

Chronic Gastric Volvulus in Infants and Children: Single Centre Experience

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Abstract

Purpose: The aim of the study was to review cases of all children who had gastric volvulus (G.V.) at a tertiary care centre in Madinah Maternity and Children Hospital, KSA and to express our experience in management of these cases with highlights on their outcome.

Materials and Methods: This was a retrospective study of 23 children with an age range between 4 months and 3 years who were managed for G.V. between 2006 and 2017. The records of these patients were reviewed for clinical features, investigations, management and outcome.

Results: All patients were less than 3 years of age with male preponderance. No patients had acute presentation. The commonest symptom was abdominal distension and non-bilious vomiting. All patients were diagnosed by barium studies and medical treatment was started for all cases. Out of 23 cases of chronic G.V. (after failure of medical treatment), posterior gastropexy was performed for 12 patients (5 cases by open technique and 7 cases via laparoscopy) with the total rate of postoperative complications reaching 33.3%. Postoperative complication in the present study was postoperative vomiting reported in two cases (16.6%), upper GIT bleeding in one case (8.3%), wound infection in one case (8.3%) and adhesive intestinal obstruction in one case (8.3%). These two cases were treated by medical anti-reflux therapy and improved totally after a period varying from 2 weeks to one month.

Conclusion: Barium meal has been shown to be a very valuable investigation for diagnosis of cases of chronic G.V. with a sensitivity of 100%. Medical therapy should be considered as the principal item of management for cases of 'G.V. especially at the younger age group (below one year of age). Posterior gastropexy is recommended as the only line of surgical treatment required for cases of chronic G.V. in whom medical treatment fails. Laparoscopic approach is a promising way with good results and low complications.

Keywords: Gastric Volvulus; Barium Meal; Posterior Gastropexy

Introduction

Gastric volvulus (G.V.) is abnormal rotation of one part of the stomach around another along its coronal or sagittal axis due to complete absence or weakness of its ligamental attachments. Mayo, *et al.* reported in his series that the age ranges from birth to 15 years with 15% of cases diagnosed immediately after birth, 20% in the neonatal period, 44% before the age of 1 year and 82% before the age of 5 years. The sex distribution is almost equal with a minimal predominance of males [1].

Clinical presentations vary from acute to chronic forms. Patients with the classic acute form are characterized by the triad of Brochardt i.e. severe epigastric distension, intractable retching and inability to pass a nasogastric tube. The chronic form is probably more common and should be suspected with the following pentalogy (intermittent colicky abdominal pain, non-bilious vomiting, upper abdominal distension, failure to thrive and may be hematemesis. Diagnosis starts by clinical suspicion, X-ray films and contrast studies [2].

The treatment of G.V. varies with disease presentation. The acute form requires immediate surgical intervention. The treatment of chronic idiopathic GV remains controversial ranging from conservative management in the form of semisetting positioning, special milk formulas and anti-reflux medications up to gastropexy either alone or with fundoplication [3].

Aim of the Study

The aim of our series is to show our experience in diagnosing and treating cases of chronic G. V.

Patients and Methods

The present study included 23 cases of surgical non-bilious vomiting due to idiopathic chronic G. V. diagnosed as gastric malrotation admitted at the Department of Pediatric Surgery, during the period from October 2006 to February 2017. Their age groups ranged between 4 months and 3 years (mean age 18 months). Patients were subjected to, proper history taking, presenting complaints and their analysis e.g. vomiting (onset, course, frequency, color, projectile or not, relation to feeding, aggravating and relieving factors, history of medical therapy and the response in addition to other associated symptoms), analysis of GERD complications i.e. failure to thrive, bleeding and respiratory symptoms.

Thorough clinical examination included vital signs (pulse, temperature, body weight, signs of dehydration, general examination of head, neck, chest, abdomen and extremities). Proper Diagnostic investigation including routine laboratory investigations, plain x-ray for the abdomen and the chest and barium meal and follow through. Figure 1 demonstrates the view of G.V. in barium meal study.



