



# Management of Sixteen Year Old Male with Intestinal Malrotation by Ladd's Procedure: A Case Report and Review of Literature

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## Authors' contributions

*This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.*

## Article Information

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Case Report

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## ABSTRACT

**Introduction:** Intestinal malrotation is an aberration seen during foetal development in neonatal period. The presentation in adolescents and adults is rare and requires prompt diagnosis and surgical intervention namely Ladd's procedure.

**Case Report:** Here, we discuss a rare case of malrotation in sixteen year old male patient who came to emergency with crampy pain in whole abdomen and vomiting since three days. A contrast enhanced CT scan of abdomen revealed malrotation of small bowel with volvulus. Laparotomy disclosed classic Ladd's bands and dilated third and fourth part of duodenum extrinsically clogging the misplaced duodenojejunal junction. Ladd's procedure comprised of widening of mesenteric base, excision of Ladd's bands followed by appendectomy. Patient was asymptomatic in follow up period. Patients with midgut malrotation may show symptoms of colicky pain in abdomen, intestinal obstruction or ischemia. Ladd's procedure is gold standard treatment of adolescents or adult patients with intestinal malrotation.

**Conclusion:** In adolescents and adults presenting with the intestinal malrotation, the diagnosis should be prompt and quick. The surgical intervention includes derotation of volvulus, inspecting for viability, Ladd's band excision and fixing of gut mesentery to the posterior wall of abdomen so as to prevent recurrence of volvulus.

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## 1. INTRODUCTION

Intestinal malrotation is developmental aberration of midgut which includes failure of normal rotation of gut around superior mesenteric artery (SMA) and fixation in abdominal cavity. Rotational abnormality of midgut is scarce condition in adolescents and grown-ups. Surgical intervention is frequently done in symptomatic patients. Although meticulous diagnosis is required; for better outcomes, immediate diagnosis and surgical intervention is needed. An intestinal malrotation with obstruction of small gut is discussed along with review of literature in this case report.

Intestinal obstruction due to congenital midgut malrotation, usually doesn't manifest after first year of life. Patients with midgut or caecal volvulus present with symptoms of acute gut obstruction, intestinal ischemia or chronic indeterminate pain in abdomen [1].

## 2. CASE REPORT

A male patient aged sixteen year presented to Emergency Department with sudden onset of pain in epigastrium. The patient rated the pain as 9/10 on severity scale. The pain started 24 hours prior to admission and there was no radiation. He had nausea along with several vomiting incidents, which was non bilious and had obstipation since 8 hours. There was no history of bleeding per rectum, fever and dysuria. He had no previous abdominal operations and didn't take any regular medications. He had similar episodes of epigastric pain in the past which got relieved by pain medications.

On general physical examination his heart rate measured 130/min and respiratory rate measured 24/min. His abdomen was tender, voluntary guarding was present but there was no affirmation of peritonitis. His abdomen was slightly distended but rest of the systemic examination was normal. Blood investigations showed Haemoglobin (Hb) of 12.6 mg/dl and Total Leucocytes Count (TLC) of 17300/cumm. Renal function and liver function tests showed no abnormality. Plain abdominal and chest radiograph revealed bowel dilatation without free air under the diaphragm. In the emergency, patient was administered analgesic drugs and intravenous fluids. The abdominal and pelvic CT-scan was taken (Fig. 1). The CT-scan revealed

reverse rotation, overdistended stomach and D1 and D2 of duodenum with twisting of mesentery at D3 with associated volvulus but the oral contrast was seen to pass through the narrow segment.

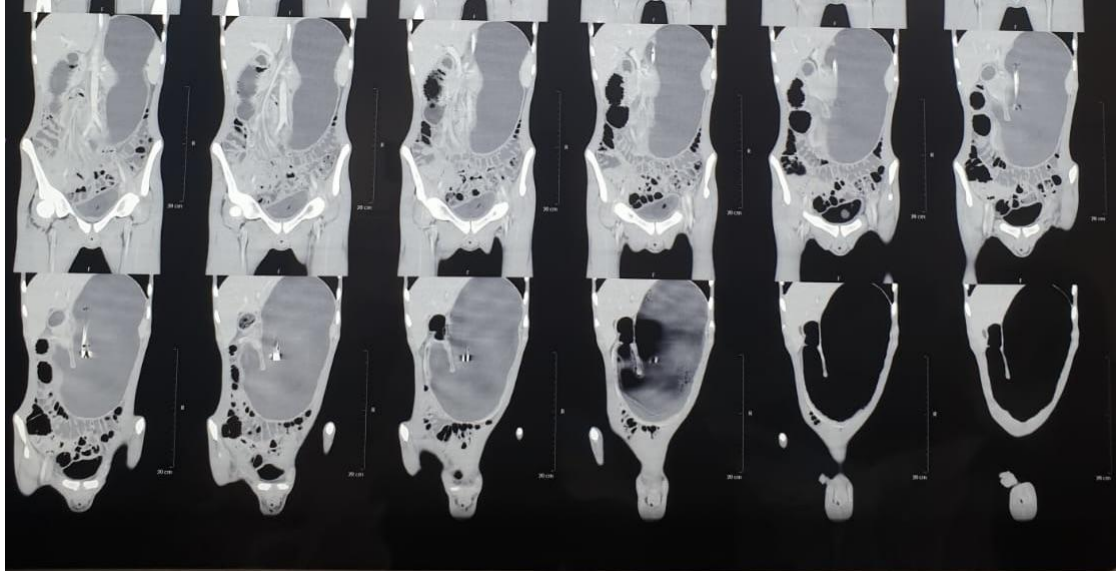
The patient was posted for surgery after CT-scan. The intraoperative findings included grossly distended stomach and the duodenojejunal junction was found to be on the right side and not crossing the midline. The duodenum as well as the duodenojejunal junction were adhered to each other with Ladd's band (Fig. 2). The caecum and appendix were on the left upper side and also adhered with the duodenojejunal junction (Fig. 3). Rest of the bowel was normal. The Ladd's band were excised and the bowel was placed according to the normal anatomy and appendectomy was done. The mesentery of gut was fixed to the posterior abdominal wall. The post operative course was unremarkable and patient was discharged in an appropriate condition after he was taking orally and passing stools. During the follow up period patient was doing well.

