



A Case of Early Gastric Carcinoma Associated with an Organoaxial Stomach Volvulus Through Paraesophageal Hiatal Hernia - A Case Report and Review of Literature

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Abstract

Paraesophageal Hernia (PEH) is the herniation of the intra-abdominal organs into the thoracic space *via* the esophageal hiatus. An upside-down stomach is when there is herniation of the stomach along with organoaxial volvulus and is a rare entity.

We present a case of an elderly patient diagnosed with early gastric cancer arising in an upside-down stomach. An elderly man presented with complaints of bloating sensation, belching and anorexia since the past 3 to 4 months. An esophagogastroduodenoscopy was done which revealed a large hiatus hernia with gastric volvulus, chronic atrophic gastritis, and a superficial lesion on anterior stomach wall. Lesion was suggestive of early gastric cancer, which was confirmed on biopsy as a well-differentiated adenocarcinoma. After imaging, the patient underwent reduction of the gastric volvulus and hiatal repair followed by distal gastrectomy and gastropexy of residual stomach with Billroth II reconstruction.

On table esophagogastrosocopy was done to delineate the extend of the gastric lesion and ensure complete excision of the lesion as it had minimal thickening.

To our knowledge, out of the 18 cases reported prior to this of malignancy in upside down stomach, this is the 5th case to have an early gastric carcinoma.

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Keywords: Upside-down stomach; Gastric volvulus; Gastric carcinoma

Introduction

The term hiatus hernia encompasses the condition where intraabdominal organs herniate into the thorax *via* the esophageal hiatus of the diaphragm. Hiatal hernias are broadly classified into four types based on the location of the gastroesophageal junction and the presence of a true hernial sac [1,2]. Type 1 or the sliding hiatal hernia (85%-91%) is the most common type where there is cephalad displacement of the gastroesophageal junction above the diaphragm. The other three types of hiatal hernia are called paraesophageal hernias (5%-15%). Paraesophageal hernia is a true hernia with a hernial sac. Type 2 is where the fundus of the stomach herniates through the phrenoesophageal membrane, and the gastroesophageal junction is fixed at its original location. Type 3 is the combination of the first two types. Type 4 has a large defect through which other abdominal organs herniate into the thorax. A combination of prolapse and volvulus of the greater portion of the stomach also called as an intrathoracic upside-down stomach is included in type IV hiatal hernias. This the rarest of all the hiatal hernias [1,3].

In an upside-down stomach, presence of malignancy is rare. Moreover, the incidence of an early gastric adenocarcinoma is itself rare in India due to its delayed presentation [4]. A case where an early gastric adenocarcinoma was detected in an upside-down stomach makes it a notable entity.

Case Presentation

An elderly man reported to the hospital with complaints of bloating sensation, belching and anorexia since past 3 to 4 months for which an esophagogastroduodenoscopy was done. His medical history included left occipital infarct leading to rigidity of bilateral upper and lower limbs, scar epilepsy, pulmonary Kochs. On examination, his abdomen was soft and flat and showed no palpable mass. Laboratory tests revealed hypoproteinemia (albumin 3.1 g/dl); all other results were normal. Upper gastrointestinal endoscopy showed pan atrophic gastritis (Kimura O-3) with early gastric

Table 1: Summary of gastric cancers in upside down stomach [12-15].

