

## Gastric Volvulus Complicating Hiatal Hernia

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### ABSTRACT

**Background:** Gastric volvulus (GV) complicating hiatal hernia is rare. It may complicate Nissen fundoplication. It may present with vague symptoms that delay the diagnosis. The radiology and upper gastroscopy are very helpful in diagnosis. The incarcerated stomach is liable for strangulation and infarction so diagnosis and early surgical intervention is mandatory. **Patients and methods:** From July 2012 till January 2016, 12 patients with gastric volvulus complicating hiatal hernia underwent surgical management at Ain Shams University hospitals. **Results:** A total of 12 adult patients presented with gastric volvulus complicating hiatal hernia. Most of the patients had vague symptoms such as atypical gastric pain, fever, obstructive episodes and recurrent chest infection. Six patients had history of previous laparoscopic Nissen fundoplication. In all patient surgical procedures started laparoscopy and completed laparoscopy in 8 of them while converted to open surgery in 4 patients due to difficult in dissection.

**Conclusion:** Gastric volvulus complicating hiatal hernia is rare and can present in a variety of ways and need a high index of suspicion for diagnosis and early surgical intervention.

**Keywords:** gastric volvulus, hiatal hernia

### INTRODUCTION

Gastric volvulus (GV) is defined as an abnormal rotation of the stomach of more than 180° that can result in incarceration and strangulation of the stomach.<sup>1</sup> Gastric volvulus as a complication of hiatal hernia is rare. It is caused by gastric torsion around one of the axes after a partial or complete passage of the stomach through the hiatal orifice.<sup>2</sup> The signs and symptoms of gastric volvulus depend on the rapidity of onset and the degree of rotation and obstruction. Because of the rarity of this disease, common gastrointestinal complaints may lead the physician to misdiagnose this as a non-surgical gastrointestinal disease if detailed history and physical examination are not obtained.<sup>3</sup> This disease is potentially life-threatening because delayed diagnosis and treatment may lead to infarction, perforation, or other lethal insults.<sup>4</sup> The symptoms can be acute with life threatening complications or may have longstanding herniation with vague symptoms, in the form of cough, retrosternal pressure and shortness of breath, abdominal bloating, retching, vomiting, hematemesis and melena.<sup>5</sup> Gastric volvulus is a rare disease that requires a high index of suspicion for diagnosis and rapid treatment.<sup>2</sup> Confirmation of the diagnosis is made by plain radiographs, gastrografen studies and upper

gastro-intestinal endoscopy. In selected patients whose diagnosis was not settled yet, CT scanning was very helpful.

### PATIENTS AND METHODS

#### Patients

This randomized study was done at Ain Shams university hospitals from July 2012 till January 2016.

A total of 12 adult patients presented with gastric volvulus complicating hiatal hernia. The medical records of age, gender, main presentation, duration of symptoms, physical examination, pre-operative laboratory, radiological, operative findings and type of surgical procedure performed were reviewed in all patients. Duration of hospital stay, post-operative complications and mortality were also recorded.

Patients presented with atypical history including severe epigastric pain with distension, vomiting followed by nonproductive retching, and vague symptoms, consisting of cough, retrosternal pressure and shortness of breath. Confirmation of the diagnosis was made by plain radiographs, gastrografen studies, and in selected patients whose diagnosis was not settled yet, CT scanning and upper gastro-intestinal endoscopy was done.

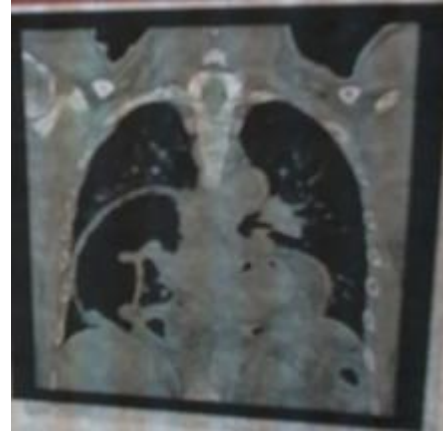
#### Preoperative evaluation

Detailed history from all patient of esophageal and throat complaints was taken. All patients

underwent plain radiographs, gastrografen studies, and in selected patients whose diagnosis was not settled yet, CT scanning or upper gastro-intestinal endoscopy was done. The treatment was surgical in all cases.

