

## A Case of Perforated Gastric Cancer Arising from an Upside-Down Stomach through Para-Esophageal Hiatal Hernia

Mahtab Vasigh<sup>1</sup>, Mohammad Reza Karoobi<sup>1</sup>, Hossein Zabihi Mahmoudabadi<sup>1</sup>, Hossein Zabihi<sup>1</sup>, Ehsan Rahim Pour<sup>1</sup>, Pedjman Farshidmehr<sup>2</sup> and Reza Hajebi\*

<sup>1</sup>Department of Surgery, Tehran University of Medical Sciences, Tehran, Iran

<sup>2</sup>Department of Vascular Surgery, Tehran University of Medical Sciences, Tehran, Iran

### Abstract

Herein we report on a case of complicated adenocarcinoma arising from an upside-down stomach in an elderly patient. An 84-year-old woman was brought to the emergency department of our hospital with abdominal pain, nausea and vomiting. AA Chest CT and an abdominopelvic CT revealed that the entire stomach had migrated into the posterior mediastinum and there was some air and fluid in the peritoneal cavity. The patient underwent a laparotomy. The upside-down stomach herniated through hiatal hiatus was reduced. There was a tumor at the ant rum of the stomach which had been perforated. A subtotal gastrectomy and regional lymph node dissection with Roth and I reconstruction and Braun procedure was done. The hiatal defect was closed by primary suturing of the right and left crura at the anterior space of the esophagus. The patient became septic within the post-op period and she expired a week after the surgery. To the best of our knowledge, this is the seventeenth case reported of adenocarcinomas in an upside-down stomach and the only case which was diagnosed due to a complication.

**Keywords:** Gastric cancer; Para-Esophageal hiatal Hernia (PEH); Adenocarcinoma; Hypertension; Ischemic heart disease

### Introduction

Herniation of intra-abdominal organs into thoracic space through the esophageal hiatus is called Para-Esophageal hiatal Hernia (PEH). It is the most common type of diaphragmatic hernia. Progressive weakening and stretching of the Para-esophageal membrane enlarges the diaphragmatic hiatus. It is the likely causative mechanism leading to PEH. PEH is more common in infants and the elderly. Congenital defects in infancy trigger this disease. In adults, some underlying conditions such as weakening of the supportive tissue of the lower esophagus or high abdominal pressure and obesity may cause PEH [1]. Four types of PEH have been described: Sliding (type I), Para esophageal (type II), mixed-form (type III) and upside-down stomach (type IV). Gastric malrotation is a life threatening condition characterized by an abnormal rotation of the stomach around an axis. Bettex and Kuffer describe a form of PEH, wherein the stomach is migrated into thoracic space accompanied with an organ axial malrotation [2]. Gastric cancer is sometimes complicated by PEH; however, advanced adenocarcinoma of pylorus arising from an upside-down stomach associated with PEH is extremely rare. This report describes the case of an elderly patient with an advanced gastric cancer arising from an upside-down stomach through a PEH which was perforated at the time of diagnosis.

### Case Presentation

An 84-year-old woman came to the emergency department of Sina Hospital due to abdominal pain. The patient's symptoms started 5 days earlier. She had nausea, and several episodes of vomiting within this time. Her medical history included hypertension and ischemic heart disease. She had a coronary artery bypass grafting 15 years earlier. Her vital signs were within normal limits and she was afebrile. A Physical examination revealed generalized abdominal tenderness and guarding. Laboratory findings on admission showed leukocytosis. A Chest CT revealed a Para-esophageal hiatal hernia in which almost all parts of the stomach were located superior to diaphragmatic level (Figures 1-3). In abdominal-pelvic CT free air and a moderate amount of fluid could be

seen in the peritoneal cavity. The patient underwent a laparotomy. Some reactive fluid and fibrin material was present in the peritoneal cavity (Figure 4). The entire stomach had migrated into thorax through diaphragmatic hiatus. The migrated stomach was reduced (Figure 5). Gross examination of the stomach revealed a tumor measuring 3.0 × 4.0 cm at the posterior wall of ant rum, which had been perforated (Figure 6). A sub-total gastrectomy and Bill Roth I reconstruction plus Braun procedure was performed. Then the hiatus was explored. The hernia orifice was approximately 8 cm in diameter (Figure 7). Finally, the hiatal defect was closed by primary suturing of the right and left crura at the anterior space of the esophagus; the remnant stomach was fixed to the crus of the diaphragm (Figure 8). The patient was transferred to ICU intubated. A Histopathology examination of the stomach confirmed the diagnosis of poorly differentiated adenocarcinoma in posterior wall of ant rum measuring 4.5 cm in its greatest dimension. Perineural and lymphoma-vascular invasion were present. All resected lymph nodes and proximal and distal margins of the stomach and tomentum were free from tumor. On the third postoperative day the patient became febrile and toxic. In spite of broad spectrum antibiotic therapy and supportive care, her blood pressure declined gradually and did not respond to medical treatment. Unfortunately, on the seventh post operation day the patient expired due to septic shock.

