

Case Report

Midgut volvulus: a rare cause of acute intestinal obstruction in adults

Rahul Jain*, Sunita Gupta, Sushanto Neogi, Ankul Mittal

Department of Surgery, Maulana Azad Medical College, New Delhi, India

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***Correspondence:**

Dr. Rahul Jain,

E-mail: rahuljainmamc@gmail.com

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ABSTRACT

Malrotation with volvulus of midgut bowel loop, a developmental anomaly of intestinal fixation, occurs due to failure of rotation of proximal midgut around the mesenteric vessels during the second stage of rotation. Anomalies presenting in adults is very rare and incidence reported is 0.0001% to 0.19%. We report a case of a young female with acute on chronic presentation of midgut malrotation.

Keywords: Intestinal obstruction, Malrotation, Midgut volvulus

INTRODUCTION

Malrotation with volvulus of midgut bowel loop, a developmental anomaly of intestinal fixation, occurs due to failure of rotation of proximal midgut around the mesenteric vessels during the second stage of rotation. As intestinal rotational anomalies may remain asymptomatic throughout their life, their true incidence is unknown. However, prevalence of 1 in 500 live births has been reported in the past.¹ 60-85% of cases diagnosed are seen in neonatal period.² Anomalies presenting in adults is very rare and incidence reported is 0.0001% to 0.19%.³ We report a case of a young female with acute on chronic presentation of midgut malrotation.

CASE REPORT

A 22-years-old female presented to surgical emergency with complaints of colicky pain in upper abdomen and multiple episodes of bilious vomiting for 4 days. Patient had similar episodes of pain and vomiting in past. Symptoms used to get relieved on taking treatment from a local practitioner, but patient did not get relieved of symptoms this time hence presented to the hospital. There was no history of hematemesis or melena.

On general physical examination, patient was thin built. Pulse rate was 94 per minute and blood pressure was 104/68 mm Hg. Pallor and bilateral lower limb edema was present. Abdominal examination revealed upper abdominal distension and succussion splash was present on auscultation. Blood investigations demonstrated a hemoglobin level of 10 g/dl, total leucocyte count of 9200/cmm with hyponatremia (sodium level of 129 meq/dl) and hypokalemia (potassium level of 3.2 meq/dl). Arterial blood gas analysis was suggestive of metabolic alkalosis. Abdominal radiograph (erect and supine) was suggestive of distended stomach. Patient was resuscitated and nasogastric tube was put which drained 1 liter of bile stained gastric fluid.

CECT (oral and intravenous) abdomen showed presence of small bowel loops in right and large bowel loops in left abdominal cavity (Figure 1). Superior mesenteric artery (SMA) was to the right of the Superior mesenteric vein (SMV) which was inverse of normal relationship (Figure 2). The Stomach and duodenum (1st and 2nd part) were grossly dilated (Figure 1). The characteristic “Whirling sign”, clockwise rotation of bowel and mesentery around the axis of SMA was seen (Figure 3).

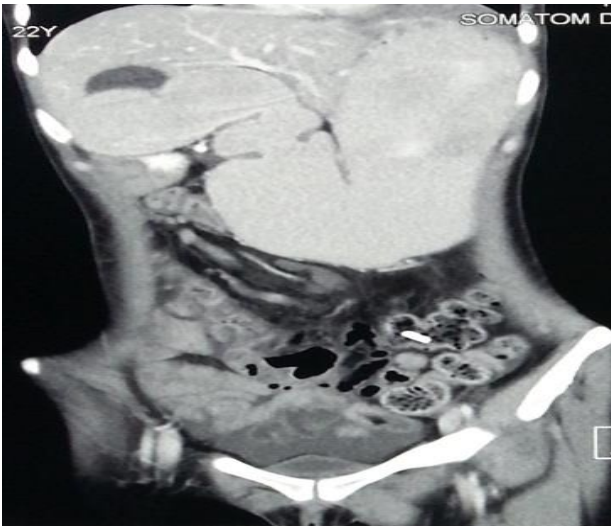


Figure 1: Grossly dilated stomach and duodenum, with large bowel on left side and small bowel on right side.

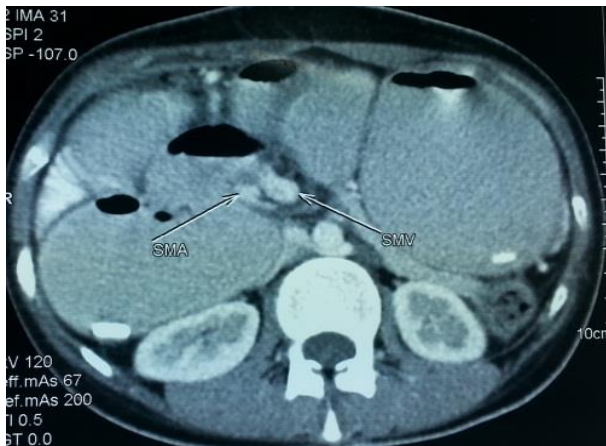


Figure 2: CECT image with SMA right to SMV.



Figure 3: Characteristic 'whirling sign'.

The patient was taken up for exploratory laparotomy after resuscitation and correction of electrolytes.



Figure 4: Swirling of duodenum around SMA.

Intraoperatively, caecum was in left lumbar region and small bowel loops were present in right side of abdominal cavity. Stomach and duodenum were dilated. Third and fourth part of duodenum were swirled around the SMA (Figure 4). Ascending and transverse colon were rotated around the small bowel. Derotation of volvulus, adhesiolysis of bands, fixation of caecum, ascending colon, hepatic flexure to the left parietal wall and appendicectomy were done. Patient was allowed orally on 2nd post-operative day. Patient was discharged on post-operative day 4. Since then patient is on regular follow up and is asymptomatic.

