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Clinical Study

Pediatric Gastric Volvulus in Senegal: an 8-year review

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Keywords
Gastric volvulus
Diagnostic delay

Abbreviations
GV - Gastric Volvulus
UGICS - Upper gastro-intestinal contrast series

Abstract

Introduction: *Gastric volvulus is a rare condition in children but is infrequently reported from sub-Saharan Africa.*

Methods: *We conducted a two-center retrospective study over 7 years (2012 – 2019) from Dakar, Senegal.*

Results: *Our study included 10 patients, the age ranging from 1 month to 11 years, without any sex predominance. Six patients had a chronic presentation. Non-bilious vomiting was found in all patients. Abdominal plain X-ray (n=10) and upper gastrointestinal series (n=7) were the most frequently requested investigations. Duration of symptoms ranged from 1 day to 2 years in patients with chronic presentation and from 1 to 4 days in those with acute manifestations. Mesentero-axial type was found in 6 cases, with an associated diaphragmatic hernia in 3 cases. An associated anomaly was found in 6 patients. In all cases, the treatment consisted of open surgery with gastropexy and adjunctive surgical treatment in patients with an associated anomaly. The postoperative outcome was unremarkable in 9 cases, and 1 patient presented with recurrence of left Bochdaleck hernia after 12 months of follow-up.*

Conclusion: *Diagnosis and management of gastric volvulus was delayed in sub-Saharan Africa. Open surgery gives favorable outcomes even in resource-limited setting.*

INTRODUCTION

Gastric volvulus (GV) is known to occur in the setting of lax ligamental support of the stomach with resultant abnormal rotation. It is a rare surgical emergency, with 10 to 20% occurring in children, of whom 58% present before the first year of life.[1,2] In this the stomach may get twisted more than 180° either on long-axis (organo-axial) or short-axis (mesentero-axial) or both.[1] The presentation may be acute or chronic, depending on the duration of symptoms. The cardinal features of GV include the triad of abdominal pain, intractable retching, and inability to pass a

nasogastric tube into the stomach. Sometimes, non-specific symptoms may lead to a delay in the diagnosis, thus worsening its prognosis.[3,4]

The main complication of GV is gastric perforation due to gastric wall necrosis. Given the life-threatening nature of GV, it should be suspected even in cases of atypical occlusive symptoms.[4] African studies on this topic are scarce.[5] Our study aims to report the diagnostic and therapeutic aspects of GV highlighting the practice in sub-Saharan Africa.

PATIENTS AND METHODS

We conducted an eight-year retrospective cross-sectional study at Albert Royer National Children's Hospital Center and Aristide Le Dantec Hospital in Dakar, Senegal. Although there are 2 other pediatric surgical services (in Diamniadio and Kaolack), these 2 services are the only public pediatric surgical facilities in Senegal.

We reviewed data from January 2012 to December 2019, which included all patients diagnosed with GV alone (primary GV) or GV associated with a coexistent pathology (secondary GV). Patients whose medical files had insufficient data were excluded. Information was collected from both medical files and operating room registers.

Collected variables were age, sex, referral diagnosis, time from symptoms to presentation at our services, clinical findings, imaging results, clinical presentation, time to surgery, type of surgical management, and outcomes. Data were saved and analyzed using Excel software.

RESULTS

Our two services identified 10 cases during the study period. The patients' ages ranged from 1 month to 11 years. There were 5 boys and 5 girls. Nine of the 10 patients previously attended another medical facility before reaching our hospital: 6 attended one medical facility, 2 attended two facilities, and 1 attended three facilities. Of the 9 referred patients, 6 had no referral diagnosis, 2 were correctly diagnosed with GV and 1 was incorrectly diagnosed as hypertrophic pyloric stenosis. The latter was 11 months old.

Duration of symptoms ranged from 1 day to 2 yrs in chronic GV and 1-4 days in acute GV. Six patients had chronic GV and 4 had acute GV. Symptoms included non-bilious vomiting in all patients, abdominal pain (n=6), and bloating (n=4). Physical examination revealed abdominal distension in 4 cases that was predominantly epigastric in 3 cases. Three patients presented with respiratory signs; of whom severe respiratory distress was found in a single case. In 2 patients, weight loss was reported. The most commonly requested imaging investigation was the plain thoraco-abdominal X-ray (n=10), followed by upper gastrointestinal contrast series (UGICS) (n=7) (Fig. 1), computed tomography (n=3), and abdominal ultrasound-Doppler scan (n=1).

