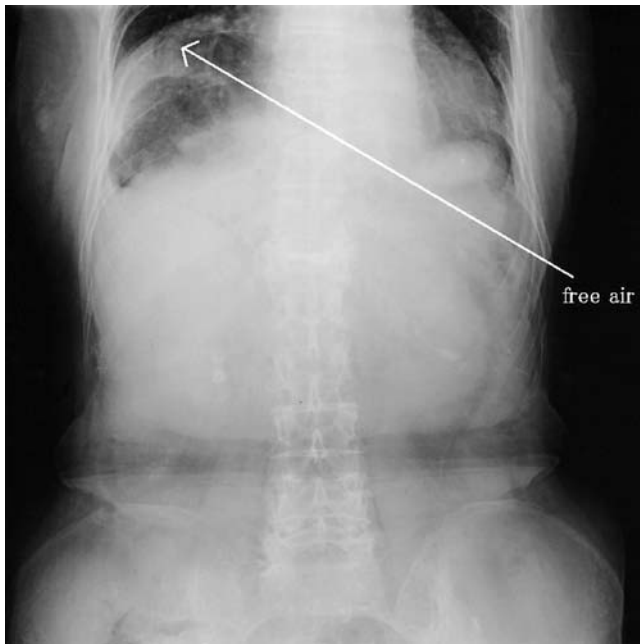
An emergency laparotomy was performed under the preoperative diagnosis of gastrointestinal perforation at an unknown site, possibly caused by a gastric ulcer, as well as an incarcerated sliding-type hiatal hernia and diffuse peritonitis.

We found a small amount of uncontaminated peritoneal fluid and massive incarceration of the stomach, omentum, and transverse colon through the hiatal hernia orifice to the mediastinum. The first and second part of the duodenum had been longitudinally stretched and straightened in association with the incarcerated stomach. A sequence of manual reduction of the fundus of the stomach, the greater curvature of the stomach, the omentum, and the transverse colon was accomplished. Finally, the lower part of the stomach was reduced from the hiatal hernia orifice. The anterior part of the stomach and the transverse colon were carefully inspected, but no perforation was found. All of the incarcerated

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organs appeared slightly edematous and congested, indicating mild strangulation, but there were no necrotic signs. An incision was made in the omentum minus, and the posterior part of the stomach and duodenum were



**Fig. 1.** Preoperative abdominal roentgenogram showed an elevated right diaphragm with a small amount of free air under the right diaphragm (arrow)

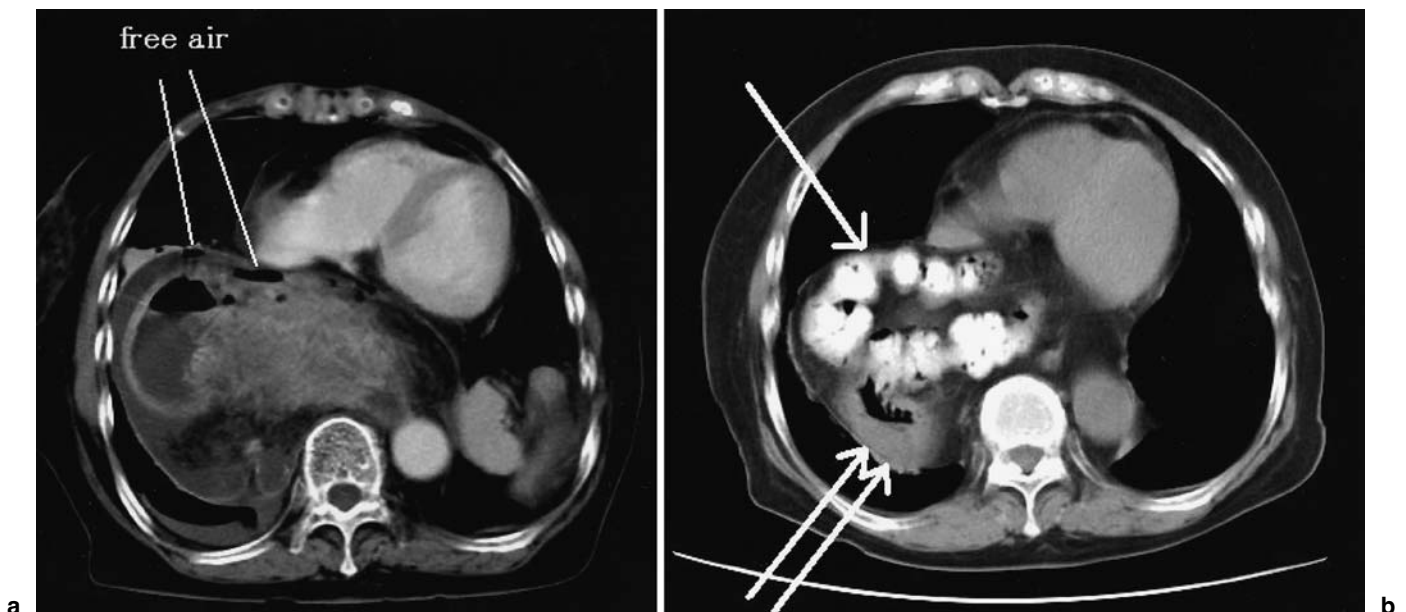
visualized. A hole, 3 mm in diameter, was found on the posterior wall of the first part of the duodenum (Fig. 3). The perforation was covered with an omental patch and the hiatal hernia was repaired by partial closure of the hernia orifice and fundoplication.

The patient's postoperative course was complicated by pneumonia, diffuse peritonitis, and thrombocytopenia of unknown origin, which resulted in systemic failure. She died on the 40th postoperative day.

