# **Original Research Article**

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# Malrotation of gut presenting in adolescents and adults at a tertiary care hospital: a prospective study

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### **ABSTRACT**

**Background:** Although malrotation of gut presenting in adolescents and adults is rare, but exists. Also its presentation is nonspecific. Hence its diagnosis needs high index of suspicion.

**Methods:** This prospective study was done in the department of surgery at SMHS hospital (GMC Srinagar) over a period of 5.5 years from July 2012 to December 2017. The patients included all the adolescent and adult patients who proved to be the cases of malrotation of gut on intraoperative visualisation.

**Results:** During the study period, 14 patients with malrotation of gut (belonging to adolescent and adult age group) were recorded. Age of the patients ranged from 16 to 54 years with an average of  $26.21\pm11.15$ years. Majority of the patients belonged to adolescent age group. Preoperatively CT (computed tomography) scan was done only in 4 patients, thereby making the diagnosis of malrotation preoperatively in these 4 patients. In all other patients, the diagnosis was made only after laparotomy (for acute abdomen) and intraoperative visualisation. Ladd's procedure was done successfully in majority of patients with two patients requiring resection of gangrenous small bowl and stoma formation.

**Conclusions:** Malrotation of gut presenting in adolescents and adults is a rare phenomenon and also the symptoms are similar to several other abdominal pathologies, hence it represents a diagnostic challenge. Hence a high index of suspicion is needed to diagnose this rare entity early without undue delay. Threshold for CT scan should be kept a little low in suspicious cases so as to diagnose and intervene in time.

Keywords: Adolescents and adults, Gangrene, Ladd's procedure, Malrotation

#### INTRODUCTION

Intestinal malrotation is a clinical entity that encompasses partial to complete failure of the 270 degrees' counter clockwise rotation of the midgut around the superior mesenteric vessels in the fetal life. Its incidence is one in every 200-500 newborns. The incidence of symptomatic cases is one in 6,000 newborns. Presentation in adults is very rare. A high index of suspicion is often necessary to diagnose this condition in adults. Adult midgut malrotation is very rare and its incidence has been

reported to be between 0.0001% and 0.19%.<sup>3,4</sup> The clinical diagnosis of midgut volvulus in adolescents and adults is difficult because the presentation is usually nonspecific and malrotation is rarely considered. Recurrent episodes of colicky abdominal pain with vomiting over a period of months or years are typical and may eventually lead to imaging.<sup>5</sup> Most adult diagnoses of midgut malrotation are made in asymptomatic patients; either on imaging investigations for unrelated conditions or at operations for other pathology. This scenario of incidental diagnosis is becoming increasingly common,

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particularly with improvements, and increased use, of diagnostic imaging techniques in modern practice. However, there are a small proportion of affected adults who may present with acute or chronic symptoms of intestinal obstruction or intermittent and recurrent abdominal pain. The true diagnosis in this age group is fraught with immense difficulty, especially because the typical presentation is with non-specific symptoms and the fact that adult surgeons usually have low index of suspicion and may not consider the diagnosis a possibility in the initial evaluation of adult patients with abdominal pain.<sup>6</sup>

Malrotation of gut presenting in adolescents and adults, although is rare but exists. Also its presentation is nonspecific. Hence its diagnosis needs high index of suspicion. Under this background present study was undertaken to look into the profile of this disease in our tertiary care hospital.

#### **METHODS**

This prospective study was done at the department of surgery SMHS hospital at GMC Srinagar over a period of 5.5 years from July 2012 to December 2017. The patients included all the adolescent and adult patients who proved to be cases of malrotation of gut on intraoperative visualisation. Patients of less than 10 years age were excluded from the study. Baseline blood investigations, abdominal radiographs, and USG (ultrasound) were done in all patients, in addition to proper history and clinical examination, and CT scan (computed tomography) was done in only 4 patients. Majority of our patients were diagnosed for first time on exploratory laparotomy. Twelve of the patients were operated in emergency operation theatre while 2 patients of elder age with CT documentation were operated in elective operation theatre because of less acute nature of their condition.

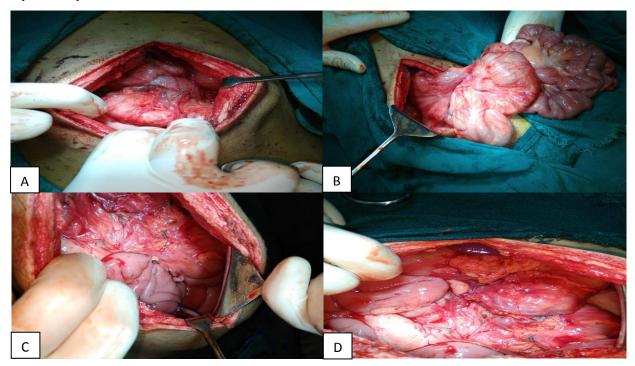


Figure 1 (A-D): Steps of Ladd's procedure (malrotation of gut).

## Statistical analysis

The recorded data was compiled and entered in a spreadsheet (Microsoft Excel) and then exported to data editor of SPSS Version 20.0 (SPSS Inc., Chicago, Illinois, USA). Continuous variables were expressed as Mean  $\pm$ SD and categorical variables were summarized as frequencies and percentages.

## **RESULTS**

During the study period of 5.5 years, a total of 14 patients with malrotation of gut (belonging to adolescent and

adult age group) were recorded. The patients included all the adolescent and adult patients who proved to be cases of malrotation of gut. Age of the patients ranged from 16 to 54 years (Table 1) with an average of  $26.21\pm11.15$  years (SD=11.149). Majority of the patients belonged to adolescent age group. Eight were male patients and 6 were female patients. Most common clinical feature was pain abdomen (Table 2).