Figure 1: The beaking sign of organoaxial gastric malrotation.

After establishing the diagnosis medical treatment was given for uncomplicated cases. This Treatment consists of positioning (semisetting position was advised at least for one hour after every feed), frequent small feeds, dietary formulas e.g. nutrition milk formula. Drugs included, antiemetics, gastric regulators, H₂ receptor antagonists (H₂RA) and proton pump inhibitors. Mild cases of reflux (grade 1 and 2 and without respiratory problems or upper GIT bleeding) are treated firstly by positioning and frequent small feeds for two weeks. If no response, antiemetics and gastric regulators are added for six months below one year and three months after one year.

Posterior gastropexy for cases of chronic gastric volvulus not responding to medical therapy for six months (12 cases). Five cases were operated by open approach and seven cases via laparoscopy. After induction of general anesthesia, the stomach is released from the transverse mesocolon and fixed posteriorly to the ligament of Treitz by two simple vicryl 4/0 stitches to ensure gastric fixation (Figure 2).



Figure 2: Fixation of the stomach to ligament of treitz.

Postoperative follow up included the use of analgesics (non-steroidal type) for at least 48 hours to minimize postoperative pain. Intravenous fluids were given for about 1 - 2 days till oral feeding was started. Oral feedings when allowed, are started by non-residue fluids for 24- then semisolids or breast feeding when possible. The scheme of postoperative follow up sheet included essentially the analysis of postoperative vomiting, pain, in addition to recording the body weight.

Results

The largest group of age lies between 24 months and 36 months (57%). This series included 12 males and 11 females. Consanguinity was positive in 5 patients (21.7%). Table 1 shows the descriptive data of gastric volvulus category.

		No	%
Age	4 months - 12 months	5	21.7
	12 months - 24 months	6	26.1
	24 months - 36 months	12	52.3
Sex	Male	12	52.2
	Female	11	47.8
Positive family history		0	0.0
Positive consanguinity		5	21.7

Table 1: The descriptive data of gastric volvulus cases (total 23 cases).

The response to medical therapy was better in the group of low age especially before 12 months (80%), (66.6%) in the group between 12 and 24 months and became 25% in the group of age more than 24 months as shown in table 2.

	Total	Responding (11)		Not responding (12)	
		No	%	No	%
4 months - 12 months	5	4	80	1	20
12 months - 24 months	6	4	66.6	2	33.3
24 months - 36 months	12	3	25	9	75
Total	23	11	47.8	12	52.2

Table 2: Results of medical treatment in gastric volvulus category (total 35 cases).

In the present study, out of 23 cases of chronic G.V., Hill’s posterior gastropexy was performed for 12 patients with the total rate of postoperative complications reaching 33.3%. All complications were detected in open cases only. No complications were detected in laparoscopic procedures. The most common postoperative complication in the present study was postoperative vomiting reported in two cases (10%). These two cases were treated by medical anti-reflux therapy and improved totally after a period varying from 2 weeks to one month.

The postoperative complications of Hill’s posterior gastropexy in our series was 40%. The most common complication was secondary reflux occurring in two cases (10%) as shown in table 3.

	Posterior Gastropexy (n = 12)	
	No	%
GIT		
1. Early complications:		
• Upper GIT bleeding	1	8.3%
2. Late complications		
• Persistent vomiting		
*Persistent GER	2	16.6%
• Adhesive intestinal obstruction	1	8.3%
Wound complications		
*Wound infection	1	8.3%
*Burst a abdomen	0	0
* Incisional hernia	0	0
Total	4	33.3%

Table 3: Post-operative complications of posterior gastropexy in gastric volvulus cases (4 cases).