\*Corresponding author: Reza Hajebi, Department of Surgery, Tehran University of Medical Sciences, Tehran, Iran, Tel: 01136746911; E-mail: reza\_hajebi2@yahoo.com

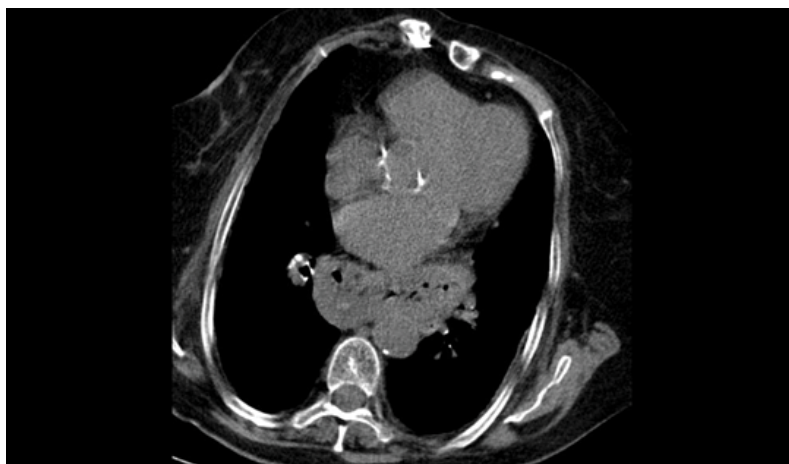
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**Figure 1:** Chest CT, cardiac is migrated into posterior mediastinum.



**Figure 2:** Chest CT, body of stomach migrated into posterior mediastinum.



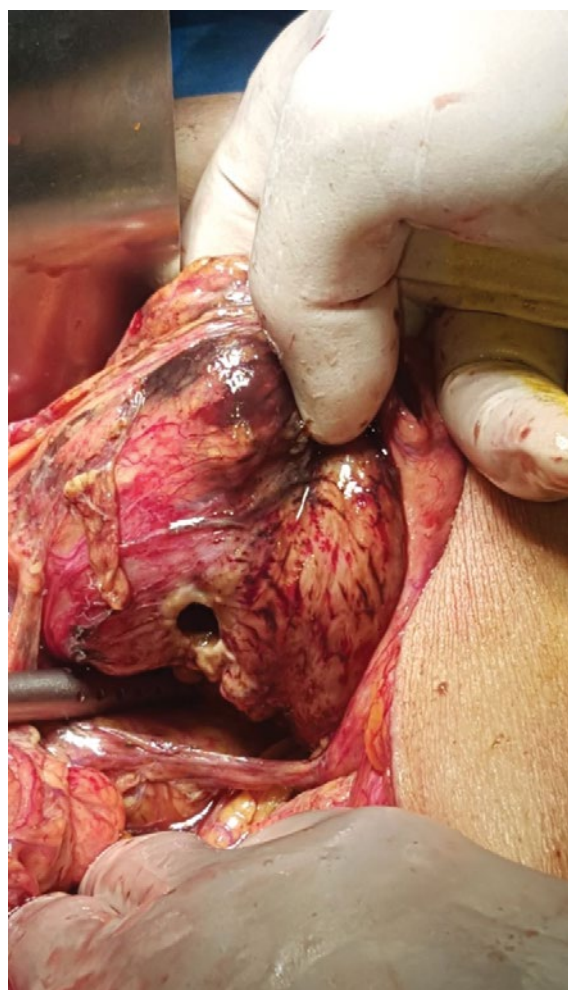
**Figure 3:** Chest CT, upside- down stomach completely migrated into posterior mediastinum.



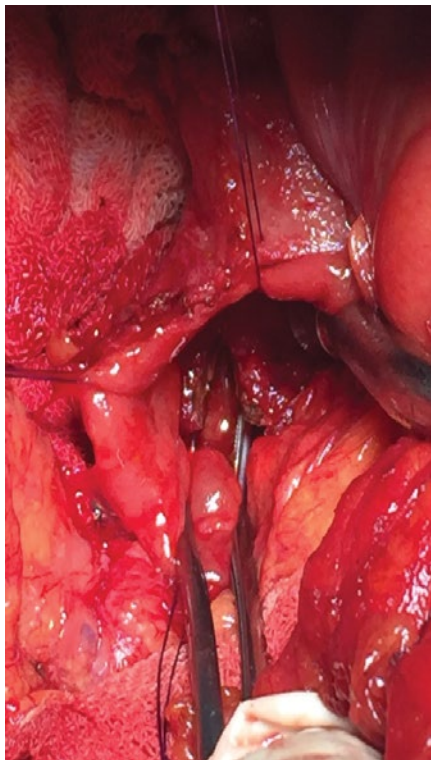
**Figure 4:** Upside- down stomach migrated into thoracic cavity through diaphragmatic hiatus.



