

Images: CT Whirl Sign - Midgut Volvulus

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Introduction

Midgut malrotation has been estimated to occur in approximately one in 500 live birth [1,2]. Reportedly 64-80% of these patients present within the first month of life, but these figures generally do not take into account those who remain undiagnosed after childhood [1,2]. Midgut volvulus is a complication of malrotation in which clockwise twisting of the bowel around the superior mesenteric artery (SMA) axis occurs because of the narrowed mesenteric attachment [3]. The CT whirl or whirlpool sign describes the swirling appearance of bowel and mesentery twisted around the SMA axis [4].

A 13 year old male presented with pain abdomen for 3 days, vomiting (bilious in nature) for 3 days, non-passage of stools and flatus for 3 days. An ultrasound done showed dilated gut loops with "whirlpool sign" in the mesenteric vessels suggestive of malrotation with volvulus. Stomach was grossly distended. CT done (Fig. 1,2,3) demonstrated characteristic clockwise twisting of bowel (three and half turns), mesentery and superior mesenteric vein around the axis of superior mesenteric artery. No bowel resection was necessary at surgery that promptly followed imaging. Associated band of Ladd was also found.

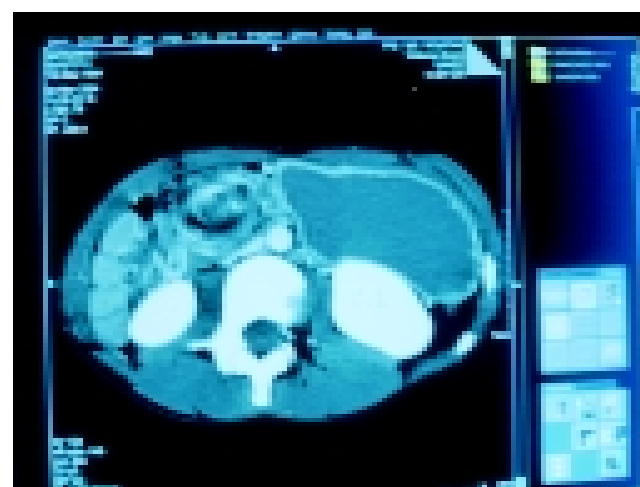
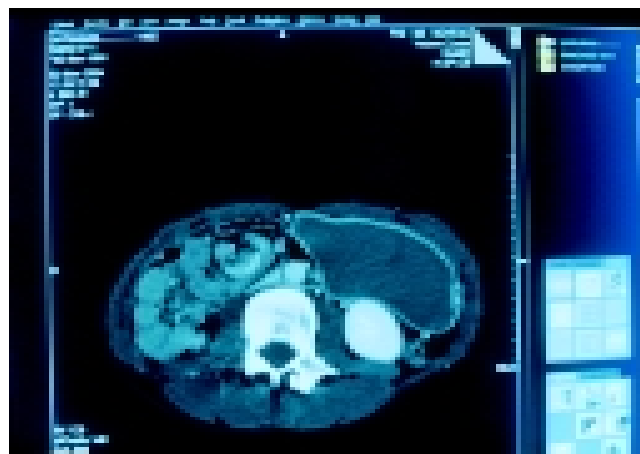
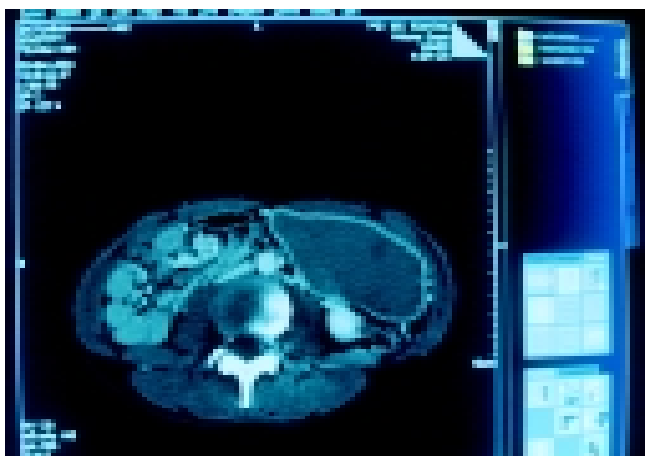


Fig 1. Sequential (cranial to caudal) axial contrast enhanced CT abdomen at the level of superior mesenteric vessels shows characteristic clockwise twisting of bowel, mesentery and superior mesenteric vein around the axis of superior mesenteric artery. No bowel resection was necessary at surgery that promptly followed imaging.

Discussion

Congenital malrotation of the midgut often presents within the first month of life. Pediatric radiologists are, therefore,

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consciously attuned to this malady and its associated imaging features. The overall incidence of malrotation, however, is unknown because some patients will present years later or remain asymptomatic for life [4]. The radiologist may encounter this important diagnosis in several different clinical settings such as an incidental imaging finding, the cause of acute abdominal symptoms, or a condition associated with abdominal situs abnormalities.

Many cases of quiescent malrotation in adults are currently being detected on cross sectional imaging (particularly CT) performed for various unrelated reasons [5]. In most patients with quiescent malrotation, the SMA and superior mesenteric vein (SMV) will assume a vertical relationship or show left right inversion [5].

Midgut volvulus is a complication of malrotation in which clockwise twisting of the bowel around the SMA axis occurs because of the narrowed mesenteric attachment [3]. Recurrent episodes of colicky abdominal pain, with vomiting over a period of months or years are typical and may eventually lead to imaging [5]. The CT whirl or whirlpool sign describes the swirling appearance of bowel and mesentery twisted around the SMA axis [4]. Low attenuating fatty mesentery with enhancing engorged vessels radiate from the twisted bowel. In the central eye of the whirl, a soft tissue density pinpoints the source of the twist [6]. Additional CT findings include duodenal obstruction, congestion of the mesenteric vasculature, and evidence of underlying malrotation [3].

Recognition of the CT signs of volvulus is critical because the findings at clinical examination are often vague and

because CT is usually the imaging technique of choice for patients presenting with acute abdominal pain [7]. Furthermore diagnosis may be difficult: the images on the patient's abdominal radiographs could be obscured if the closed loop is filled with fluid, oriented in an anteroposterior plane, or overlain by loops of air-distended bowel [8]. CT reveals the presence and location of the volvulus and gives the added benefit of allowing early identification of potentially fatal complications, such as ischemia and perforation [9].

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