### Surgical technique

The surgical approach started laparoscopic in all cases. The operative technique followed the principles as described by Lee et al;<sup>6</sup> Four ports were introduced, and a liver retractor placed through the epigastrium. The standard left crus approach was used to expose the hiatus and esophagus. The dissection began with the division of short gastric vessels along the greater curvature of stomach continuing upward until the angle of His. When the fundus has been thoroughly mobilized, the peritoneum was divided from the left to the right crus, and then the right crus was dissected downward to completely encircle the esophagus. Following this, extended transhiatal esophageal dissection was undertaken by entering into mediastinum and completely reducing the hernia sac. The mediastinal dissection was continued until at least 3 cm of intra-abdominal esophagus was achieved without tension. Then a posterior crural repair was done. In addition to the repair, the cruroplasty was buttressed with onlay V-shaped coated mesh. All patients then underwent gastric fundoplication. Difficult cases converted to open surgery. (Fig 4and5)



**Fig. 2:** CT scan image



**Fig. 3:** Contrast study showing intrathoracic herniated stomach



**Fig. 1:** Chest x-ray showing air fluid level in rt. side of the chest



**Fig. 4:** Nissen fundoplication after mesh placement



**Fig. 5:** Nissen fundoplication after mesh placement

### Statistical Analysis

Required data were collected tabulated and then statistically analyzed. Analysis of data was done using IBM SPSS software (statistical program for social science version 21). Data analysis was performed by the usual methods of descriptive statistics frequencies and percentages for discrete variables, average, median, and standard deviations for continuous variables. The results were significant (S) with  $P < 0.05$  & highly significant (HS) with  $P < 0.01$ .  $P \geq 0.05$  were regarded non-significant (NS).

## RESULTS

### Enrolled Patients

Between July 2012 till January 2016, 12 patients presented with gastric volvulus complicating hiatal hernia were enrolled in our study. There were nine women and three men with a mean age of 39 (18–60). Female: male ratio was 75:25 (Table 1).

**Table 1:** Patient demographics

No. of patients	12
Age (year)	39 (range 18-60)
Sex	
Female	9(75%)
Male	3 (25%)

Most of patients had various symptoms such as atypical gastric pain, fever, obstructive episodes and recurrent chest infection. Six patients had history of previous laparoscopic Nissen fundoplication (Table 2).

**Table 2:** Surgical History

No. of patients	12
Laparoscopic Nissen fundoplication	6(50%)
No Previous surgery	6(50%)

All Surgeries started laparoscopic but 4 cases were converted to open surgery because of difficult in dissection and adhesion while the other 8 cases completed laparoscopic (Table3).

**Table 3:** Conversion rate

No. of patients	12
Completed laparoscopic	8(67%)
Converted to open surgery	4(33%)

In all patient surgical procedures was reduction of stomach and assess it is viability. The hiatal orifice was narrowed in all cases by approximation of the crus by several non-absorbable sutures; Then V-shaped coated mesh was used in all cases. Nissen procedure was performed in all cases.

In this study there was no mortality and complications were as recurrent upper abdominal surgery

## DISCUSSION

The stomach is anchored at the cardia and tethered by the gastrocolic, gastrohepatic, gastrophrenic and gastrosplenic ligaments; however, the stomach needs to store, grind, and mix food requires that it be relatively mobile. As a result, some movement is normal and intermittent episodes of asymptomatic gastric rotation do occur.<sup>7</sup>

According to etiology, gastric volvulus can be classified as either type 1 (idiopathic) or type 2 (congenital or acquired). Type (1) primary gastric volvulus comprises two thirds of cases and is presumably due to abnormal laxity of these ligaments. This allows approximation of the cardia and pylorus when the stomach is full, predisposing to volvulus. Type (1) gastric volvulus is more common in adults but has been reported in children. Type (2) secondary gastric volvulus is found in one third of patients and is usually associated with congenital or acquired abnormalities that result in abnormal mobility of

the stomach.<sup>1,8,9</sup> In adults the most common such defect is a paraesophageal hernia.<sup>9</sup>

Gourgiotis and his colleagues reported in a study that paraesophageal hiatus hernia was the cause of acute gastric volvulus in 16 out of 21 patients.<sup>10</sup> In this study, gastric volvulus (GV) was complication of hiatal hernia in all patients.

The most frequently used classification system according to the axis of rotation was proposed by Singleton<sup>11</sup> who described 3 types of gastric volvulus: organoaxial, mesenteroaxial and combination-unclassified.

