Midgut Volvulus With Acute Abdomen in an Adult Patient: a case report

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Symptomatic bowel malrotation in adults is rare. We present a patient with midgut malrotation and discuss the embryology, diagnosis and the radiographic features. A 72-year-old man presented with mild abdominal pain for two weeks. Computed Tomography (CT) revealed that twisted small bowel encircles the central superior mesenteric artery (SMA) in a whirl pattern. The patient underwent surgical correction with Ladd’s procedure and a final diagnosis of midgut volvulus was made.

Key words: Malrotation; Midgut volvulus; Computer Tomography

Rotational gut abnormalities are generally considered diseases of the neonatal and pediatric populations. However, they may be symptomatic in teenagers and adults, often with disastrous outcomes. Symptomatic bowel malrotation first presenting in the adult is rare. Midgut volvulus is the most common complication of malrotation in the adult. CT can play an important role in the evaluation of patient with this abnormality. The CT findings in midgut volvulus might be pathognomonic if the classic swirl pattern around a central superior mesenteric artery is seen. CT is beneficial in the rapid diagnosis and surgical treatment of this unusual condition in adult patients who present with abdominal pain or bowel obstruction of uncertain causes. Angiography not only provides help in the diagnosis of the anatomy of vascular distribution in our patient, but also the evaluation of venous return. We present a case of bowel malrotation complicated by midgut volvulus in an adult patient. The preoperative CT findings were pathognomonic. To our knowledge, this is a rare report of CT and angiographic findings of chronic venous obstruction in the midgut volvulus [1,2,3].

CASE REPORT

A 72 year-old man presented mild abdominal pain and distention associated with nausea and vomiting for two weeks. The pain persisted for 2 days prior to admission. He had a similar episode 3 years before, and the panendoscope studies showed it as gastric ulcer. His symptoms resolved after medical treatment. He had had no previous abdominal surgery. Abdominal radiographs did not reveal dilated bowel or other abnormalities.

CT scan showed the typical findings of midgut volvulus (Figs.1 A-B). The small bowel was twisted around the superior mesenteric artery. Venous engorgement with mesenteric edema was present. Selective superior mesenteric arteriogram demonstrated twisting
of the superior mesenteric artery with the proximal branches to the jejunum presented in the right lower quadrant and the distal branches to the ileum in the right lower quadrant as well (Fig. 2). There were amount of collateral with engorged mesenteric vessels in late phase of superior mesenteric arteriogram (Fig. 3).

During surgery, the small bowel was found to be twisted more than 360 degree around the superior mesenteric artery. No bowel necrosis was present. The patient underwent surgical correction by Ladd’s procedure. He remains asymptomatic 4 months after surgery.

DISCUSSION

Midgut volvulus is a complication of bowel malrotation [1,4,5,6,7]. Early in embryonic life, the gut consists of a straight tube that can be divided into three parts: the foregut, the midgut and the hindgut. The midgut is supplied by the superior mesenteric artery, and it is mainly this portion that the rotation of the gastrointestinal tract develops [8]. The midgut actually extrudes through the extraembryonic cavity, makes a 90 degree counterclockwise turn, and a counterclockwise direction to 270 degree. All this is completed by the 11th gestational week of life. When it fails to rotate, the entire small bowel remains on the right side of the abdomen, the colon is on the left, and the ligament of Treitz is absent. Malrotation, or incomplete rotation, is the most common anomaly of this process, and can result in various positionings of the intestine with unusual adhesions. These aberrant adhesions are shorter and looser than normal mesenteric attachments, allowing volvulus to occur [9]. Malrotation is also associated with peritoneal or Ladd’s bands, which can cause duodenal obstruction. Midgut volvulus is rare in adults. Most symptomatic anomalies of intestinal rotation are found in the neonatal period, frequently in association with other congenital abnormalities [9]. Half are diagnosed in the first week and 80% within the first month. Many patients remain asymptomatic and their conditions are discovered incidentally by laparotomy or during investigation of unrelated symptoms in adult life. In Wang and Welch’s [10] series of the malrotation in adolescents and adults, 24 out of 50 cases were clinically asymptomatic. In the adult with malrotation, midgut volvulus is the most common cause of bowel obstruction [1,4,5,6,7]. In the normal adult population, volvulus usually occurs in the colon.