Preoperatively CT (computed tomography) scan was done only in 4 patients, thereby making the diagnosis of malrotation preoperatively in these 4 patients. In all other patients, the diagnosis was made only after laparotomy

(for acute abdomen) and intraoperative (Table 3) visualization. Ladd's procedure was done successfully in majority of patients with two patients requiring resection of gangrenous small bowl and stoma formation. One patient with gangrene gut developed surgical site infection, which was managed successfully. Hospital stay of the patients ranged from 3days to 11 days, with an average of 4.71 days.

Table 1: Age distribution.

Age group (in years)	Number of patients (%)
10-19	6 (42.8)
20-29	4 (28.6)
≥30	4 (28.6)
Total	14

Table 2: Clinical features(C/Fs).

Clinical features	Number of patients
Cramp like abdominal pain	7
Chronic abdominal pain	2
Sensations of extreme fullness and discomfort after meals.	6
Vomiting	5
Peritonitis	2

Table 3: Intraoperative findings.

Findings	Number of patients
Volvulus	8
Gangrene	2
Only malrotation without complications	4

In majority of patients, light orals were started next day only. Symptomatic improvement was reported in almost all patient following surgical intervention. Patients were strictly followed for 3months after surgery except one outsider young male patient with resection of gangrenous bowl, who left for his home state in the first postoperative month only. All patients looked nutritionally improving after surgery except the two patients with gangrenous bowl who landed in resection of the significant portions of their bowl. These two patients started becoming malnourished in the postoperative period.

### **DISCUSSION**

Most of the malrotation cases are observed in the first month of life. Yet, it may be seen in adults.<sup>6</sup> Its true incidence in adults is difficult to estimate, since most adult cases are asymptomatic and often never diagnosed.<sup>7-9</sup> Thus, when in adolescents and adults, it represents a diagnostic challenge, due to symptoms similar to several other abdominal pathologies.<sup>7</sup> The

patients in our study ranged from 16 to 45 years, with the majority belonging to the adolescent age group. Hence a high index of suspicion is needed to diagnose this rare entity early without undue delay, so as to avoid or limit further complications. History of intermittent abdominal cramps, chronic abdominal pain and sensations of extreme fullness and discomfort after meals should raise suspicion of malrotation and should be kept a differential diagnosis. Imaging studies such as plain radiography, contrast enhanced stomach-duodenum radiography, ultrasonography and computerized tomography scan can help diagnose malrotation. Contrast enhanced radiograph has been shown to be the most accurate method.<sup>11</sup> Typical radiological signs include corkscrew sign, which is caused by the dilatation of various duodenal segments at different levels and the relocation of duodenojejunal junction due to jejunum folding. <sup>12</sup> In ultrasonography, the superior mesenteric vein (SMV) lies to the left or anterior to the superior mesenteric artery (SMA). Doppler USG may show the whirlpool sign with rotation of SMV around SMA which is typical for malrotation. 12 Besides, jejunal arteries lie to the right instead of to the left in computerized tomography scan as another diagnostic sign of malrotation.<sup>13</sup> Ladd's procedure has been the standard procedure of elective treatment of intestinal malrotation since 1936.<sup>14</sup> This procedure consists of following steps: first, mid gut volvulus is untwisted; bands causing obstruction are divided; segments of colon and small bowel are set to neutral position and appendectomy is added to prevent future difficulty of diagnosis of appendicitis. Threshold for CT scan should be low whenever there is suspicion of malrotation of gut. Most common clinical feature was pain abdomen in our patients. Similar was the result in another study by Husberg et al. 15 Volvulus was more common in vounger patient than the older ones in our study. Nehra et al, presents an excellent retrospective study, which includes 130 patients of all ages, treated at a single institution. Only 30 % of the patients were below 1 year of age, and as many as 48 % were above 18 years of age at the time of diagnosis.<sup>16</sup> They described a decreased risk for volvulus with age, which also was confirmed among adult cases in the study by Husberg et al. 15 Consequently, a conservative attitude towards surgery is more reasonable in the older age group.

Two patients with radiological diagnosis of malrotation underwent surgery in elective operation theatre, becaue of less emergent nature of their condition. Today, many authors advocate surgical correction of malrotation due to the difficulty in predicting who will be striked by torsion of the midgut, bringing an urgent, life-threatening condition in the future. Furthermore, we cannot be certain that patients without complaints are truly free from symptoms. <sup>17,18</sup> In most of our cases senior surgeon was called during the procedure, as the junior doctors are not well experienced in dealing with this rare condition. Hence to avoid inadequate treatment and recurrence, the operation should be started preferably during the day time when the senior people are available unless the patient is

demanding urgent intervention during the night hours when the senior person should be called without hesitation.

#### **CONCLUSION**

Malrotation of gut presenting in adolescents and adults is a rare phenomenon and also the symptoms are similar to several other abdominal pathologies, hence it represents a diagnostic challenge. Hence a high index of suspicion is needed to diagnose this rare entity early without undue delay, so as to avoid or limit further complications. History of intermittent abdominal cramps, chronic abdominal pain and sensations of extreme fullness and discomfort after meals should raise suspicion of malrotation and should be kept a differential diagnosis. Threshold for CT scan should be kept a little low in suspicious cases so as diagnose and intervene in time. Well trained senior person should be involved during the surgical intervention of this rare condition. Further studies and reporting is needed to get familiar with this rare condition.

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