

Successful treatment of a 16-year-old patient with intestinal malrotation with Ladd procedure: case report and literature review

ABSTRACT

Introduction: Intestinal malrotation is a rotation anomaly that occurs during foetal development and usually presents in the neonatal period. The presentation in adolescent and adults is rare and requires prompt diagnosis and surgical intervention namely Ladd's procedure.

Case Report: We present a rare case of malrotation in a 16 year old male patient who presented with crampy generalized abdominal pain, and vomiting for a duration of three days. A contrast enhanced computed tomography abdominal scan showed malrotation of the small bowel with volvulus. Laparotomy revealed typical Ladd's bands and a distended third and fourth duodenal portion extrinsically obstructing the misplaced duodenojejunal junction. The Ladd's procedure, including widening of base of mesentery, division of Ladd's bands and appendectomy, was performed. Symptoms completely resolved in follow up period. Patients with midgut malrotation may present with crampy abdominal pain, intestinal obstruction, or intestinal ischemia. The Ladd's procedure is feasible and safe treatment of teenage 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 the fixing of gut mesentery to the posterior abdominal wall so as to decrease repeat episodes of volvulus.

Keywords-Malrotation, Laparotomy, Ladd procedure, Intestinal obstruction, Teenage

INTRODUCTION

Intestinal malrotation is a developmental anomaly of the midgut which consists of failure of normal foetal rotation of intestines around the superior mesenteric artery and their fixation in the peritoneal cavity. Rotational anomalies of the midgut are rare condition in teenagers and adults. Surgical intervention is frequently done in symptomatic patients. Although meticulous diagnosis is required, but quick diagnosis and surgical intervention is required for better outcomes. In the present report, a case of incidental intestinal malrotation with clinical findings of small bowel obstruction is discussed with a literature review.

Congenital midgut malrotation, a rare anomaly leading to intestinal obstruction, is generally doesn't present beyond the first year of life. Symptomatic patients present with either acute gut obstruction, ischemic intestine with a midgut or caecal volvulus or with chronic vague abdominal pain.^[1]

CASE REPORT

A 16 year old male presented Emergency Department with sudden onset epigastric abdominal pain, which he rated as 9 out of 10 in severity. The pain had started 24 hours back and there was no radiation. He had experienced associated nausea and had multiple episodes of vomiting which was non bilious. The patient had experienced obstipation since 8 hours. There was no history of bleeding per rectum, fever, dysuria. He had no previous abdominal operations, no significant past medical or family history and didn't take any regular medications.

On examination his Heart rate was 130 /min and Respiratory Rate was 24/min. He had generalised abdominal tenderness, with voluntary guarding but no evidence of peritonitis. His abdomen was mildly distended. Further systemic examination was unremarkable. Blood tests were performed which showed Hb-12.6 gm% ,TLC 17300/cumm. Urea and electrolytes and liver function tests

were within normal range. Plain abdominal and chest films were remarkable, with no free air under the diaphragm but bowel dilatation was present. Initially the patient was treated with analgesic drugs and fluids and an abdominal and pelvic computed tomography (CT) was requested (Fig. 1). The CT demonstrated reverse rotation with 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.

Following the CT scan the patient was taken to operating room. 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 was adhered to the 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 appropriate condition after he was taking orally and passing stools. The weekly appointment were scheduled and the patient during the weekly follow up has been doing well.



Figure 1- The Coronal section of contrast enhanced CT scan of abdomen and pelvis showing grossly distended stomach and D1 D2 with twisting of mesentery at D3 and associated volvulus



Figure 2- Ladd's band between duodenum an duodenojejunal flexure



Figure 3- Intraoperative image showing caecum and appendix on left side with dense adhesions with duodenojejunal flexure

DISCUSSION

Malrotation of the midgut is an anomaly of embryological development of the gastrointestinal tract. By the 4th intrauterine week, the gastrointestinal tract looks like an endoderm-lined tube. During the 5th week, a vascular pedicle develops and the gut gets divided into foregut, midgut and hindgut. The superior mesenteric artery is the main blood supply to the midgut. The midgut is the major intestine that gets rotated which is divided into three stages. Stage 1 occurs between 5th-10th week and involves expansion of the midgut into the extra-embryonic cavity, a 90° counter-clockwise rotation, and coming back of the midgut into the primitive abdomen. Stage 2 occurs from 11th week, comprising of more counter-clockwise rotation inside abdominal cavity, finishing a 270° counter clockwise rotation. These movements bring the “C” loop of the duodenum behind the superior mesenteric artery, ascending colon on the right, transverse colon aloft, and descending colon on the left of the abdominal cavity. Stage 3 comprises of joining and anchoring of the mesentery. The cecum descends, and the ascending and descending colon gets fixed to the posterior abdominal wall. If there is failure of rotation involving the entire midgut, severe malposition follows that includes, small bowel positioned on the right side and the colon on the left side of abdominal cavity. Stage 1 failure leads to omphaloceles which is caused by failure of bowel to return to the abdominal cavity. Stage 2 aberrations consist of non-rotation, malrotation, and reversed rotation. Stage 3 aberrations consist of a mobile duodenum, cecum, and non-fixed small bowel mesentery.[2-4]

Midgut malrotation and nonrotation is led by failure of the counter-clockwise rotation of the midgut, resulting in the faulty location of the duodenojejunal junction to the right of midline.

Midgut volvulus is infrequent in adolescent and adults.[5] and commonly presents in the first month of life. In an adult with malrotation, midgut volvulus is frequent cause of intestinal obstruction.[6] Acute presentation of midgut volvulus, ileocecal junction occurs mostly in the neonate with the incidence of such presentation decreasing with age.[7,8] The subacute and chronic presentation is more difficult to diagnose as symptoms being non-specific like chronic abdominal pain, bloating, vomiting, constipation, and diarrhoea.[9] The gut twists around the primitive dorsal mesentery leading to constriction and compression of the superior mesenteric vessels. This will ultimately affect the venous outflow and the involved bowel will become congested. The infarcted bowel will have mucosal shedding and bleeding, and if the volvulus gets relieved spontaneously, the patient will present with bloody diarrhoea.

Intraoperatively, the entire mass of the small bowel after being delivered through midline incision, the volvulus is completely untwisted in a counter-clockwise direction. The viability of the bowel is thoroughly inspected. The gangrenous bowel is resected and healthy bowel continuity is restored. In case the viability of the gut is uncertain, re look surgery is performed 24 to 48 hours later, along with adequate resuscitation.^[10] Limited resection may then be possible.

In conclusion, there should be prompt diagnosis of intestinal malrotation in the adolescents and adults which have rare incidence. During surgery the bowel should be de rotated, checked for viability, Ladd's band excised and the gut mesentery should be fixed to the posterior abdominal wall so as to decrease repeat episodes of volvulus.

Consent-Written informed consent was obtained from the patient's guardian/parent/next in keen for publication of this report and any accompanying images. A copy of the written consent is available for review by the Editor-in -Chief of this journal.

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