Intestinal obstruction, often occurs in duodenum due to internal hernia or peritoneal bands, and midgut volvulus is the most common complications of malrotation in adults. A vegetarian diet and pregnancy may be factors which lead to volvulus; a theory based on a number of cases found in vegetarian Indian villages and in women during pregnancy and puerperium [11]. Volvulus may present catastrophically as small bowel infarction, but it may also present, as in our patient, as recurrent episodes of abdominal pain. The pain is usually periumbilical or epigastric, frequently post-

Figure 1. 72-year-old man who presented with epigastric pain and vomiting. A-B, CT scans (cephalad to caudal) obtained at the time of hospital admission. (a) shows collaterals of superior mesenteric veins (long arrow) surrounding the superior mesenteric artery (short arrow). In (b) bowel is twisted around central superior mesenteric artery ( arrow). Note whirl pattern (arrow, B)
prandial, and often associated with a feeling of fullness, nausea and vomiting. The symptoms can be mistaken for irritable bowel syndrome, adhesions, Crohn’s disease, pancreatic and biliary disease, or even psychiatric illness. Malrotation is highly associated with peptic ulcer disease, which may be caused by chronic partial gastric or duodenal outlet obstruction [1]. An upper gastrointestinal and small intestines examination can be used to diagnose malrotation and midgut volvulus, particularly in infants [1,14]. The small bowels wrapped around the SMA on oral contrast-enhanced studies have a spiral or corkscrew appearance, which is a diagnostic feature of midgut volvulus. In the review of the radiologic findings in malrotation and volvulus, Steiner [12] emphasized that if the distance from the tip of the cecum to the duodenojejunal flexure is small, there is a greater potential for the small intestine to rotate about the axis of the SMA, resulting in a midgut volvulus. The CT appearance of midgut volvulus is also diagnostic. The small bowel wrapped around the SMA creates a distinctive whirl pattern [5,6] as the volvulus, which causes the mesenteric veins and lymphatics to become congested. Mesenteric edema can also develop. The relationship of the superior mesenteric vein (SMV) to the SMA as shown by CT can suggest the diagnosis of bowel malrotation, although it is not pathognomonic [2]. The proximal SMV is normally anterior and to the right of the SMA. The SMV position can be to the left of the superior mesenteric artery in bowel malrotation. However, a normally positioned superior mesenteric vein does not exclude the diagnosis of bowel malrotation [2]. As in our case, the engorgement of mesenteric veins is to the right of the superior mesenteric artery [Fig 1A]. Angiography will demonstrate the abnormal anatomy of the SMA, which normally curves down and to the left of midline with the vessels to the small bowel, which not cross over themselves. The appearance of the SMA, as illustrated by our case, has been described as corkscrew appearance and referred to as the “barber pole sign” [13]. Grika and Popky emphasized that this is a dynamic lesion with spontaneous relapses and remissions. The angiogram will define the vascular patency at the time of the study. Intestinal varices resulting from chronic venous obstruction were evident in our case. One report of a child with long-standing complete obstruction of the SMA and SMV who manifested with recurrent gastrointestinal bleeding from varices within the bowel, was described as a complication of midgut malrotation and volvulus [3]. Long-standing, complete obstruction of the mesenteric vascular supply is distinctly uncommon in cases of midgut malrotation and volvulus. The adult described here, however, had partial obstruction of the SMV with collateral mesenteric circulation in association with midgut volvulus. Treatment of symptomatic patients is to defining the abnormal anatomy first. The adhesions that are secondary to recurrent volvulus are released down and the intestines returned to their normal position. Ladd’s procedure is most commonly performed. It consists of derotation of the volvulus, inspection of the mesenteric root, division of Ladd’s bands, complete immobilization and straightening of the duodenum, and wide separation of the

Figure 2. Selective superior mesenteric angiogram shows abnormal curling and corkscrew appearance of vessel toward the right.

Figure 3. SMA portogram shows venous engorgement of mesenteric collaterals due to chronic venous obstruction.
duodenum and cecum, often with appendectomy [14]. After corrective surgery, the recurrence rate in adults is not known. If diagnosis or treatment of midgut volvulus is delayed, bowel necrosis and death may occur.

**REFERENCE**

“中腸扭結”出現於成人急性腹痛病例一個案報告

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成人出現腸道旋轉異常的現象是罕見的。此研究報告我們提出一個腸道旋轉異常的成人病例，並探討其胚胎學、診斷及放射線攝影圖像的特徵。一位72歲的男性病患經歷兩週的輕微腹痛後由電腦斷層資料顯示在腹部中上腸系膜動脈部位出現小腸迴轉型態。該病患最後以Ladd's步驟予以手術矯正並確認其中腸扭結的診斷。

關鍵詞：旋轉異常；中腸扭結；電腦斷層