

## Midgut Malrotation- A Case of a 11-Year-Old Girl

**Amos Mailosi\* and Modai Clement Mnenula**

*Kamuzu University of Health Sciences (KUHeS), Blantyre, Malawi*

**\*Corresponding Author:** Amos Mailosi, Kamuzu University of Health Sciences (KUHeS), Blantyre, Malawi.

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### Abstract

We saw a 11 year-old early January 2022. We diagnosed her with congenital midgut malrotation, a condition that is rarely diagnosed or suspected in our setting. In this report we discuss how to suspect and diagnose midgut malrotation as well as how to manage it in a resource limited-settings like ours. Intra-operation findings confirmed the diagnosis mid gut malrotation. The case was managed successfully and the outcome was good with no complications and a quick disappearance of all the symptoms following the operation. While the condition may be difficult to diagnose, and usually mistaken for other conditions that cause chronic abdominal pains, midgut malrotation should be suspected in children who present to hospital with intermittent abdominal pains usually associated with, in advanced case, vomiting and/or abdominal distension.

**Keywords:** *Malrotation; Ladd's Band; Bowel Obstruction*

### Introduction

Malrotation is a congenital abnormal rotation of bowel, usually both small and large bowel, in the peritoneal cavity. About 70% of the cases present in the first month of live and about 80 % presents in the first year. a smaller percentage of patients present as adults.(1) In general, malrotation can present at any age. However, the presenting symptoms are usually different between adults and children. The classic presentation in children is bilious vomitus and abdominal pains; this happens especially with volvulus due to the malrotation.(2) The incidence of malrotation in the world is not known; however various reports and studies have reported it as being 1 in every 500 births. However, this maybe overestimation due to selection bias. The incidence of malrotation in Malawi is not known; however, the studies from elsewhere have not reported social, racial and other factors to have any influence on the incidence.

### The Case

Here we have a case of a 11-year-old female child, Hawa (the name has been changed), who presented with a 1-week history of abdominal distension and pain associated with not passing stool or flatus. She did not have a history of fevers. she had been completely well before the week of the onset of the symptoms.

**Past medical history:** No previous history of admissions. Had normal developmental history and finished all the vaccines. No history of surgeries. For about 2 years had been having complaints of on and off abdominal pains; sometimes the symptoms would be accompanied by episodes of vomiting. The guardians had thought it was helminths infestation, therefore she had been treated with Albendazole several times. She was never ill enough to be admitted or to be referred to a district hospital. Hawa achieved all the developmental milestones in the right time. The guardian though Hawa's abdomen has always been a bit big for her age for some years but she has never considered it to be a problem. Hawa had never been treated for malnutrition; however, her guardians thought that she had been somehow stunted when compared to other children of her age group.

**Family history:** No family history of cancer, diabetes mellitus, hypertension or other familial diseases. No history of TB contact.

**Social history:** She lives with her mother and grandmother. The family affords to have 3 meals per day and lives in a grass-thatched house and drinks from a borehole. There were no significant social issues that were reported and that would be related to Hawa's condition. She was in standard 4 of the primary school.

On examination she was in pain; she had the following vital signs:

- Pulse rate: 140 beats/minute
- Respiratory rate: 30 cycles per minute
- Temperature: 37°C.

She had a very tender and tense abdomen on palpation; She did not have rebound tenderness or guarding. She did not have any organomegaly. Bowel sounds were not present on auscultation. On the digital examination of the rectum the rectum was empty. From the history and examination findings the diagnosis of the bowel obstruction was made and the following investigations were ordered:

- Erect abdominal and chest x-rays
- Supine abdominal x-rays
- Full blood count
- Random blood sugar
- Malaria parasite tests.

**The x-ray results**



**Figure:** The x-rays showed distended loop of large bowel and multiple air-fluid levels. There was no fluid under the diaphragm.

The Full blood count showed a normal white cell count of 5; a haemoglobin level of 9.5g/dl; platelet of 400. The rest of the parameters of a full blood count were within the normal range. The malaria test was negative and the random blood sugar was also with the normal range

Nasogastric tube was inserted; she was started on IV fluids (ringers lactate) via two large bores cannulas and she was also give a start dose of 2 grams of ceftriaxone. She was prepared for surgical operation in theatre.

Laparotomy was done and the following were the findings in theatre: there was the caecum and the first proximal part of the large bowel distended. The caecum was very distended and it was about or bigger than the size of the stomach. It is important to say here that the NGT did not drain anything until untwisting of the obstructed

bowel was done in theatre. After the untwisting, the NGT started draining a lot; it drained about 1 liter of gastrointestinal/faecal material. We found Ladd's band between the duodenum and the caecum; this is fibrous stalk of peritoneal tissue that attached the cecum to the retroperitoneum in the right lower quadrant of the abdominal cavity We made a small incision (about 0.5cm) in the caecum; we drained foul smelling fluid and faecal contents amounting to about 3 litres. The distended bowel was still viable though it had started to turn blue(ischemia), on untwisting and removal of the Ladd's band it returned to the normal colour with normal blood circulation. The small incision was successfully closed. There was no fluid in the peritoneum; however, some drained contents spilled into the peritoneum from the incision that we made; the peritoneal cavity was washed with warm lukewarm 0.9% normal saline.