Case	Year	Reference (first author)	Age	Gender	Chief complaints	Location of gc	Staging	Histology	Treatment	Size of hiatus, mm	Closure of hernial orifice	Complication
1	1993	Izumi	80	F	Anemia	M	III B	P/D	Total gastrectomy; R-Y	70	None	Anastomotic leak
2	1994	Narayan	71	M	Dysphagia	U, M, L	IV	P/D	Total gastrectomy; B-I	Unknown	Done	Unknown
3	1996	Sato	80	F	Nausea, vomiting	U, M, L	Unknown	Sig	Chemo (methotrexate + fluorouracil)	35	No surgery	-
4	1997	Matsuda	70	F	Abdominal fullness, heartburn, appetite loss	M, L	IIIB	P/D	Total gastrectomy; R-Y	70	DONE	NONE
5	1999	Seshimo	78	F	Nausea, appetite loss	L	IB	W/D	Distal gastrectomy, B-I	70	Done	None
6	2001	Kawai	85	F	Dyspnea, Palpitation	M	IA	M/D	Distal gastrectomy, B-I	80	Done	Pneumonia
7	2001	Horiba	74	F	Fever	M, L	IIIA	M/D	Distal gastrectomy, B-I	Unknown	Done	Unknown
8	2003	Tsutani	73	F	Epigastralgia	U	IA	M/D	Proximal gastrectomy, interposition	60	Done	Leakage of anastomosis
9	2009	Iso	86	F	Tarry stool	U	II	LCNEC	Total gastrectomy, R_Y	50	Done	None
10	2010	Shibuya	87	M	Appetite loss, vomiting	L	IA	M/D	Distal gastrectomy, B-I	100	Done	None
11	2010	Takahashi	73	F	Abdominal pressure, appetite loss	L	II	P/D	Total gastrectomy, R_Y	70	Done	None
12	2012	Kominami	87	F	Appetite loss, fatigue	M, L	III	P/D	Distal gastrectomy, R-Y	50	Done	None
13	2013	Toyokawa	78	F	Vomiting, abdominal pain	U	IA	M/D	laparoscopic assisted Total gastrectomy, R-Y	Unknown	Done	None
14	2013	Mia Tsutani	82	M	Appetite loss, anemia	U, M, L	IIIA	M/D	Total gastrectomy, R-Y	50	Done	None
15	2015	Namikawa	88	F	None - diagnosed on medical check up	L	II	W/D	Distal gastrectomy, R-Y	Not mentioned	Done	Not mentioned
16	2016	Namikawa	83	M	Not mentioned	L, antrum	IA, II	M/D	laparoscopic assisted distal gastrectomy, B-I	60	Done	None
17	2021	Vasigh	84	F	Abdominal pain, nausea, vomiting	Antrum	IIIB	P/D	Subtotal gastrectomy, B-I	80	Done	Septic shock and death
18	2022	Present case	68	M	Bloating and belching	M	IA	W/D	Distal gastrectomy, B-I	70	Done	None

B-I: Billroth-I; GC: Gastric Cancer; L: Lower; LCNEC: Large-Cell Neuroendocrine Carcinoma; M: Middle; M/D: Moderately Differentiated Adenocarcinoma; P/D: Poorly Differentiated Adenocarcinoma; R-Y: Roux-en-Y; Sig: Signet ring cell carcinoma; U: Upper; W/D: Well-Differentiated adenocarcinoma

cancer of the anterior stomach wall. It also showed an organoaxial volvulus also known as an upside-down stomach (Figure 1). Pathological analysis of biopsy specimens revealed well differentiated adenocarcinoma. Computed tomography images showed an organoaxial gastric volvulus which is sliding up through a large PEH (Figure 2) and irregularly thickened gastric mucosa at the greater curvature through the PEH. No lymph nodes or distant metastases seen. Preoperative staging for gastric cancer was T1aN0M0, stage I. It was decided to go for the reduction of volvulus with gastrectomy guided by on table esophagogastroscope, repair of hernial hiatus and gastropexy of residual stomach.

Median laparotomy incision was taken, and more than two-thirds of stomach was found to be herniated through the enormously dilated hiatus into the left thorax along with the greater omentum (Figure 3). The hernial orifice was approximately 7 cm in diameter (Figure 4). The stomach was untwisted and hernia was reduced completely.

Since, the tumor was only mucosal, induration could not be felt. On table, esophagogastroscope was done and exact tumor margins marked (Figure 5). Since, there were signs of pan atrophic gastritis with few small discrete suspicious lesions in the distal stomach, it was decided to go for distal gastrectomy with Billroth II reconstruction. A nasogastric tube was passed beyond the anastomosis to continue the enteral feeding. The crura of the diaphragm were approximated with interrupted nonabsorbable sutures for closure of the hernial orifice - 3 sutures posteriorly right above the aorta (Figure 6) and 1 suture anteriorly taken. Gastropexy of residual stomach was done to prevent relapse of the volvulus.

