

## Intestinal Malrotation: Experience with Diagnosis And Management of 76 Patients from A Tertiary Care Centre in India

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### Abstract

**Introduction:** Malrotation is a spectrum of anatomical abnormalities due to incomplete rotation and fixation of intestine during the embryonic development. The clinical presentation varies from off and on symptoms of high intestinal obstruction to life threatening mid gut volvulus with intestinal gangrene. The present paper shares our experience with presentation and subsequent management in patients presenting with a diagnosis of intestinal malrotation.

**Materials and methods:** The study was carried out in the department of surgery, SGRRIMHS Dehradun, India. All the patients admitted to the department during last seven years (2010-2017) with a diagnosis of intestinal malrotation were retrospectively analyzed. The case records were looked for the age sex and symptoms at the time of presentation. The data sheets were analyzed for the investigations done and treatment offered and the complications if any with outcome achieved.

**Results:** A total of 76 patients admitted with a diagnosis of intestinal malrotation in the study period. There were 43 males and 33 females. The age at presentation ranged from newborn to 14 year. Most of the patients of intestinal malrotation presented in the early neonatal period. In 60 patients the classical Ladd's procedure was performed and was curative. Remaining patients needed resection of the bowel and anastomosis or exteriorization of the bowel. The most common post-operative complication was ileus.

**Conclusion:** A high index of suspicion, a careful history followed by upper GI contrast is essential to diagnose these patients. It is essential to interpret the early symptoms correctly so that the corrective surgery can be performed in time and fatal complications like mid gut volvulus can be prevented.

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### I. Introduction

Malrotation is a spectrum of anatomic abnormalities due to incomplete rotation and fixation of intestine during fetal development. The normal placement of intestine in peritoneal cavity involves complete rotation followed by fixation during early embryonic development. Since the first description of normal embryology of rotation and fixation of human intestine given by Mall (1) in 1898 and described in detail by Dott (2) in 1923, it is a diagnostic dilemma for surgeons. The surgical management has not changed much since it was described by Ladd in 1932 (3). The presentation of this surgical problem ranges from neonate to adults and symptoms varies from bilious or non bilious vomiting, vague abdominal discomfort to life threatening midgut volvulus and ischemic infarction of intestine. This paper retrospectively reviews the presentation and management of patients presented with malrotation in last 7 years to our centre.

### II. Material And Methods

This retrospective study is conducted in the department of surgery Sri guru ram rai institute of medical and health sciences Dehradun uttarakhand, India. The patients admitted and operated from December 2010 to January 2017, with complains primarily due to malrotation were retrospectively analysed in this study. The individual data sheets were looked for the age and mode of presentation. The case sheets were analyzed for the treatment offered and outcome achieved. In this time period Total 76 patients, 43 male and 33 female, age ranging from newborn to 14 years, were admitted and treated in our department primarily for malrotation and its complications during the study period. The patients in whom malrotation was incidentally found during operation for some other pathology or in whom malrotation was secondarily associated with some other major disease were excluded. The diagnosis was suspected primarily on the basis of clinical presentation of the patients and confirmed by upper G I contrast studies. The clinical symptoms to suspect a patient having malrotation were vomiting (bilious or nonbilious) (4), recurrent abdominal pain and abdominal distension, or chronic non specific abdominal symptoms (5). The major criteria for diagnosing malrotation on Upper G I

contrast were dilated stomach, a dilated C-loop of duodenum, and right sided duodenojejunal flexure to the midline. No other diagnostic modality was used to diagnose malrotation. Those patients who presented as acute intestinal obstruction or with signs of bowel ischemia were subjected to operative procedure directly after resuscitation and plain abdominal radiograph without further diagnostic evaluation and diagnosis was made intraoperatively. The data thus obtained was analysed by stratifying the patients according to age, sex, primary symptoms at the time of presentation, operative procedures and complications.

**(Picture 1 and 2)**

### **III. Results**

Total 76 patients were admitted and undergone operation for intestinal rotational anomalies from December 2010 to January 2017, in our department. The results of this study are shown in the tables (**table 1 to 5**). It is clear from our data that most of the patients of malrotation presented in first year of life and among those presented in their first year more than half presented in their first month. Only 14 (18.42%) patients were older than 5 years. About 56.5% of our patients were male (9). The most common presentation was vomiting either bilious or nonbilious (4). This presentation is mostly seen in newborns who presented with complains of bilious vomiting after feed. Second most common presentation was chronic or recurrent abdominal pain (5) and, off and on abdominal distension. This presentation is found in older children and the cause is thought to be the recurrent midgut volvulus around the narrow mesenteric pedicle which derotates spontaneously to relieve the symptoms. Some older patients presented with non specific abdominal symptoms like anorexia, nausea, constipation and failure to thrive. It was this group of patients which was most difficult to diagnose. A high index of suspicion, a careful history followed by upper G I contrast is essential to diagnose these patients. About 19 of our patients presented as acute abdomen and half of them had signs of bowel ischemia at the time of admission. These patients after a quick resuscitation and plain abdominal radiograph were subjected to operative intervention and diagnosis was made intraoperatively.