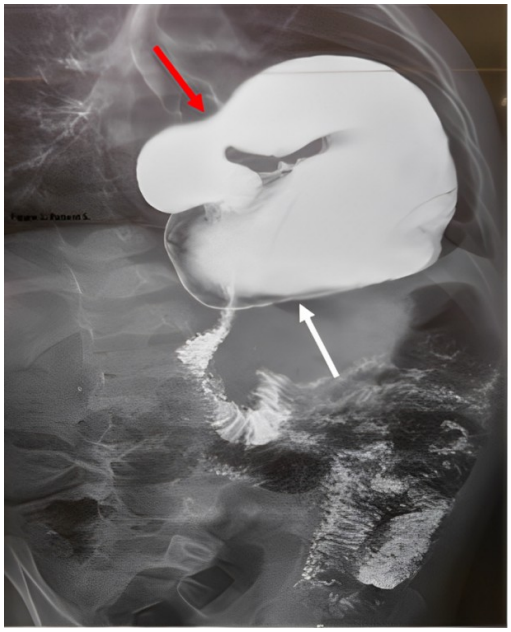

Fig 1. Mesentero-axial gastric volvulus

Upper gastrointestinal contrast radiograph of the patient-5 depicting the pylorus in the left upper abdomen (red arrow) with an inverted fundus (white arrow).

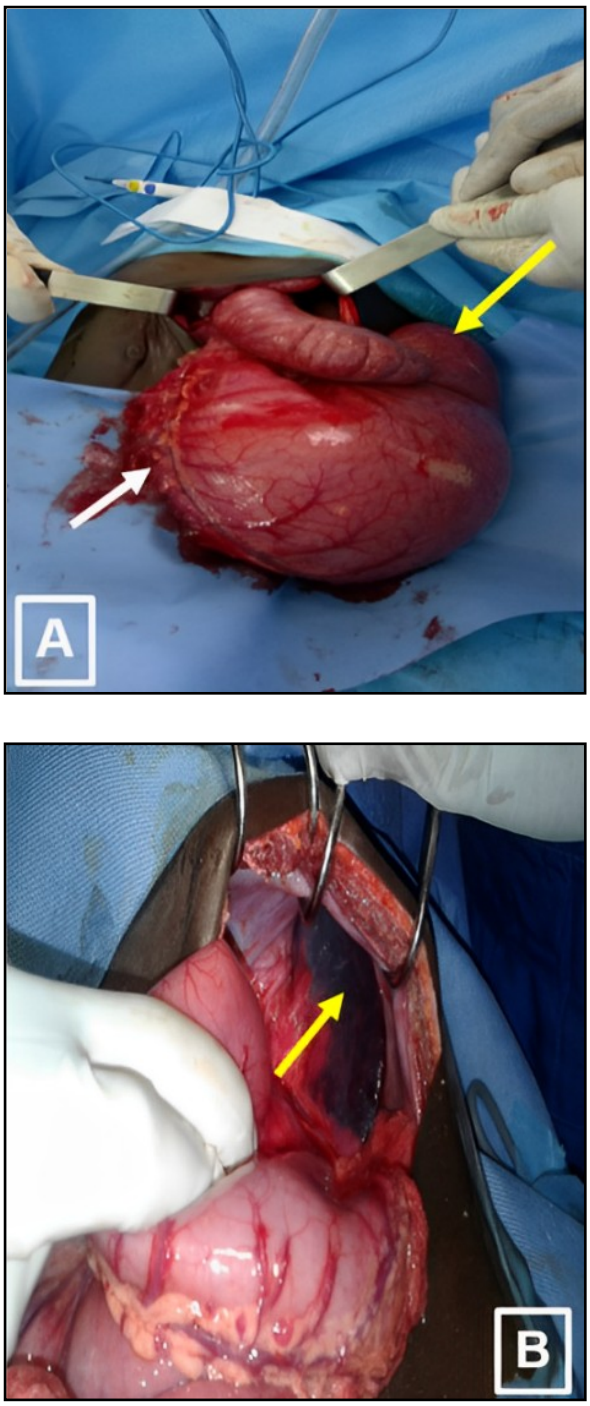

Fig 2. Intraoperative findings in patient-1.
(A) - Mesentero-axial gastric volvulus with the pylorus in the left upper abdomen (yellow arrow) and the fundus in the lower position (white arrow). (B) - Left Bochdaleck hernia involving the spleen (yellow arrow).

