Duodenal Volvulus with Intestinal Malrotation in a 9 Year Old Boy: A Case Report

Abstract: The gastrointestinal tract contains multiple and complex organs that play together a vital role in the life of humans. This tract may be affected by multiple diseases, either congenital or acquired during life. Congenital diseases commonly manifest during the infancy period, and it rarely remains masked until later in life especially those affecting the small intestine. Different radiological techniques are widely used for the diagnosis and, sometimes, for therapeutic purposes, in association with medical and surgical approaches. In this article, a rare case of duodenal volvulus with intestinal malrotation due to late presentation in a 9-year-old boy will be discussed.

Keywords: Gastrointestinal Tract, Congenital Disease, Small Intestine, Malrotation, Volvulus.

BACKGROUND:
Intestinal malrotation is a congenital defect that occurs early in pregnancy when a baby's intestines fail to form into a coil in the abdomen. Malrotation means, in other words, that the bowels are abnormally located within the abdomen. This can lead to dangerous complications such as volvulus (twisting around mesentery) (Millar, A. J. W. et al., 2003, November). The definite cause of intestinal malrotation is yet to be discovered. Despite not being associated with a specific gene, there is few evidence of occurrence in familiar pattern (Stalker, H. J., & Chitayat, D. 1992). Congenital anomalies of rotation of small intestines vary in type depending on the degree of rotation. The major presenting manifestation of these anomalies is the clinical picture of intestinal obstruction; a big interest in pediatric surgery (Filston, H. C., & Kirks, D. R. 1981).

CASE DESCRIPTION:
A nine and a half years old boy, previously healthy, with a virgin abdomen, presented to our emergency department with 2 days history of diffuse intermittent abdominal pain. Pain was associated with greenish-yellowish vomiting of 3 to 4 times per day, decrease oral intake, and constipation. Patient was mildly tachycardic despite being afebrile with maintained urine output. Oxygen saturation was normal. Physical exam was significant for a soft but diffusely tender abdomen. No history of erosive agents or medications ingestion. Laboratory tests were ordered. Patient was managed symptomatically while waiting for a conclusive diagnosis. Blood count and inflammatory markers were within normal range (Table 1). Liver and pancreatic enzymes were also normal.

<table>
<thead>
<tr>
<th>Tests</th>
<th>ER Labs: Pre-Op</th>
<th>Day 3 Post-Op</th>
<th>Normal Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>WBC</td>
<td>8.07</td>
<td>3.93</td>
<td>4-10 K/uL</td>
</tr>
<tr>
<td>Polymorph</td>
<td>78.1</td>
<td>65.9</td>
<td>50-70 %</td>
</tr>
<tr>
<td>Lymphocytes</td>
<td>15.4</td>
<td>18.9</td>
<td>20-40 %</td>
</tr>
<tr>
<td>Hemoglobin</td>
<td>12.9</td>
<td>12</td>
<td>12.6-17.4 g/dl</td>
</tr>
<tr>
<td>Hematocrit</td>
<td>36.5</td>
<td>35.3</td>
<td>37-51 %</td>
</tr>
<tr>
<td>MCV</td>
<td>80.5</td>
<td>82.3</td>
<td>80-94 fl</td>
</tr>
<tr>
<td>Platelet count</td>
<td>381</td>
<td>298</td>
<td>150-400 K/uL</td>
</tr>
<tr>
<td>CRP</td>
<td>3.21</td>
<td>43.9</td>
<td>&lt;10 mg/L</td>
</tr>
</tbody>
</table>

Table 1: Laboratory Tests Performed On Presentation and Day 3 after Surgery
Creatinine   0.44  0.39  0.3-1.2 mg/dl
Sodium       129  141  135-145 meq/L
Potassium     3.7  3.2  3.5-5.5 meq/L
Chloride      99  103  96-106 meq/L
Bicarbonate   17  27  23-30 meq/L
Calcium       10  -----  8.6-10.3 mg/dl
SGPT          28  21  7-56 IU/L
SGOT          -----  26  8-45 IU/L
Lipase        16  -----  10-140 IU/L
Amylase       50  -----  30-110 IU/L

A standing abdominal x-ray was ordered (Figure 1) and showed few distended bowel loops of the small intestine in the left upper abdominal quadrant. Image had volvulus aspect.