Approximated blood loss of 50 to 80mls was lost during the operation. The patient was transfused 1 pint of blood following the procedure. She was started on IV ceftriaxone and kept in the high dependency unit of the paediatric ward. She was kept NPO (nothing per os) for 3 days. On the third day she was allowed to start taking fluids. on the 4<sup>th</sup> day she was started on soft diet like porridge. She started passing stool on the second day. On the 5<sup>th</sup> day of admission she started passing normal stool. On day 6 of admission she was discharged. She was to be reviewed in family medicine clinic in 2 weeks.

## Discussion

The true incidence of intestinal malrotation is not known; this is partly because the malrotation can remain asymptomatic throughout a person's whole life. Malrotation is a result of an arrest of normal rotation of the embryonic gut.

**Embryology:** The embryonic coelomic cavity, or body cavity, cannot accommodate the rapidly expanding gastrointestinal (GI) tract in the 4<sup>th</sup> to 8<sup>th</sup> week of embryonic development. Due to this, the primary intestinal loop buckles into the area of the yolk stalk, which later becomes an umbilicus; the developing superior mesenteric artery (SMA) forms the axis of this loop. As the primary intestinal loop buckles out of the abdomen, it begins the normal rotation of the bowel by twisting 90 degrees counterclockwise. This rotation is facilitated by the following two factors:

- The proximal bowel (duodenojejunal loop) grows faster than the distal bowel (caecocolic loop), and
- The rapid growth of the liver.

The primary loop continues to grow, and then returns to the abdomen during the 8<sup>th</sup> to 10<sup>th</sup> week of gestation. With the return to the abdomen, there is an additional 180 degrees' counterclockwise rotation. The overall effect is that the bowel rotates 270 degrees counterclockwise from the original primary loop.

Once the bowel has rotated into its final position, fixation to the posterior abdomen occurs. The proximal portion of the bowel is fixed to the retroperitoneum early in gestation (at the ligament of Treitz), whereas fixation of the colon is gradual and usually completed just before term.

**Normal gut development:** Normal rotation and fixation result in a wide-based mesentery that extends from the ligament of Treitz in the left upper quadrant to the ileocecal valve in the right lower quadrant. Most anomalies of rotation result in an abnormally narrow mesenteric base. Because the midgut is suspended on this narrow vascular pedicle rather than on the wide base of the mesentery, there is a risk of volvulus (torsion of the intestines).

**Abnormal gut development:** The most common abnormalities of rotation are nonrotation or malrotation (incomplete rotation) abnormalities:

- If both limbs of the primary loop return to the abdomen with no further rotation, non-rotation occurs. In this condition, the small bowel is located on the right of the abdomen and the colon on the left. Nonrotation is not as dangerous for the patient as malrotation because, in general, the base of the mesentery is wider than in malrotation, and the risk of volvulus is less. However, nonrotation can be a difficult diagnosis radiologically; symptomatic patients may warrant laparoscopic or open exploration to confirm the diagnosis [3,4]. Asymptomatic patients with radiologic findings suggesting non-rotation can be observed.
- In malrotation, the duodenojejunal limb remains in a position of nonrotation, and the cecocolic limb has partial rotation (usually approximately 90 degrees instead of 180 degrees). The end result is that the cecum ends up in the mid-upper abdomen and the abnormally positioned cecum is fixated to the right lateral abdominal wall by bands of peritoneum. These bands of peritoneum, called Ladd bands, cross the duodenum and can cause extrinsic compression and obstruction of the duodenum.

Our patient had been complaining of abdominal pains for a number of years. Her abdominal had been reported to be somehow big for her age for a number of years. However, when she presented to hospital vomiting was not a major symptom. From our description of presentation of malrotation in older children the patient's presentation fit well our description. Most likely she had been having intermittent volvulus or partial obstructions due to malrotation. The presentation of chronic intermittent abdominal pains has been reported in several studies of malrotation. Usually the patients diagnosed in adulthood as malrotation tend to have been diagnosed at some point before with other abdominal pain causing disorders such as irritable bowel syndrome (IBS) and others; this has been known for many years as very old reports suggest. (5,6)

The diagnosis of malrotation in our patient would be missed easily had it been she did not develop a total bowel obstruction due to malrotation.

## Conclusion

The real prevalence and incidence of congenital mid-gut malrotation is not known. It is very important to investigate thoroughly all paediatric patients and adults who present to hospital with intermittent abdominal pains that may sound like various abdominal pain causing disorders and syndromes. It is also important to rule out bowel obstruction in all abdominal distensions and/or un-explained vomiting in paediatric patients. Midgut malrotation and associated bowel obstruction are very treatable and curable conditions provided they are diagnosed in time.

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