Histopathological examination revealed Moderately differentiated mucinous adenocarcinoma of the stomach infiltrating muscle without metastasis to regional lymph nodes (pT2N0Mx). The postoperative course was uneventful. Patient was started on enteral feeds on day 2 and full oral diet on day 5.

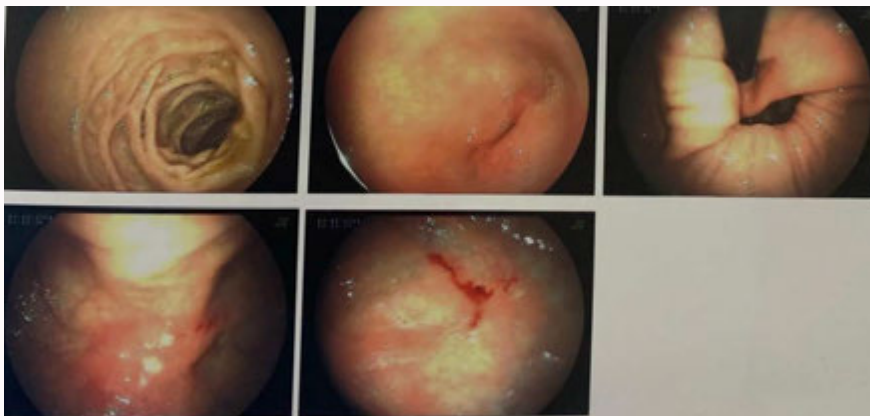


Figure 1: Esophagogastroduodenoscopy showing large sliding hiatus hernia with gastric volvulus and gastric ulcer.

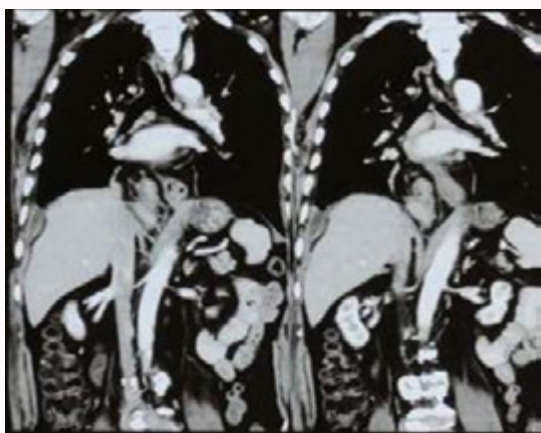


Figure 2: Computed tomography image showing volvulus and paraesophageal hiatal hernia.



Figure 3: Herniation of the stomach through esophageal hiatus.

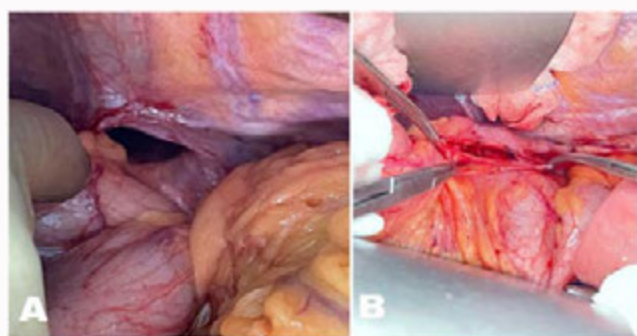


Figure 4: A) Hiatal hernia opening around 7 centimeters. B) Hernia sac.

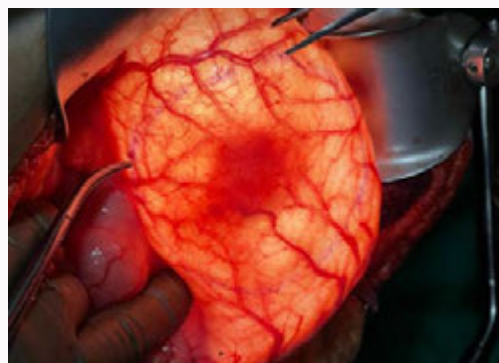


Figure 5: Stomach as seen after inflation for esophagogastroduodenoscopy and under scope light from outside. Tumor seen and adequate margins marked.