In 60 (78.94%) of the patients classical Ladd's procedure with appendectomy was performed. In those situations where irreversible bowel ischemia was present resection of gangrenous bowel with primary anastomosis or exteriorisation of bowel as double barrel stoma (where there was gross contamination of peritoneal cavity) was performed. Postoperative management includes intravenous fluids, intravenous antibiotics and passive Ryle's tube suction. Antibiotics were given for 3 days to 8 days postoperatively according to the patient's condition (average 4 days). Ryle's tube was removed once the aspirated content became nonbilious and bowel movement started (average 3 days). Oral feed in the form of clear liquids started once the Ryle's tube was removed and increases to semisolids as the patient tolerated. Before the time of discharge all patients were on normal diet.

In this series 5 patients died (6.57%). Among those who expired 2 were presented with bowel ischemia and shock with very low general condition. 1 neonates aspirated in postoperative period, one premature infant developed apnoea and cardiopulmonary arrest and one patient expired in immediate postoperative period due to anaesthetic complication. The most common post operative complication was delayed peristalsis (13.15%) which was diagnosed by excessive bilious aspirate from Ryle's tube or vomiting when trial feed was given. All the patients with this complication were managed conservatively by delayed oral feeds and prokinetic drugs (Cisapride). 8 patients developed wound infections and one developed incisional hernia. Wound infection was developed in those patients who had bowel gangrene and gross peritoneal contamination on operation and in all cases wound infection was managed with antibiotics and regular dressings.

### **IV. Discussion**

The malrotation is a surgical problem mostly seen in neonates but can also present in older children. It includes a wide range of rotational and fixation anomalies ranges from small bands obstructing the duodenum to complete non-fixation of intestine in the peritoneal cavity. The exact incidence of the disease is difficult to determine as many patients are asymptomatic. The patients with congenital bands may presents with the symptoms of duodenal obstruction and on upper GI contrast shows duodenomegaly and distended stomach. Midgut volvulus is the most worrisome complication (6, 7, 8) of the disease and can lead to fatal complications due to infarction of variable length of small intestine if not treated urgently. The diagnosis can be suspected on clinical presentation and confirmed by upper G I contrast studies. The role of contrast C T can be debated. In our series out of 20 patients who had chronic symptoms 16 were referred from other hospitals, 9 of whom had a contrast CT done. The sensitivity of upper G I contrast in diagnosing malrotation is around 85% in our series (10). So we prefer a Upper G I contrast over a contrast C T, as it is reliable and cost effective, which is a major concern in a developing country like ours. The ultrasonography when used in selected cases showed poor results. The standard surgical technique for malrotation is Ladd's procedure. It is again a matter of debate that appendectomy should be performed routinely or not. We performed it in most of the cases but a new consensus to preserve the appendix is developing because various uses of appendix as a conduit are well known. We leave

it on operating surgeon's choice either to leave or remove the appendix. In cases where intestinal gangrene is present resection of gangrenous bowel and primary anastomosis or exteriorization of bowel is to be done depending on the condition of patient, bowel and peritoneal cavity.

As a paediatric surgeon it is essential to interpret the early symptoms correctly so that the corrective surgery can be performed timely and fatal complications can be prevented.

### V. Conclusion

Finally based on our experience we recommend that at any age if malrotation is diagnosed one should consider it for surgical correction. In cases where malrotation is suspected clinically, upper G I contrast should be performed to confirm the diagnosis, and if the contrast study is doubtful one should go for surgical intervention either via laparotomy or laparoscopy in symptomatic patients.

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<b>Table 1.</b>	
<b>Age of presentation</b>	
<b>Age</b>	<b>No. of patients</b>
O-1 month	29 (38.15%)
1 month – 1 year	20 (26.31%)
1 – 5 years	13 (17.10%)
5 – 10 years	10(13.15%)
> 10 years	4 (5.26%)
<b>Total</b>	<b>76</b>

<b>Table 2.</b>	
<b>Sex distribution</b>	
Male	43 (56.57%)
Female	33 (43.42%)

<b>Table 3.</b>	
<b>Clinical presentation</b>	
Vomiting (bilious or nonbilious)	37 (48.68%)
Chronic abdominal pain and abdominal distension	14 (18.42%)
Non-specific abdominal complains, (anorexia, nausea, constipation) and failure to thrive	6 (7.89%)
Acute intestinal obstruction (midgut volvulus)	9 (11.84%)
Signs of bowel ischemia, septicaemia	10 (13.15%) and shock

<b>Table 4.</b>	
<b>Operative procedures</b>	
Ladd's procedure	60 (78.94%)
Resection with primary anastomosis	9 (11.84%)
Resection with double barrel stoma	7 (9.21%)

<b>Table 5.</b>	
<b>Complications</b>	
Mortalities	5 (6.57%)
Wound infection	8 (10.52%)
Delayed peristalsis	10 (13.15%)
Incisional hernia	1 (0.76%)



**Picture.1** Upper GI contrast showing incomplete obstruction with extrinsic compression of duodenum



**Picture.2** plain X-Ray showing bowel gas pattern in stomach and duodenum with paucity of air in distal bowel.

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