**Figure 5:** Stomach is reduced from thorax back to the abdominal cavity.



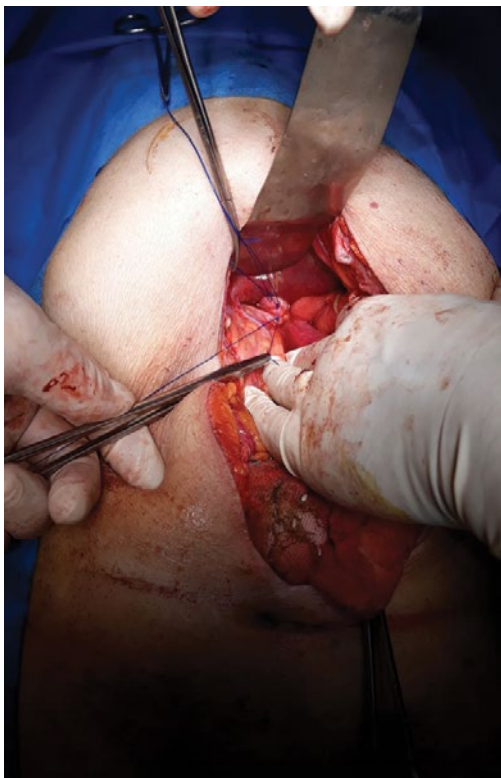
**Figure 6:** Post wall of ant rum is perforated due to a tumor mass.



**Figure 7:** Diaphragmatic hiatus after reduction of stomach into abdominal cavity.



**Figure 9:** Gross specimen revealing subtotal gastrectomy and perforation in the posterior wall of the ant rum.



**Figure 8:** Repair of defect of diaphragmatic hiatus.

## Results and Discussion

Para-esophageal hiatal Hernia (PEH) wherein the entire stomach migrates into the posterior mediastinum, accompanied by gastric organ-axial rotation results in a rare condition, known as upside-down stomach. Chronic reflux of gastric juices into the esophagus is one of the strongest risk factors for adenocarcinoma of the esophagus and gastric cardiac. However, there is no general agreement about the relationship between PEH and gastric cancer [3]. There are reports indicating that patients with such cancers show a high prevalence of co-existing PEH [4,5]. Therefore, several studies suggested that an upper gastrointestinal endoscopy should be performed regularly in patients with PEH to assess the possible occurrence of gastro esophageal malignancies [6-8].

Gastric cancer presenting in upside-down stomach is extremely rare, and to the best of our knowledge, the present case is the seventeenth such cases reported in the literature [9-14]. Among these cases, the mean patient age was 78.9 years and most of the patients were female (male: female ratio=3:11). The chief complaints were abdominal symptoms such as nausea and vomiting, and epigastria discomfort and thoracic symptoms such as heartburn, dyspnea and palpitations, which were not regarded as specific clinical symptoms in this pathological condition [10]. Considering the similarity of the symptoms of gastric cancer and PEH, detection of gastric cancer may be delayed [15]. Accordingly, gastric cancer arising through an upside-down stomach through a PEH tends to be more advanced and detected at a later stage. 46.1% of the patients show stage III and IV tumors. At the time of initial diagnosis the tumor is usually large (mean diameter 69.8 mm).

Histopathologically, moderately differentiated adenocarcinoma exists in 42.8% of the patients, 35.7% are poorly differentiated adenocarcinoma and 7.1% are well-differentiated adenocarcinoma, signet ring cell carcinoma or large-cell neuroendocrine carcinoma [10].

Surgical intervention is undertaken in most patients, even those who are asymptomatic, because of the high associated risk of life threatening complications, such as strangulation, perforation, and bleeding [16].

Surgical treatment includes reduction of the herniated stomach and standard surgical treatments for gastric cancer according to the stage of cancer. Finally, the hernia orifice is repaired. Among the 17 reported patients, including the present one, 7 underwent total gastrectomy, 8 underwent distal gastrectomy, 1 underwent proximal gastrectomy and 1 was administered chemotherapy. The mean diameter of the hiatus was 64.1 mm. Closure of the hernia orifice was performed in 15 patients. There are 5 successful totally laparoscopic surgical repairs among those cases [11,12]. Anastomotic leakage occurred in 2 cases. The change in negative and positive pressures caused by breathing after closure of the hernia orifice could have been a predisposing factor leading to anastomotic leakage [16]. Meanwhile, whether closure of the hernia orifice affects anastomotic dehiscence is unclear.

## Conclusion

Although PEH is a common chronic disorder, an upside-down stomach is a rare type of PEH. Moreover, gastric cancer arising from an upside-down stomach through a PEH is extremely rare. Early detection of gastric cancer may be delayed because the symptoms of gastric cancer are concealed by large PEH. We should consider gastric malignancies in patients with a PEH and perform careful regular follow-up examinations by upper gastrointestinal endoscopy. Additional reports of gastric cancer arising from an upside-down stomach are needed for optimization of standard management of this uncommon disease.

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