Organoaxial volvulus is the most common variant, occurring in approximately 59% of cases.<sup>4</sup> Because the duodenum and gastroesophageal (GE) junction are relatively fixed, the stomach rotates around an axis that connects the gastroesophageal junction and the pylorus "longitudinal axis", with the greater curvature rotating (most often) anteriorly.<sup>12</sup> This rotation is analogous to "wringing out a wet rag."<sup>13</sup> In such cases, obstruction can occur at the pylorus, the gastroesophageal junction, or both. Most cases of acute volvulus are related to organoaxial rotation; strangulation and necrosis are more likely to occur and have been reported in 5-28% of cases.<sup>14</sup>

In this study, all patients were elective and no cases of strangulation and necrosis were found.

In mesenteroaxial volvulus, which comprises 29% of cases, rotation occurs around the transgastric axis (a line connecting the middle of the lesser curvature with the middle of the greater curvature). The result is that the anterior gastric wall folds upon itself. Complete obstruction and strangulation are unlikely. Most cases of chronic volvulus are related to mesenteroaxial rotation<sup>14</sup> which were comparable to this study.

The remaining 12% of volvuli exhibit features of both the above or remain unclassified, these usually present with chronic or recurrent symptoms.<sup>7</sup>

Diagnosis of GV is based on clinical suspicion and radiographic studies. In cases of organoaxial volvulus, plain films and contrast studies may both be falsely negative, depending on the degree of torsion and presence or absence of diaphragmatic hernia<sup>15</sup>

Plain films may show a horizontally oriented stomach with a single air fluid level on upright views with a paucity of distal gas. Upper gastrointestinal (GI) contrast radiographic studies

(using barium or gastrografen) may show a low lying esophagogastric junction and a horizontal or inverted "upside-down" stomach with the cardia and pylorus at the same level in addition to slow passage of contrast material past the site of twisting.<sup>10,16</sup>

Contrast studies are sensitive and specific if performed with the stomach in the "twisted" state and reported to have a diagnostic yield in 81-84% of patients.<sup>16,17</sup>

In this study, gastrografen aided us in the diagnosis of all patients

CT can lead to immediate diagnosis in cases of volvulus secondary to paraesophageal hernia. Upon CT, any stomach in an unusually high position in a patient with acute abdominal pain and vomiting should make one suspect gastric volvulus.<sup>10</sup>

In this study, CT scanning was very effective in diagnosis of all patients, one of them with recurrent chest infections and the other who was misdiagnosed as acute pancreatitis.

Upper gastrointestinal endoscopy may be helpful in the diagnosis of gastric volvulus, though it is not done routinely in patients presented with acute abdomen. Based on their experience, Anthony and his colleagues described that the following features on endoscopy that are highly suggestive of the most common type of volvulus (organoaxial): tortuous stomach, paraesophageal hernia, and inability to locate or pass the scope through the pylorus.<sup>18</sup> In the late stage of acute gastric volvulus (AGV), strangulation of the blood supply can result in progressive ischemic ulceration or mucosal fissuring which will be also apparent by endoscopy.<sup>19</sup>

In this study, endoscopy was effective in the diagnosis of all patients one of them was misdiagnosed as bleeding varices based on his history being a chronic liver disease patient, but the endoscopist noted a tortuous stomach and inability to pass the scope through the pylorus, in addition to multiple mucosal erosions.

In this study, and in most others, the surgical approach used was laparoscopic repair for paraesophageal Hernia.<sup>20,21</sup>

Early experience with laparoscopic hiatal hernia repair was criticized for high recurrence rates<sup>22</sup> and long operative times.<sup>23</sup> However, decreasing morbidity rates and other benefits of laparoscopy continued use of the technique.<sup>24</sup>

There is evidence that with increased laparoscopic operative experience, morbidity and recurrence rates remain low even with increased patient comorbidities.<sup>25</sup> Patient satisfaction and quality of life scores are excellent following laparoscopic hiatal hernia repairs.<sup>26</sup>

In this study, half of the patients had previous laparoscopic Nissen fundoplication instead of that all case started laparoscopy which succeed to continue in 8 patients and four patients converted to open surgery because adhesions and difficult dissection and save placement of the mesh.

## CONCLUSION

Gastric volvulus complicating hiatal hernia is rare and can present in a variety of ways and need a high index of suspicious for diagnosis and early surgical intervention.

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