DISCUSSION

Midgut malrotation is broadly considered a deviation from the normal 270-degree counterclockwise rotation of the gut during embryonic development. During week 4 of foetal development, the embryonic gut is divided into the foregut, midgut and hindgut based on the anatomical blood supply. The midgut is supplied by the superior mesenteric artery (SMA).

There is physiological herniation into the umbilical cord at about the sixth week of life. The progressive reduction of the physiological midgut herniation starts at about 10th week. During this period, the midgut undergoes a 270-degree counterclockwise rotation around the SMA axis. This rotation occurs in three stages: the first stage occurs between six and eight weeks (90 degrees), the second stage is at nine weeks (180 degrees), and the third stage is at 12 weeks of gestation (270 degrees) (Figure 5).

Most anomalies of midgut rotation occur during the second stage of rotation and have been characterized as nonrotation, reverse rotation, and malrotation. Malrotation of the midgut loop, a developmental anomaly of intestinal fixation and rotation, occurs when the proximal midgut fails to rotate around the mesenteric vessels during the second stage of rotation.

The distal midgut does rotate 90 degrees in a counterclockwise direction, however, with the result that the jejunum and ileum remain to the right of the superior

mesenteric artery and the cecum is situated in the subpyloric region. There may be formation of Ladd's bands

which can compress duodenum and cause obstruction.

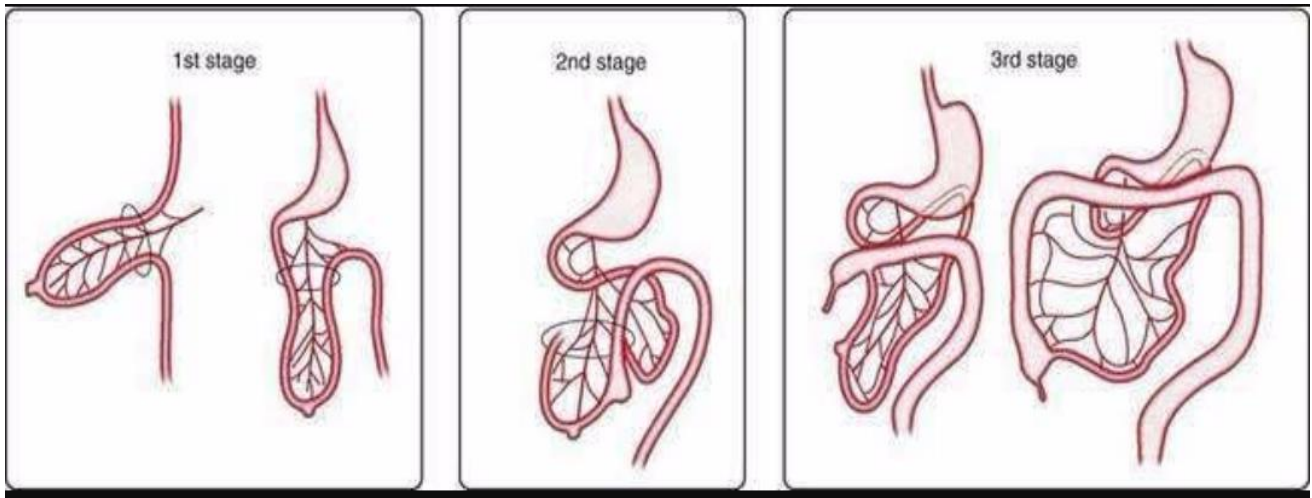


Figure 5: The three stages of normal intestinal rotation.

Most of the cases present in neonatal period but only up to 0.2% of cases present in adulthood.^{1,2} Two distinct patterns of adult presentations have been reported in the literature: acute and chronic.⁴ Chronic presentation is more common in adults. This is characterized by intermittent crampy abdominal pain, bloating, nausea and vomiting over several months or years. Others present with acute intestinal obstruction. They may present with localized peritonitis in the right upper quadrant or on the left side of the abdomen if their appendix becomes inflamed.

Different modalities of investigations are available for diagnosis of midgut volvulus like plain abdominal radiograph, ultrasound scan (USS), computed tomography (CT) scan, magnetic resonance imaging (MRI) scan and mesenteric arteriography. But CT scan with or without UGI contrast study is now considered the investigation of choice; providing diagnostic accuracy of 80%.⁵ As per Nichols and Li, deviation from normal positional relationship of SMV and SMA can be used as an indicator of diagnosis (Figure 2).⁶ But as described by Fisher, twisting of small bowel and mesentery around the narrow SMA pedicle giving distinctive 'whirlpool' appearance on CT scan is characteristic for midgut volvulus (Figure 3).⁷

Surgery is the mainstay of treatment for midgut malrotation. The surgical management of intestinal malrotation was first described by William Ladd in 1936.⁸ The classical Ladd's Procedure consists of 4 parts: division of Ladd's bands overlying the duodenum; widening of the narrowed root of the mesentery by mobilizing the duodenum and division of the adhesions around the SMA; counterclockwise derotation of the midgut volvulus if present and appendectomy to

prevent future diagnostic dilemma. Various modifications have been used to prevent further volvulus which include duodenopexy, caecopexy and suture fixation of the ascending colon to the right abdominal wall, in the retroperitoneal position.⁴ We have used this procedure for the treatment of our patient. The patient is asymptomatic for last 1 year.

CONCLUSION

Midgut malrotation with volvulus although rare, should be kept as a possible differential diagnosis even in adult patients with signs and symptoms of upper gastrointestinal obstruction. Acute illness can be diagnosed on CECT and can be managed surgically with good long-term results.

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