

Case Report

Gastrointestinal malrotation and Ladd's bands in adults — a case series

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Gastrointestinal malrotation commonly present early in life. A minority of the patients remain asymptomatic in childhood and may present in late in life. In this article we describe cases of adult intestinal malrotation seen in the authors' practice. A retrospective analysis of all the patients in the authors' practice was done over a period of 10 years (2001-2011) to identify cases of adult intestinal malrotation. A total of eight cases were identified. The mean age of the patients was 33.2 years. Recurrent vomiting and weight loss were the predominant symptoms. Barium meal follow through clinched the diagnosis in three cases by revealing duodenal obstruction along with left sided cecum. Ladd's procedure was done in five patients while one patient had bowel infraction and no definitive surgery could be performed. Majority of the patients had good recovery with complete resolution of their symptoms. Gastrointestinal malrotation can present in adults, albeit rarely. The medical practitioners should be aware of the condition in order to diagnose and treat the condition in an appropriate and timely manner.

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Key words : Ladd's bands, Gut rotation, Intestinal malrotation.

Malrotation is a congenital abnormal position of the bowel within the peritoneal cavity. It usually involves both the small and the large bowel. Malrotation is accompanied by abnormal bowel fixation by mesenteric bands or absence of fixation of portions of the bowel, leading to increased risks of bowel obstruction, acute or chronic volvulus, and bowel necrosis. Malrotation is usually diagnosed in newborns and young infants; up to 90% of symptomatic cases occur within the 1st year of life¹⁻³. A minority of patients may escape diagnosis in the early life and may be detected in their adulthood. In adults, malrotation may have myriad symptoms. It can be a bewildering situation for surgeons not familiar with the condition. We, in this article describe cases of adult malrotation associated with Ladd's bands and discuss the management.

MATERIAL AND METHODS

A retrospective analysis of all the patients in the authors' practice was done over a period of ten years (2001-2011). All the relevant details regarding the patient profile, presenting symptoms,

clinical features, imaging features, surgical findings and the outcomes were recorded.

RESULTS

A total of eight cases of intestinal malrotation were found. Four of the eight cases were operated under elective setting (Case 1,2,3,4) while four were operated under emergency set up (Case 5,6,7,8). The age of the patients ranged from 14 to 55 years with the mean age of 33.2 years. Recurrent vomiting and weight loss were the predominant symptoms. Four patients had history of previous abdominal surgery. The patient profile, clinical presentations and surgical history have been described in Table 1.

X-ray and ultrasound examination of the abdomen were the initial investigations offered in these patients. Contrast enhanced CT scan of the abdomen was done in one case that had a gall bladder mass (Case 4) which revealed infiltration of liver. It also demonstrated a left sided cecum. Upper gastrointestinal endoscopy done in three cases revealed dilatation of the stomach. Barium meal follow through clinched the diagnosis in the elective cases by revealing duodenal obstruction along with left sided cecum (Figs 1a & 1b). The imaging findings are summarised in Table 2.

Six of the eight patients underwent Ladd's procedure was performed (Figs 2a & 2b). Two patients could not have any definitive procedure due to the established ischemic gangrene of small bowel. The intra-operative findings, surgery performed and the outcome of the patients has been described in Table 3. Four patients made excellent recovery after the Ladd's procedure and are doing well on follow up. The mortality was higher in patients with acute presentation as compared to the elective cases.

DISCUSSION

Anomalies of rotation are the commonest embryologic malformations of the gastrointestinal tract. It has been reported that as

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Table 1 — The demographic details, clinical presentations, operative findings and surgical history of cases with intestinal malrotation

Age/Sex	Clinical presentation	Previous surgery
14/Male	Recurrent vomiting & weight loss	None
37/Female	Recurrent vomiting & weight loss	None
38/Female	Recurrent vomiting & weight loss	Appendectomy
54/Male	Recurrent vomiting & weight loss, pain abdomen	None
55/Male	Acute intestinal obstruction	Extended cholecystectomy 2 weeks before presentation
30/Male	Acute intestinal obstruction	Right hemicolectomy 1 year back for cecal volvulus
17/Male	Jaundice and sub-acute intestinal obstruction	Appendectomy 3 weeks before presentation
21/Male	Acute intestinal obstruction	None

many as 90% of the cases present within the first year of life⁴⁻⁶. The condition is rare in adults. The actual incidence malrotation is difficult to assess as people may not be detected to be having intestinal malrotations unless they present with symptoms or are incidentally diagnosed on unrelated investigations. The autopsy data indicate that the incidence of malrotation may be up to 1%⁷⁻¹⁰.

During the normal embryogenesis, the small intestinal loops protrude in the umbilical coelome and form the umbilical loop. This loop undergoes an anticlockwise rotation around the superior mesenteric artery. Any anomaly which hinders this process can result in rotation abnormalities. The most common cause of these rotational abnormalities is the presence of fibrous bands which were described in the classic article by William Ladd in the year 1936 and bear his name^{11,12}.

The clinical presentation can be varied in the adult patients. They often presents with signs of intestinal obstruction. Pain abdo-

Table 2 — Findings on X-ray, ultrasound and barium meal follow through

X-ray abdomen	Ultrasonographic findings	Barium meal follow through
Not performed	Normal	Duodenal obstruction and left sided cecum
Not performed	Normal	Duodenal obstruction and left sided cecum
Not performed	Normal	Duodenal obstruction and left sided cecum
Not performed	Gall bladder mass	Not performed
Distended small bowel	Not performed	Not performed
Distended small bowel	Not performed	Not performed
Distended small bowel	Not performed	Not performed
Distended small bowel	Dilated bowel loops	Not performed

men with forceful vomiting is the most commonly encountered presentations. The vomiting may be bilious or non bilious depending upon the level of obstruction. Patients who have midgut volvulus may present with acute onset of bilious vomiting and severe pain abdomen. The patients may have chronic history of abdominal pain and often are on antispasmodic medications. Less common chronic symptoms included diarrhoea, bloating, constipation, bleeding etc^{4,6,13}. In our series, the patients who were symptomatic since long durations, presented with vomiting and weight loss.