## 3. DISCUSSION

Midgut malrotation is an aberration during formation of gastrointestinal tract. Gastrointestinal tract resembles an endoderm-lined tube by 4<sup>th</sup> week in-utero. By 5<sup>th</sup> week in-utero, vascular supply of gut develops and gut differentiates into foregut, midgut and hindgut. Major blood supply to the midgut is by superior mesenteric artery. The midgut is major intestine that gets rotated. Its development comprises of three stages. Stage 1 takes place between 5<sup>th</sup>-10<sup>th</sup> week. In this stage, midgut expands into extra-embryonic cavity, rotates 90° counter-clockwise and comes back in primitive abdominal cavity. Stage 2 arises from 11<sup>th</sup> week, comprising of more counter-clockwise rotation inside abdominal cavity, finishing a 270° counter clockwise rotation. As a result of these rotations, the duodenal "C" loop gets placed behind SMA. Ascending colon positions itself on the right, transverse colon aloft, and descending colon on the left side of the abdominal cavity. In stage 3, mesentery gets fixed to posterior abdominal wall. There is descent of cecum, fixation of ascending and descending colon to posterior wall of abdomen. Failure of rotation of entire midgut leads to placement of small gut on right side and colon on left side of abdomen. If the gut fails to

return in abdominal cavity during stage 1, it leads to omphaloceles. Anomalies in stage 2 results in absence of rotation, faulty rotation or reversal of

rotation of gut. Abnormalities in stage 3 lead to malpositioned duodenum and caecum and non-adhered mesentery of small intestine [2-4].



**Fig. 1. The Coronal section of contrast enhanced CT scan of abdomen and pelvis depicting grossly distended stomach and D1 D2 with twisting of mesentery at D3 and associated volvulus**



**Fig. 2. Ladd's band between duodenum an duodenojejunal flexure**



**Fig. 3. Intraoperative image showing caecum and appendix on left side with dense adhesions with duodenojejunal flexure**

Due to failure of counter-clockwise rotation of the midgut, the duodenojejunal junction shifts to right of midline.

Volvulus of midgut is rarely found among adolescents and adults [5]. The volvulus of midgut is common cause of intestinal obstruction in adults with malrotation, [6] which presents as crampy abdominal pain and vomiting. Acute presentation of midgut volvulus occurs mostly in neonates. As the age increases, the incidence of such presentation decreases [7,8]. Subacute and chronic form is more difficult to diagnose as symptoms are non-specific like chronic abdominal pain, bloating, vomiting, constipation, and diarrhoea [9]. The warping of gut around native mesentery causes constriction of SMA, which ultimately obstructs venous outflow causing congestion of the bowel. This will lead to mucosal shedding and bleeding, and if the volvulus gets relieved spontaneously, the patient will present with bloody diarrhoea. The intestinal malrotation can be promptly diagnosed with the help of abdominal x-rays as well as contrast enhanced CT scan of abdomen. Ladd's procedure is surgical intervention of choice in intestinal malrotation.

In Ladd's procedure, entire gut is delivered through midline incision, volvulus is untwisted in anti-clockwise direction, viability of bowel is inspected, gangrenous bowel is resected and healthy bowel is restored. Ladd's band is excised and gut is fixed to hind wall of abdomen in order to prevent future recurrence of volvulus.

A second surgery is carried out after 24-48 hours along with adequate resuscitation [10], if there is unpredictability of viability of gut. Limited resection may then be possible and anastomosis of healthy bowel may be performed.

#### **4. CONCLUSION**

In conclusion, there should be prompt diagnosis of intestinal malrotation in the adolescents and adults which have rare incidence. Ladd's procedure is intervention of choice which can be performed by open laparotomy or laparoscopically.

#### **CONSENT**

Written informed consent was obtained from the patient's guardian/parent/next in keen for

publication of this report and any accompanying images.

### ETHICAL APPROVAL

As per international standard or university standard written ethical approval has been collected and preserved by the author(s).

### COMPETING INTERESTS

Authors have declared that no competing interests exist.

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