The diagnosis of gastric volvulus was made pre-operatively in 7 cases. The type of gastric volvulus was specified in 8 cases: mesentero-axial in 6 and organo-axial in 2. In 2 patients, spontaneous derotation was noted on surgical exploration; hence the type of volvulus could not be ascertained, as UGICS series had not been performed in these cases. In all cases, the standard anatomical anchors of the stomach were absent. In 6 patients, associated anomalies were present. (Table 1)

The time from the first consultation in one of the two pediatric surgical departments to the surgery date ranged from 4 days to 4.5 months in patients with chronic gastric volvulus and from 1 to 11 days in patients with acute gastric volvulus. All patients underwent laparotomy by upper abdominal transverse incision. The treatment consisted of gastropexy in all the patients. Adjunct surgical treatment included diaphragmatic hernia repair in 2 cases (Fig. 2), diaphragmatic plication, hiatus hernia repair, Nissen fundoplication, appendectomy, removal of supernumerary spleen, and gastric perforation suture (Fig. 3), each in one case.

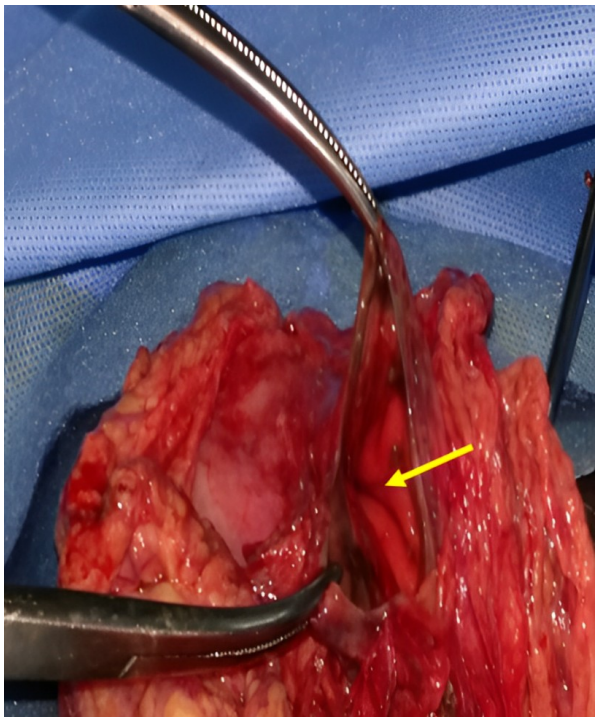

Fig 3. Intraoperative findings in patient 6
He had a history of trauma. Posterior gastric perforation is shown (yellow arrow)

Table I. Summary of clinical details, diagnostic aspects and outcome of gastric volvulus

Pt.No.	Sex	Age	Symptoms (duration)	Imaging	Volvulus type	Associated anomalies	Follow-up	Outcome
1	M	4 yr	AP, Vomiting, constipation (4d)	XR, Doppler	Acute MAV	Left CDH	24 m	Unremarkable
2	F	11m	AP, Vomiting (3m)	XR, UGICS	Chronic MAV	Left CDH	15 m	Unremarkable
3	F	12m	Vomiting (6m)	XR, UGICS	Chronic GVUS	Nil	4 yr	Unremarkable
4	F	17m	AP, AD Vomiting (8m)	XR, UGICS, CT	Chronic MAV	Left CDE, Wandering spleen	4 yr	Unremarkable
5	F	4 yr, 3 m	AP, AD, Vomiting (1d)	XR, UGICS	Acute MAV	Accessory spleen	3 m	Unremarkable
6	M	8 yr	AP, Vomiting, Hematemesis (2d)	XR, CT	Acute MAV	Left CDH, Gastric perforation, Splenic and colonic contusions	19 m	Recurrence of Bochdaleck hernia
7	M	2 yr, 7 m	Vomiting (4 m)	XR, UGICS, CT	Acute OAV	Hiatus hernia	3 m	Unremarkable
8	M	1 m	Vomiting, AD (2 wk)	XR, UGICS	Chronic MAV	Nil	3 m	Unremarkable
9	F	1 m	Vomiting (few hrs)	XR, UGICS	Chronic OAV	Nil	4 m	Unremarkable
10	M	11yr	AP, AD, Vomiting (2 yr)	XR	Chronic GVUS	Nil	3 m	Unremarkable