Discussion

Gastric volvulus is abnormal rotation of one part of the stomach around another along its coronal or sagittal axis due to complete absence or Weakness of its ligamental attachments. The age ranges from birth to 15 years with 15% of cases diagnosed immediately after birth, 20% in the neonatal period, 44% before the age of 1 year and 82% before the age of 5 years. The sex distribution is almost equal with a minimal predominance of males [1].

The original classification of gastric volvulus was based on the axis of gastric rotation: organoaxial rotation (along the long axis extending from the hiatus of the diaphragm to the pylorus), mesentericoaxial rotation (along the short axis transecting the lesser and

greater curvatures) and combined type. The disorder can be divided also by degrees of rotation: complete (more than 180 degrees) and incomplete (less than 180 degrees) [4].

Gastric volvulus may be primary (35% of cases) or secondary (65% of cases). Primary gastric volvulus is caused by hyperlaxity of the peritoneal attachments of the stomach (the gastrosplenic, gastrophrenic, gastrocolic and gastrohepatic ligaments) due to abnormal fusion of the fetal mesenteries. The fixed elements besides the ligaments are the duodenum which becomes retroperitoneal at the second portion and the gastroesophageal junction at the diaphragmatic hiatus. A diaphragmatic defects such as in cases of eventration, giant hiatus hernia or left Bochdalek can lead to secondary types [5].

The clinical presentation of gastric volvulus varies widely depending on the degree of rotation of the stomach and the resulting obstruction. Patients with the classic acute form are characterized by the triad of Brochardt i.e. severe epigastric distension, intractable retching and inability to pass a nasogastric tube. These findings indicate an obstruction at the pylorus and the cardia with distension of the stomach causing vascular compromise and leading to ischemia, necrosis, perforation and possible death. Surgery must be performed immediately, The acute form is rarely seen in neonates and is not typical in infants, however, about 70% of children present with some of these criteria. In children, symptoms include vomiting, chest pain, dysphagia, dyspepsia and acute respiratory distress [6].

The chronic form is probably more common and should be suspected with the following pentalogy (intermittent colicky abdominal pain, non-bilious vomiting, upper abdominal distension, failure to thrive and may be hematemesis). Patients may show epigastric pain, nausea, vomiting, intermittent dysphagia, irritability and failure to thrive. The symptoms can appear intermittently for weeks to years. The golden standard for diagnosis of acute gastric volvulus is the findings on laparotomy. This usually will confirm the radiologic and clinical diagnosis. In cases of chronic G.V. the surgeon can notice only laxity of stomach ligaments and evidence for minor organ affection depending on the duration to the devolvulation [7].

The clinical suspicion of gastric volvulus is generally confirmed by radiological studies. The clinician must keep in mind, that the radiologic appearance varies widely with the broad spectrum of the disease. In patients with the acute presentation, plain abdominal X-ray film can reveal gastric dilatation and paucity of gas in the remainder of the intestinal tract [8]. Barium meal almost confirms the diagnosis in chronic intermittent cases but the results of this test may be normal so that it should be repeated as soon as possible after the appearance of the symptoms. In organoaxial volvulus, the greater curvature of the stomach swings anteriorly and upward. The result is an "upside-down" of the stomach with the lesser curvature below the greater one. There is a low gastroesophageal junction and distortion of the duodenum with either a single or double fluid levels. In mesentericoaxial volvulus, the pylorus rotates from right to left so that the stomach lies "right-side up". In the supine position the distended stomach appears spherical, whereas in the up-right plain film, there is a double fluid levels, one at the proximal stomach and one at the distal stomach. "Beaking" is seen at the obstructed pyloric canal [2].

Barium meal has been shown to be a very valuable investigation for diagnosis of cases of chronic G.V. with a sensitivity of 100% in the present study and Elhalaby and Emad (2001). These findings are higher than those reported by Mayo., *et al.* (2001) (97%) and Dilorenzo., *et al.* (1987) (89%) [9]. Thus, we can state that chronic G.V. is often a radiological diagnosis that even may not be seen at laparotomy.