Imaging modalities most commonly offered are X-rays, contrast studies, CT scan, duplex ultrasonography etc. Plain X-ray of the abdomen may reveal signs of intestinal obstruction in the form of distended bowel loops or else in case of duodenal obstruction, a classic “double bubble” sign may be seen. Contrast studies like barium enema to confirm the position of cecum or barium meal follow through studies are extremely useful^{6,9,14}. Coiling and inversion of the superior mesenteric vein over the superior mesenteric artery may be seen of duplex ultrasound^{15,16}. CT scan with oral and

intravenous contrast can help in establishing the diagnosis as well as assessing the bowel viability^{17,18}. It is not uncommon that some patients may not be diagnosed even with these studies and surgical exploration is the ultimate answer.

Malrotation may go undiagnosed even in patients who have had a previous abdominal surgery for an unrelated disease especially if the operating surgeon is not familiar with this condition. This happened in three of our cases who had previous abdominal surgery (Case 4,5,6 respectively). This highlights the importance of educating all the surgeons regarding intestinal malrotations in order to help them identify and correct it surgically.

The management of gastrointestinal malrotation depends



Fig 1a — Obstruction of Duodenum due to Ladd's Band (arrow)

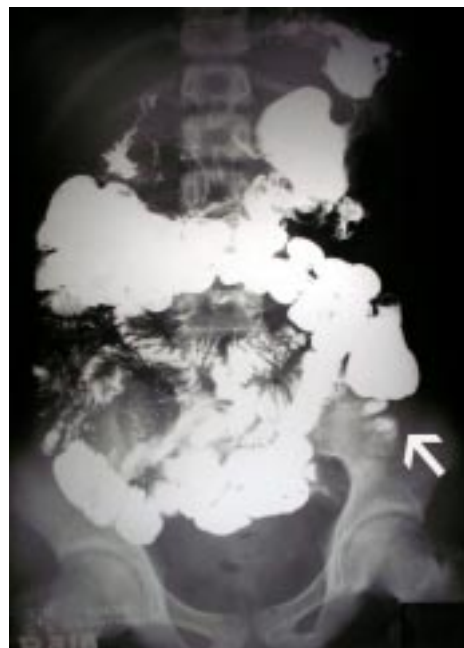


Fig 1b — Left sided ileo-caecal junction with appendix (arrow)



Fig 2a — Narrow mesentery of the small bowel demonstrated with forceps



Fig 2b — Final position of the caecum on the left after Ladd's procedure (forceps)

Table 3 — Per-operative findings, surgical procedure performed and outcome of the patients with gastrointestinal malrotation

Per-operative finding	Surgery performed	Outcome
Malrotation of the gut and Ladd's band	Ladd's procedure	Excellent
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Inoperable Carcinoma gall bladder with malrotation of the gut and Ladd's band	Ladd's procedure	Patient discharged and received palliative treatment for carcinoma of gall bladder
Midgut volvulus and bowel ischemia	Ladd's procedure	Patient expired on fifth post operative day
Ileo-sigmoid anastomosis with internal herniation	Ladd's procedure	Excellent
Midgut volvulus with bowel infraction	None	Patient expired on third post operative day
Small bowel gangrene	None	Patient expired on sixth post operative day

upon the clinical presentation. The Ladd's procedure remains the cornerstone of surgical treatment for malrotation in patients with symptomatic malrotations. This procedure comprises of reduction of volvulus (if present), division of mesenteric bands, widening of the mesenteric base, placement of small bowel on the right and large bowel on the left of the abdomen, and appendectomy. This procedure has been consistently shown to relieve symptoms and reduce the risk of future volvulus and bowel ischemia. In our study Ladd's procedure was done in five of the six patients of which four made good recovery and are asymptomatic on follow up. Considering the efficacy of Ladd's procedure and the inability to predict which patient will eventually have a volvulus, it is now recommended that even asymptomatic patients with malrotations should be operated^{6,9,19}.

To summarize, eight adult cases of intestinal malrotation have been described in this study. The clinical presentation is vague, ranging from diffuse pain abdomen, nausea, vomiting, to features of acute intestinal obstruction. History of previous abdominal surgery does not rule out the presence of malrotations. X-ray abdomen, ultrasound, barium meal follow through and CT scan can be useful in establishing the diagnosis. The condition is associated with high mortality especially in case of acute presentation due to mid gut volvulus and subsequent ischemia of the bowel. Ladd's procedure, in the absence of established volvulus/bowel ischemia offers cure.

CONCLUSION

Our series shows that adult intestinal malrotations presents as a perplexing problem to the surgeon. As the presentation is non specific, diagnosis is often delayed and a high index of suspicion is needed. Malrotation with its propensity for volvulus is truly a time bomb lying within. Thus, it is important that intestinal malrotation should be considered and identified as a possible aetiology for patients with chronic, vague abdominal complaints. The medical practitioners should be aware of the condition in order to diagnose and treat the condition in an appropriate and timely manner. A careful clinical approach will identify patients not responding to treatment in the usual way. All the pertinent diagnostic tests, especially barium studies, should be carried out in these patients. Due to the high morbidity and mortality, prompt intervention is mandatory. Surgical correction by Ladd's procedure should be offered at the earliest in order to alleviate the symptoms and to avoid the risk of catastrophic complications like volvulus and bowel ischemia.

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