Figure 1: KUB done on first day of presentation (7/2/2021), showing distended few bowels of the small intestine in LUQ, with tendency to volvulus aspect CT scan of the abdomen and pelvis with PO and IV contrast was performed (Figure 2), showing “intestinal malrotation, associated with volvulus and sub-occlusion at the level of the duodenum, associated with gastric and proximal duodenal distention”.

Figure 2: CT-scan done, confirming the diagnosis of volvulus, showing duodenal volvulus with intestinal malrotation

Pediatric surgery team was immediately consulted, and the patient was taken emergently to the operating room where laparotomy was performed as shown in Figure 3. De-volvulus of the duodenum followed by Ladd’s procedure (colon fixation on left, small bowels on right, and appendectomy) was performed.
**Figure 3:** Intestinal volvulus at the level of duodenum (boule), as described by the pediatric surgeon, where de-volvulus was done followed by Ladd procedure. Patient was then admitted to regular floor. Post-op recovery was smooth and fast; he tolerated progressive PO feeding advancement. Follow-up labs were done on day 3 post-op with normal values. Patient was then discharged home on day 5 post-op and showed proper surgical recovery.

**Discussion:**

Symptomatic malrotation incidence is estimated to be 1:6000 among live births (Aboagye, J. et al., 2014). Male patients are more affected than female, with a 2:1 ratio. Patients with malrotation are at increased risk of volvulus which manifests typically with sudden onset of bilious emesis (Ford, E. G. et al., 1992). The most common age presentation is early in life. About 50% of affected patients present within the first week of life, and more than 60% before completing the first month. Only rarely do patients present later in life as in our case (Powell, D. M. et al., 1989), in which the age was 9 years. Our case represents a case of congenital intestinal malrotation, complicated by midgut volvulus and sub occlusion at the level of the duodenum. The most common presentation is that of biliary emesis. All cases of intestinal malrotation that are complicated by volvulus should be treated surgically to prevent further damage to the patient, such as necrosis, secondary peritonitis, malabsorption, and severe sepsis, which can all lead to death. Early diagnosis and treatment are the cornerstones (Heidsma, C.M. et al., 2015). Malrotation is treated operatively ideally after appropriate resuscitation. A patient with suspected midgut volvulus should be operated emergently without any delay, as that might put the bowel at risk for irreversible ischemia (Fraser, J. D. et al., 2009; Nehra, D., & Goldstein, A. M. 2011; & Tsumura, H. et al., 2003). During the operation, the involved bowel part is untwisted in a counter clockwise direction and observed for blood flow (Tsumura, H. et al., 2003). Next step then would depend on whether the involved segment of bowel is ischemic or viable. When bowel appears viable after detorsion, the malrotation is treated by the Ladd procedure (Lampi, B. et al., 2009; & Hagendoorn, J. et al., 2011). In Ladd procedure, division of the adhesive peritoneal bands that are at the origin of the malrotation takes place, by that relieving obstruction and straightening duodenal course. Prophylactic appendectomy is also done because the cecum will be fixed to the left side during the procedure making presentation of appendicitis non-typical. Majority of patients undergoing Ladd procedure recover and recurrence of volvulus is possible but rare (Tsumura, H. et al., 2003).

**Conclusion:**

Congenital intestinal anomalies commonly present during the first year of life, and the major clinical presentation is obstruction, causing bilious vomiting, abdominal distention and obstruction. Some may manifest later, even in adulthood. The cornerstone is the early diagnosis and intervention to avoid severe and irreversible complications.

**References:**