Discussion

Gastric volvulus was first described by Berti in 1866 [5]. It is a rare entity, where the stomach rotates on itself along its transverse or longitudinal axis. It was further classified by Singleton in 1940 [6] into organoaxial or mesenteroaxial type. Organoaxial is more common occurring in more than two-thirds of the cases. In 30% of the cases, gastric volvulus is considered as primary (due to laxity of ligamentous attachments) but most of the times it is due to an anatomic disorder of other organs – like spleen, diaphragm [7,8].

Hiatal hernia is a condition in which the intra-abdominal contents protrude from the esophageal hiatus into the thoracic cavity. They are divided into four types. Type IV being the rarest.

Four PEH has two variants - one is the herniation of other abdominal viscera into the thoracic space, and another was described by Bettex and Kuffer as the upside-down stomach, a condition in which all or most of the stomach is placed in the thoracic cavity [9]. Stiefek et al also emphasized on this type of upside-down stomach – a condition in which the stomach is extensively pulled out and twisted upside down in the hernial sack in the thoracic cavity [10]. The upside-down stomach is associated with large hiatal defects as described by Munteanu et al. [11]. Also, a permanent or intermittent

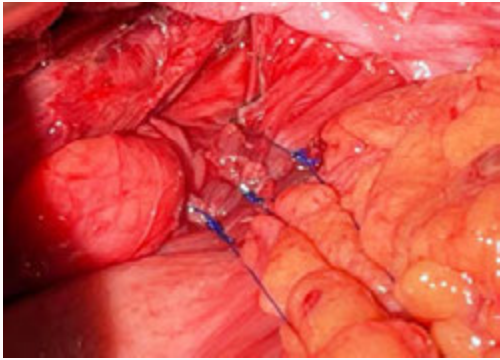


Figure 6: Three non-absorbable sutures taken posteriorly to approximate the two crura of the hernia defect.

protrusion of more than one-third of the stomach into the thoracic cavity, a single organ or in association with other organs, and a hiatal defect of greater than 5 cm were defined with an upside-down stomach [11].

Adenocarcinoma in an upside-down stomach is a rare entity with only 17 cases reported till now, this being the 18th case [12].

Seeing the above cases, the mean patient age was 79.27 years and most of the patients were female (male: female ratio =5:13). The chief complaints were abdominal symptoms such as nausea and vomiting, and epigastric discomfort, belching, loss of appetite and thoracic symptoms such as heartburn and dyspnea which are related to both the disorders PEH and gastric cancer leading to delay in detection of gastric cancer. Therefore, gastric cancer in a volvulus stomach through a PEH tends to be more advanced. Only 5 (including our case) out of 18 case showed IA cancer that is early gastric carcinoma. 44.4% of the patients show stage III and IV tumors. Histopathologically, moderately differentiated adenocarcinoma exists in 38.89% of the patients, 33.4% are poorly differentiated adenocarcinoma and 16.7% are well-differentiated adenocarcinoma, 5.6% signet ring cell carcinoma or 5.6% large-cell neuroendocrine carcinoma. Definitive treatment is untwisting of the volvulus, reduction of hernia and gastrectomy as per the location and stage of tumor followed by hiatal closure. Nagai et al. reported that upside-down stomach is a result of both laxity of the ligamentous attachments of the stomach (hepatoduodenal, hepatogastric, hepatodiaphragmatic ligaments, gastrosplenic ligament), and relaxation of the esophageal hiatus [16].

Hiatal size was an average of 85 mm, correlating higher incidence of upside-down stomach with a larger hiatal size. Closure of hiatus by Crural approximation was done in 16 cases.

Seven cases underwent total gastrectomy, 1 case subtotal gastrectomy, 8 cases underwent distal gastrectomy, 1 proximal gastrectomy and 1 only chemotherapy.

Postoperative complications - one had pneumonia, one septic shock leading to death and two had anastomotic leak - one in total and another in proximal gastrectomy. Since in both cases, anastomosis is in thorax, changes in thoracic pressure caused by breathing after closure of the hernial site might have led to the anastomotic give-away [17].

Still, the relationship between PEH and gastric malignancy remains undefined. Many studies suggest a link between gastric malignancy and PEH, but none have been able to produce direct

evidence for the same [18] and hence regular follow up in patients with PEH to diagnose gastric malignancy at early stage is advisable.

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