Non Rotation of Gut - A Case Report

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ABSTRACT

Intestinal non-rotation is a congenital anomaly of rotation of the mid gut. During the development of the embryo the gut undergoes umbilical herniation because of the smaller abdominal cavity. When it re-enters the abdomen organs will be fixed in an adult position after a complex rotation. The small bowel is found predominantly on the right side of the abdomen whereas the caecum, appendix and large intestines occupy left side of abdomen. The caecum and appendix are fixed in the right lower quadrant after 270 degree of mid gut rotation. The incidence of non-rotation is 1:500. The CT imaging can be used for detection and confirmation which affords material for a review of embryological and gross anatomy findings. If any variations occur during the whole process it can lead to a number of disorders such as Acute mid gut volvulus, Chronic mid gut volvulus, Acute duodenal obstruction, Chronic duodenal obstruction, Internal herniation, Superior mesenteric artery syndrome. Here we present a case of non rotation of gut in which the caecum along with appendix is placed below the liver. All the parts of the large intestine are smaller in length when compared to the normal. In such condition they may present with gut volvulus resulting in severe abdominal pain and bilious vomiting.

KEYWORDS: Non-rotation, Umbilical herniation, Fixation, Volvulus

INTRODUCTION

During development, intestines are in the form of a loop outside the abdominal cavity called as physiological umbilical hernia. At 10th week of intrauterine life, the intestine returns into the abdominal cavity by a complex process of developmental events called rotation and fixation of gut by zygosis[1].

As the development progresses the mid gut grows in length and forms U-shaped ventral loop around superior mesenteric artery known as primary intestinal loop. Vitello intestinal duct is attached to the apex of the loop. Cephalic part of the gut gives rise to duodenum, jejunum and ileum where as caudal part gives terminal part of ileum, caecum, appendix, ascending and medial two thirds of transverse colon. During 6th week a caecal diverticulum develops caudal part of intestinal loop. The proximal part of this forms dilated and caecum and the distal part persists as appendix. These intestinal loops herniated out via umbilicus are called as physiological umbilical hernia from 5th to 10th week[2].

The process of rotation can be subdivided into three subsequent developmental steps. First stage: Occurs in the umbilical sac where the mid gut loop rotates anti-clock wise with an angle of 90 degrees around the superior mesenteric artery. Second stage: The mid gut loop under goes elongation and re-enters the abdomen and gives rise to the coils of small intestine which occupy the right part of abdomen. The left limb of the mid gut loop with caecum and appendix enters later into the left half of abdomen. Third stage : The caecum rotates 180 degrees of anti-clock wise rotation from left iliac region to umbilical region, right hypochondriac region, right lumbar region and finally reaches right iliac fossa. After a complete mid gut rotation of 270˚ the intestine is fixed to the posterior abdominal wall by a process of zygosis[2].

CASE REPORT

The case was reported in the routine dissection of embalmed cadaver in the dissection hall of Anatomy department at Apollo Institute of Medical Sciences and Research, Hyderabad.

The cadaver was received into the Anatomy department and embalmed with embalming fluid. After proper fixation, cadaver was kept on the dissection table in supine position.
Sex of the cadaver was noted. An incision was given in the anterior wall of abdomen extending from the xiphoid process to the pubic symphysis. Lateral horizontal incisions were given extending posteriorly from the umbilicus. The skin and the layers of the anterior abdominal wall are reflected. Immediately below the small intestine loops is seen (Fig No 1). The peritoneum and the small intestine were dissected and removed. The position of various parts of the large intestine was noted. The caecum with the retrocaecal appendix is noted just below the liver (Fig No 2). The ascending colon is shorter in length and is situated at the liver. The transverse colon is present at its position running horizontally above the pancreas (Fig No 3). The blood vessels supplying to the parts of the colon are traced (Fig No 4). The measurements all the parts are taken. Length of all the parts of colon is less than the normal.

Table 1: Showing the length of the parts of colon

<table>
<thead>
<tr>
<th>Part</th>
<th>Normal length</th>
<th>Length in the specimen</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ascending colon</td>
<td>12.5 cms</td>
<td>8 cms</td>
</tr>
<tr>
<td>Transverse colon</td>
<td>50 cms</td>
<td>25 cms</td>
</tr>
<tr>
<td>Descending colon</td>
<td>25 cms</td>
<td>16 cms</td>
</tr>
<tr>
<td>Sigmoid colon</td>
<td>37.5 cms</td>
<td>29 cms</td>
</tr>
</tbody>
</table>

Figure:1 Small intestine seen immediately after removal of anterior abdominal wall

Figure :2 Showing the position of caecum and transverse colon
DISCUSSION

The development of mid gut is a very dynamic process extending from the 5th week to 10th week [1]. During this time the mid gut tube herniates outside as physiological hernia and returns back to the abdominal cavity in an organized and sequential manner. If this sequential return of the mid gut gets disorganized, it leads to anomalies of rotation of the gut in the form of non-rotation and malrotation. These anomalies tend to occur when the umbilical ring is wider and the normal sequence of the return of the pre-arterial and post-arterial segment is lost. Non-rotation results in undue narrow base and lengthening of the mesentery leading to ptosis, torsion and volvulus[2]. Approximately 85% of non-rotation cases present in the first two weeks of life [3]. However, presentation of intestinal malrotation is very rare and its incidence has been reported to be between 0.2% and 0.5%. True incidence of non-rotation in older children or adults is unclear, because a number of patients may be asymptomatic. Even once the anomaly is discovered, many live without complaint.
Rotational anomalies, which may or may not be symptomatic, are estimated to occur in between 1/200 to 1/500 live births [4]. Symptomatic non-rotation is estimated to occur in 1/6000 live births [5]. Traditionally, intestinal non-rotation has been considered primarily a disease of infancy with infrequent occurrence beyond the first year of life. However, a series of 170 patients of all ages with intestinal non-rotation managed at a single institution found the following age distribution [6]: infants under one year of age: 31 percent, children one to 18 years of age: 21 percent[7].

Congenital non-rotation usually shows up in the first month of life. But the signs of identification are not obvious and are nonspecific. Symptoms in the adult patient are often mistaken for irritable bowel syndrome, peptic ulcer disease, biliary and pancreatic disease, and psychiatric disorders[8]. The diagnosis depends on the radio imaging techniques especially the CT imaging [9]. In a few of them it may diagnosed by incidental imaging. Usually the case detection is an autopsy finding or incidental finding during gastroenterostomy.

CONCLUSION
The incidence of non-rotation is rare as detection is incidental unless there are any symptoms. They need the assistance of radio imaging techniques for detection and confirmation. Non-rotation / malrotation of the intestine play an important role in clinical presentation of appendicitis because of the abnormal placement of appendix in abdomen. Diagnosis of Meckel’s diverticulum and intestinal bands may be delayed because of non-rotation. Thus, a surgeon should have a thorough knowledge of the embryonic rotation of gut and its congenital anomalies which could help in a thorough evaluation in diagnosed cases prior to any surgical intervention.

REFERENCES

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