

Three Types of Displacement of Intestinal Tract with the Symptoms

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Abstract

Intestine from jejunum to sigmoid colon is the most well-known redundant organ that severe displacement and organ ischemia may occur. Three main types of intestinal tract displacement named as intussusception, volvulus, and herniation. They may be caused by narrow base of the organs attached to the body cavity, increased weight of the organ, misleading force or structure, and trap cavity formation. The ischemic situation is attributed to compression or traction of blood vessels, venous vessels having lower blood pressure will be affected first and followed by the obstacle of arterial vessels. Not only venous occlusion with vascular congestion or edematous swelling of tissue but also ischemic congestion/stromal hemorrhage exacerbate organ displacement, trapping and compression with a vicious cycle to strangulation.

In conclusion, normal intestinal tract is a special organ may be engaged in intractable displacement, ischemic change and thus abdominal pain even without specific predisposing factor or prodromal symptom.

Keywords: *Intussusception; Volvulus; Hernia; Ischemia; Vessel Compression; Vessel Traction*

Introduction

Ischemia, caused by poor blood supply, is a main cause of tissue damage or even necrosis. Occlusion of blood vessel is the cause of ischemia in adults or elders frequently. External compression of blood vessels, for example, torsion of internal organ, is the other cause of tissue ischemia. Prolapse or traction of tissue or organ inducing blood vessel traction and more venous obstruction could make ischemic congestion or even ischemia-related stromal hemorrhage. Because of persistent trapping, torsion or traction, anatomically normal redundant tissue or organ, such as intestinal tract, testis, ovary or brain might develop intractable displacement-related ischemia or infarction from the babyhood to elders.

Intestine from jejunum to sigmoid colon is the most well-known redundant organ that severe displacement and organ ischemia may occur. Three main types of intestinal tract displacement named as intussusception, volvulus, and herniation (Figure 1). The ischemic situation is attributed to compression or traction of blood vessels, venous vessels having lower blood pressure will be affected first and followed by the obstacle of arterial vessels.

How do such types of intractable displacement develop? They may be related to a narrow base attached to the body cavity, increased weight of the organ, misleading force or structure, and trap cavity formation. Congestive or edematous swelling of the displaced tissue after venous occlusion exacerbating organ compression and incarceration with a vicious cycle to strangulation. Contrarily, despite narrow-based attachment, lung, liver and spleen fit in with their spaces and hard to develop displacement.

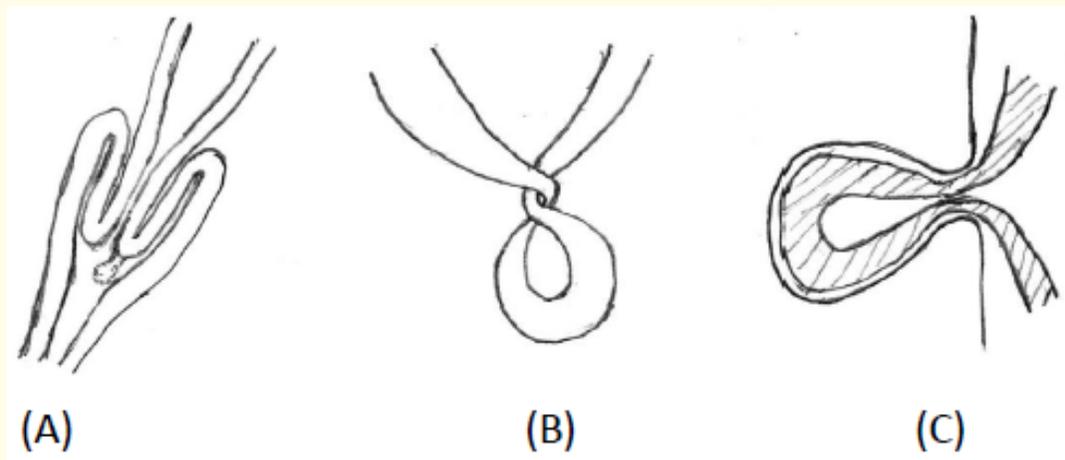


Figure 1: Three main types of intestinal tract displacements: Intussusception (A), Volvulus (B) and Herniation (C).

Displacement with intestinal intussusception

Theoretically, intussusception may occur from jejunum to sigmoid colon. Colon intussusception involves sigmoid colon of children more frequently caused by soft and loose colon wall. In adulthood, it is more likely caused by the traction of a lead point, such as colonic polyp, submucosal mass lesion, ileocecal valve, etc. and exacerbated by peristalsis. Rectum is a retroperitoneal organ. However, reducible or irreducible rectal prolapse (Figure 2A) is well documented. Rectal mucosal prolapse is the other form highlighting the more fixed outer rectal wall in retroperitoneal space. When rectal prolapse develops pain, incarceration to strangulation, passage of strawberry jam-like mucus and mucosal ischemic hemorrhage, surgical intervention is indicated. Anyway, the excised surgical specimens of intractable rectal prolapse were rather uncommon in my pathologic practice for thirty years.