The treatment of G.V. varies with disease presentation. The acute form of presentation is beyond the scope of our series. However, it may be fatal and requires prompt surgical intervention [10].

The treatment of chronic idiopathic GV remains controversial. Conservative management in the form of positioning of the infant in the prone or upright position for at least one hour after meals and prokinetic drugs may improve the tone and strength of gastric ligamentous attachments. The success rate of the conservative therapy ranges from 70% - 85% especially when the infants don't have symptoms of GERD and under 6 months of age [11]. Surgery is indicated in refractory cases of chronic G.V. with failed medical therapy especially when the infants have symptoms of GERD and after 6 month of age. Teague., *et al.* [12] advised gastropexy and partial fundoplication as a considerable procedure in treating G.V. But Darani., *et al.* (2005) recommended gastropexy alone as the mode of treatment. Both procedures are accompanied by correction of associated anomalies which may include plication of the diaphragm for repair of the paraesophageal hernia and Ladd's procedure for intestinal malrotation. Gastropexy is of three types: anterior (Boerema) gastropexy, posterior (Hills) gastropexy and fixation of the stomach during gastrostomy.

In the present series, 23 cases of chronic G.V. received medical therapy with a success rate of 47.8%. These results agreed with those obtained by Darani., *et al.* (2005) (43%), higher than Mayo., *et al.* (2001) (25.7%) and [13] and lower than Dilorenzo., *et al.* (1987) (77%) and E1-halaby and Emad (2001) (89%).

These differences are explained by different patients numbers and the introduction of laparoscopy in some studies. Laparoscopy added a great improvement in the outcome of these cases [15].

In the present study, out of 23 cases of chronic G.V., Hill’s posterior gastropexy was performed for 12 patients with the total rate of postoperative complications reaching 33.3%. All complications occurred with open approach.

The most common postoperative complication in the present study was postoperative vomiting reported in two cases (16.6%). These two cases were treated by medical anti-reflux therapy and improved totally after a period varying from 2 weeks to one month. Thus, posterior gastropexy is recommended as the only line of surgical treatment required for cases of chronic G.V. in whom medical treatment fails. These findings agree with Darani., *et al.* (2005) and Mayo., *et al.* (2001). On the other hand, El-Gohary., *et al.* (1995) and [14] advised partial fundoplication as an initial procedure with gastropexy in cases of chronic G.V. In contrary to these recommendations, El-halaby and Emad (2001) considered gastropexy in G.V. as over treatment.

Wound complications were reported in one case of Hill’s posterior gastropexy (8.3%) in the present study. These results agreed with the common rate of wound complications reported in other series that was between 4.7 - 5.9%.

The operative outcome in relations to different operative procedures in different series is shown in table 4.

Study	No of patients	Operative procedure	The total of complications	Postoperative persistent vomiting
Dilorenzo., <i>et al.</i> (1987)	16	Anterior gastropexy	24.3%	12%
El-Gohary., <i>et al.</i> (1995)	8	Gastropexy and partial fundoplication	12.7%	5%
El-halaby and Emad (2001)	8	Anterior gastropexy	8.6%	Not recorded
Darani., <i>et al.</i> (2005)	19	Posterior gastropexy	35.9%	10.53%
Present study (2009)	12	Posterior gastropexy	33.3%	16.6%

Table 4: The operative outcome in relation to different operative procedures of G.V. in different studies.

Conclusion

In conclusion, barium meal has been shown to be a very valuable investigation for diagnosis of cases of chronic G.V. with a sensitivity of 100% in the present study. Thus, We can state that chronic G.V. is often a radiological diagnosis that even may not be seen at laparotomy. Medical therapy should be considered as the principal item of management for cases of 'G.V. especially at the younger age group (below 4 months of age) Posterior gastropexy is recommended as the only line of surgical treatment required for cases of chronic G.V. in whom medical treatment fails. Laparoscopic approach is a promising way with good results and low complications.

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