AD - abdominal distension; AP - abdominal pain; CDE - Congenital Diaphragmatic Eventration; CDH - Congenital Bochdaleck Diaphragmatic Hernia; CT - Computed Tomography; GVUS - Gastric volvulus (unspecified); MAV - Mesenteroaxial volvulus; OAV - Organoaxial volvulus; UGICS - Upper gastrointestinal contrast series; XR - abdominal plain x-ray

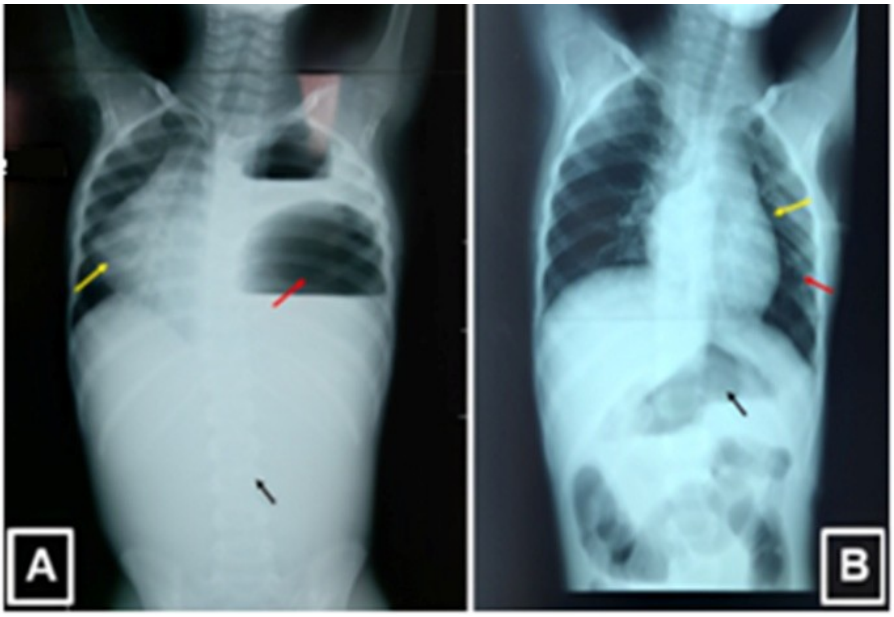

Fig 4. Gastric volvulus associated with left Bochdaleck hernia.

(A)-Preoperative radiograph showing intra-thoracic stomach (red arrow) with right-sided mediastinal shift (yellow arrow) and gasless abdomen (black arrow). (B)-Postoperative radiograph on day-30 showing full recovery of the left lung (red arrow), return of the mediastinal to normal position (yellow arrow), and presence of bowel gas (black arrow).

All patients had unremarkable early postoperative outcomes except one child. He was an 8-year-old boy who presented with an acute post-traumatic gastric volvulus associated with a left Bochdaleck hernia. He was treated with gastric detorsion and reduction of the hernia contents but without diaphragmatic repair because the defect was more than 50% of the hemi-diaphragm. The treatment of diaphragmatic hernia was delayed due to non-availability of synthetic patches necessary to close of the significant defect. On delayed extubation at 24 hrs, epigastric distension persisted and abdominal pain was marked. This prompted surgical re-exploration one day after the first operation. On re-exploration perforation of the posterior gastric wall was noted. He underwent repair of the diaphragmatic hernia without a synthetic patch and suturing of the gastric perforation. The early outcome of this second operation was unremarkable.