## Discussion

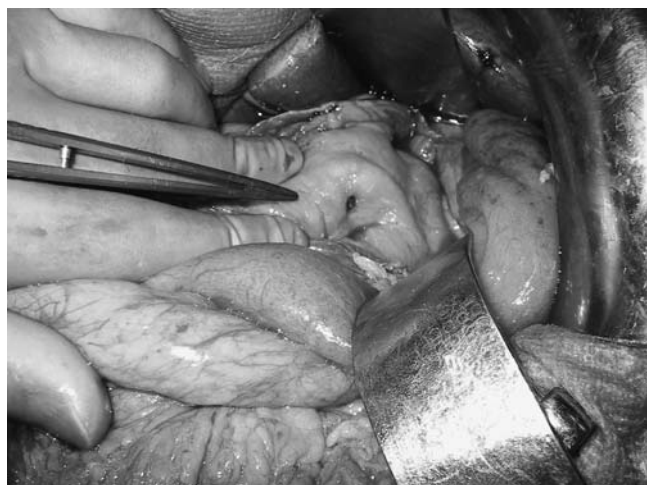
According to a previous report, gastric ulcers were found in 6%–8% of hiatal hernias, and perforation was estimated to occur in 7% of patients with a symptomatic gastric ulcer and a hiatal hernia.<sup>1</sup> Although many patients with hiatal hernias remain asymptomatic, chronic incarcerated hiatal hernia may lead to serious life-threatening problems requiring operative intervention.<sup>2</sup> Therefore, early elective surgery before perforation is strongly recommended.<sup>1–4</sup> Our research failed to find any report on perforated duodenal ulcer associated with incarcerated hiatal hernia and, to the best of our knowledge, ours is the first case to be documented.

Hirshberg and Schein discussed the pathogenesis of gastric ulcer in hiatal hernia in detail.<sup>1</sup> The “riding ulcer” was introduced to describe a mechanism of continuous trauma to the gastric wall by the “riding



**Fig. 2.** **a** Preoperative plain abdominal computed tomography (CT) scan on the day of perforation showed an incarcerated hiatal hernia involving the stomach, transverse colon, and omentum. A small amount of free air was seen in the hiatal hernia sac. **b** Preoperative chest CT scan with intravenous

enhancement and transanal intestinal enhancement, done 3 months before the perforation. Organs such as the stomach (double arrow) and the transverse colon (arrow) were clearly visualized



**Fig. 3.** Intraoperative photograph showing a perforation, 3 mm in diameter, on the posterior wall of first part of the duodenum

motion” of the herniated stomach in and out of the chest during herniation.<sup>5</sup> Stretching of the left gastric vascular pedicle or a deficient supply of blood to the lesser curvature are also predisposing mechanical factors.<sup>1</sup> Hyperacidity<sup>6</sup> and retention of the gastric secretion<sup>7</sup> are predisposing chemical factors, which explain the effectiveness of acid-reducing medication. The long-term intake of NSAIDs or steroids may also contribute to the development of gastroduodenal ulceration. The pathogenesis of the duodenal ulcer with the hiatus hernia in our patient is still unclear, but the fact that the perforation on the posterior wall of the duodenum was located not in the hiatus hernia sac but in the free intraperitoneal space would indicate the unlikely existence of a riding ulcer of the duodenum. As stretching of the left gastric vascular pedicle or a deficient supply of blood to the lesser curvature is a mechanical factor predisposing to gastric ulcers with hiatal hernia,<sup>1</sup> the stretching of the right gastric and gastroepiploic vascular pedicles by incarceration of the stomach and omentum with the transverse colon in this patient could also have been a mechanical factor-predisposing to the development of the duodenal ulcer. Our patient had undergone a gastroduodenal endoscopic examination 1 year before this perforative event. A severe sliding hiatus hernia and healing ulcer scars on the anterior wall of the middle portion of the stomach were seen, but there were no lesions in the first or second part of the duodenum at that time.

There are two possible reasons why free air was found only in the hernia sac and not elsewhere in the

peritoneal cavity. First, the area of perforation in the posterior wall of the duodenum was already inside the hiatal hernia orifice, and second, the duodenal ulcer perforated inside the peritoneal space and free air moved under the hepatoduodenal ligament and omental bursa, and up into the hiatal hernia. The operative finding that the first and second part of the duodenum were longitudinally stretched and straightened, but not incarcerated in the hiatal hernia sac support the second explanation.

This combined condition is thought to be extremely rare, but a definite possibility in patients with a hiatal hernia and a duodenal ulcer. Because the reported mortality of perforated gastric ulcer associated with hiatal hernia exceeds 60%,<sup>1</sup> the mortality of a perforated duodenal ulcer associated with a hiatal hernia is also thought to be high. Our patient died on the 40th postoperative day, of pneumonia, diffuse peritonitis, and thrombocytopenia of unknown etiology. Therefore, the indications for surgical treatment of an unperforated duodenal ulcer associated with incarcerated hiatal hernia should be considered carefully. For gastric ulcer associated with a hiatal hernia, failure of the ulcer to heal or recurrence are indications for surgery.<sup>1</sup> While some surgeons advocate reducing the stomach and repairing the hiatus hernia, many surgeons insist on supplementing the repair of hernias with a direct attack on the ulcer by gastric resection, ulcer excision, or vagotomy and drainage.<sup>1</sup> In conclusion, early elective surgical intervention is strongly recommended for a medically uncontrollable duodenal ulcer associated with a hiatus hernia, especially in high-risk patients such as those on steroids or NSAIDs.

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