Because the intestine’s blood supply is through mesentery or mesocolon, intussusception with impaired blood perfusion is due to blood vessel traction and intestinal wall compression. Enema reduction of intestinal intussusceptions are successful over 55.3% of cases, reported by Jiraporn Khorana, *et al* [1]. In case of severe ischemia or necrosis of the involved intestinal segment, surgical removal of involved segment is indicated [1].

Exceptionally, a case of drop of partial gastric wall approaching the gastric outlet (pylorus) due to the dragging of superficial-located and pedunculated gastrointestinal stromal tumor (GIST) of stomach is present in my experience. Total inversion of appendix into cecal lumen, a stage of complete appendiceal intussusception (Figure 2B), indeed present once in the surgical specimen of my pathologic laboratory and seen in few literatures. It may be asymptomatic [2]. Because of poor blood supply during gradually complete inversion of the appendix, the inverted appendix is shorter than an ordinary appendix (around 3 cm in length) observed under colonoscopy at cecum [3]. Microscopically, slim mesoappendiceal adipose tissue in the core portion of inverted appendix should not only be the enhancing factor of appendiceal inversion but also the result of narrow-space effect of total inversion of the appendix. Noticeably, a lead point of intussusception in the appendix may not be found, but the inverted appendix could be the lead point of cecocolic intussusception [4]. Cecal perforation might happen if endoscopic ‘polypectomy’ of the inverted appendix is performed.

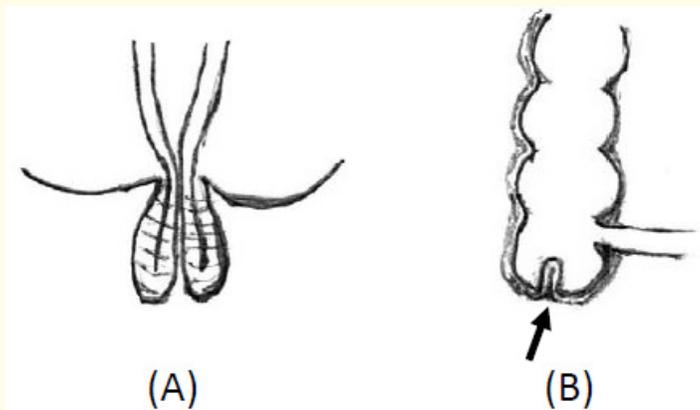


Figure 2: Two special types of intussusception - rectal prolapse (A) and inverted appendix or complete appendiceal intussusception (arrow) (B).

Displacement with intestinal volvulus

It means twisting of an intestinal loop of small intestine or colon. Obviously, it will impair the blood supply of the twisted loop. Volvulus of the small intestine usually occurs in infants and children. In adults, volvulus of the small intestine is rare but mainly occurs in the colon, especially sigmoid colon [5]. In the United States, colonic volvulus cases comprise 5% of intestinal obstruction and 10% to 15% of large-bowel obstruction. The common locations of large-bowel volvulus include the sigmoid colon (80%), cecum (15%), transverse colon (3%), and splenic flexure (2%), reported by Le CK and Qaja E [6]. Like intussusception, non-operative reduction of a colonic volvulus by endoscopic pneumatic manipulation or less recommended barium enema (hydrostatic force) is the first consideration for uncomplicated cases [7].

Displacement with abdominal hernias

Herniation of gastrointestinal (GI) tract, means protrusion of a segment of GI tract into a cavity around the abdominal wall, gaps among abdominal internal organs or even retroperitoneum. Abdominal hernias are very common, particularly among men, performing about 700,000 operations each year in the US [8]. The involved organ includes the proximal stomach to the colon. Small intestine, except for duodenum, is the major portion to be affected. The main types of hernias include direct or indirect inguinal hernia, femoral hernia, umbilical hernia, ventral (incisional) hernia, internal hernia, hiatal hernia of stomach, and congenital abdominal epigastric hernia. Posture-dependent variable symptoms happen to some reducible hernias. The severities of intestinal herniation become worse form reducible intestinal loop to irreducible herniation, incarceration of the herniated intestinal segment with obstruction, and eventual strangulation with ischemic necrosis of the intestine.

Hiatal hernias are divided into sliding type with upward displacement of the esophagocardiac junction above diaphragm, and paraesophageal type with rolling up of gastric fundus portion into the thoracic cavity. The patient may have gastroesophageal reflux disease (GERD) with heartburn feeling [9] related to poor function of the cardiac sphincter. Internal herniation may be caused by paraduodenal hernia or Treitz hernia, trans-mesenteric hernia, post-surgical hernia or adhesion band-related hernia [10].

Comment

Stromal congestion is not absolutely related to an ischemic condition, adenoma-related or infection-related stromal congestion is another possibility. Pathologically, impaired vascular perfusion initiates submucosal congestion and edema, then mucosal hyperemia and

hemorrhage, serosal congestion, followed by mucosal degradation and sloughing, and finally infarction and necrosis of smooth muscle layer of intestinal wall. The main symptom of tissue ischemia is pain, that may be related to tissue hypoxia, acidosis, tissue distension with congestion and swelling, and occasionally local infection.

Conclusion

It should be kept in mind that normal intestinal tract is a remarkably redundant organ may be engaged in intractable displacement, ischemia and thus abdominal pain even without specific predisposing factor or prodromal symptom.

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