The follow-up period ranged from 3 months to 4 years. Nine patients had unremarkable recovery without any long-term sequelae. (Fig. 4) In the patient with a post-traumatic gastric volvulus associated with a left Bochdaleck hernia, a recurrence of the diaphragmatic hernia was noted after 12 months and a repair with a patch was planned

DISCUSSION

With a frequency of 1.4 cases per year, GV is a rare condition in our daily practice. The Senegalese literature has reported two cases of GV in adults.[6,7] A large pediatric study reported 150 cases of GV from Senegal.[8,9] The diagnosis is rare in our setting, and this can be attributable to the lack of awareness about GV among the referring doctors in peripheral health facilities. Thus, only 2 children were correctly diagnosed before their admission to our services. The rarity of this pathology is also partly due to the robustness of e gastric ligaments, which reduces its mobility.[10]

In our study, as well as in the literature, non-bilious vomiting, abdominal distension and abdominal pain were the common symptoms of GV. The classic Borchardt's triad (unproductive retching, epigastric pain or distention and the inability to pass a nasogastric tube) is rarely encountered in children.[3]

The diagnosis of GV is often challenging since the symptomatology varies in acute or chronic presentations.[2] In our study, the delay between the first consultation in one of the pediatric surgical services and the surgery date was eight times shorter for acute presentations. This difference is explained by acute gastric volvulus leading to a sudden onset of upper gastro intestinal obstruction with epigastric distension. Symptomatology of chronic gastric volvulus is insidious. It evolves through periodic exacer-bations and remissions along with non-specific symptoms such as non-bilious vomiting, respi-ratory signs, and growth retardation.[11,12] This atypical symptomatology, combined with limited knowledge of the disease and low index of suspicion in our settings, makes GV a difficult and challenging diagnosis.

Abdominal plain X-ray seems sufficient for diag-nosing acute forms by showing the classical double-bubble sign.[13] Other authors suggest that the CT scan should be the first-line examination.[9] Considering the limitations of our setting, upper gastrointestinal contrast study appears to be the critical tool for confirming GV and its type, as CT is sometimes unavailable in an emergency. Some authors reported that the UGICS can identify up to 82% of gastric volvulus and hence is the preferred investigation.[2,13-15] In our experience, it helped to diagnose GV in 7 out of 10 patients.

In our study, diaphragmatic hernia is the most frequently associated condition, in which abnormal attachment of gastric ligaments leads to intra-thoracic gastric ascension. The acute type of GV is often associated with congenital anatomical abnormalities, the most common of which are diaphragmatic hernia, diaphragmatic eventration, para-esophageal (hiatus) hernia, and congenital

asplenia or wandering spleen.[2,16] Our series noted an exceptional hiatus hernia associated with a chronic volvulus. Two patients with an acute GV had an associated diaphragmatic hernia, and one had an accessory spleen. Chronic and acute types also differ in their etiology. Generally, the chronic form is idiopathic.[11] In our series, 4 of the 6 patients with chronic GV had no associated anomaly. Authors rarely reported associated anomalies in chronic volvulus.[11] Indeed, chronic GV is caused by simple laxity of the gastric ligaments. The absence of an organic cause could explain spontaneous resolution of episodic volvulus in these patients and therefore the insidious mode of evolution by intermittent flare-ups.[11]

The surgical management requires a gastropexy and repair of the diaphragmatic defect, if a diaphragmatic hernia is associated.[11] All patients underwent a laparotomy repair because minimal invasive surgery is still not well established in our country. Open surgery allows the reduction of intra-thoracic GV with performance of additional procedures like repair of diaphragm.[17] Therefore, it appears to be more suitable for acute GV.

Despite the increasingly satisfactory results of conservative treatment in chronic forms,[11] all our patients have benefited from surgical management. This approach appears safer in African context, where the required follow-up of conservative treatment may not be possible due to lack of parental understanding of the disease and financial constraints.

The mortality rate in acute GV is twice that of chronic GV.[2] This is due to the possibility of ischemia and perforation occurring in 5-28% of cases.[2] No death was recorded in our study, but only one case of gastric perforation was found in a patient with an acute GV. Therefore, it is a presentation with high morbidity and mortality that deserves the attention of practitioners.

CONCLUSION

The diagnosis and management of GV was delayed in our set-up, especially in its chronic form, due to lack of awareness among referring doctors. The UGICS was the core radiological diagnostic examination, which should be considered in case of atypical gastric outlet obstruction. Open gastropexy resulted in a favorable outcome even in resource-limited setting.

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