

# Laparoscopic Resection of Duplicated Sigmoid Colon Under the Guidance of Intraoperative Colonoscopy

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**Abstract:** Colonic duplications are rare congenital malformations. Complete surgical removal is the treatment of choice. The authors report a case of sigmoid colonic duplication successfully treated by laparoscopic resection under the guidance of intraoperative colonoscopy.

**Key Words:** sigmoid colonic duplication, laparoscopic resection, intraoperative colonoscopy

(*Surg Laparosc Endosc Percutan Tech* 2005;15:299–301)

Alimentary tract duplications are rare congenital malformations. They can occur at any site along the gastrointestinal tract, with the ileum as the most common site followed in order by esophagus, duodenum, stomach, jejunum, and colon.<sup>1</sup> In spite of the rarity of these entities, they are well documented and described in the literature. Complete surgical removal of duplication is the standard of treatment.<sup>2</sup> Most of the previous series have reported surgery through laparotomy, and laparoscopic treatment is extremely rare. We report a case of sigmoid colonic duplication successfully treated by laparoscopic resection under the guidance of intraoperative colonoscopy.

## CASE REPORT

A 8-year-old girl was admitted to our hospital complaining of intermittent abdominal discomfort and pain of 2 weeks' duration. She had no cardiovascular and respiratory instability. On physical examination, she had an approximately 5-cm fixed and tender mass on the right abdomen lateral to the umbilicus. Abdominal ultrasonography showed an inflammatory mass, 4.2 cm in size, compressing the inferior vena cava. Abdominal computed tomography (CT) scan revealed a 6-cm hypodense tumor with central fluid density surrounded by enhanced thick wall (Fig. 1A). It was connected to the sigmoid colon by a segment of bowel filled with enhanced material (Fig. 1B). Barium enema confirmed that the enteric duplication communicated with sigmoid colon (Fig. 2).

Received for publication January 24, 2005; accepted June 28, 2005.

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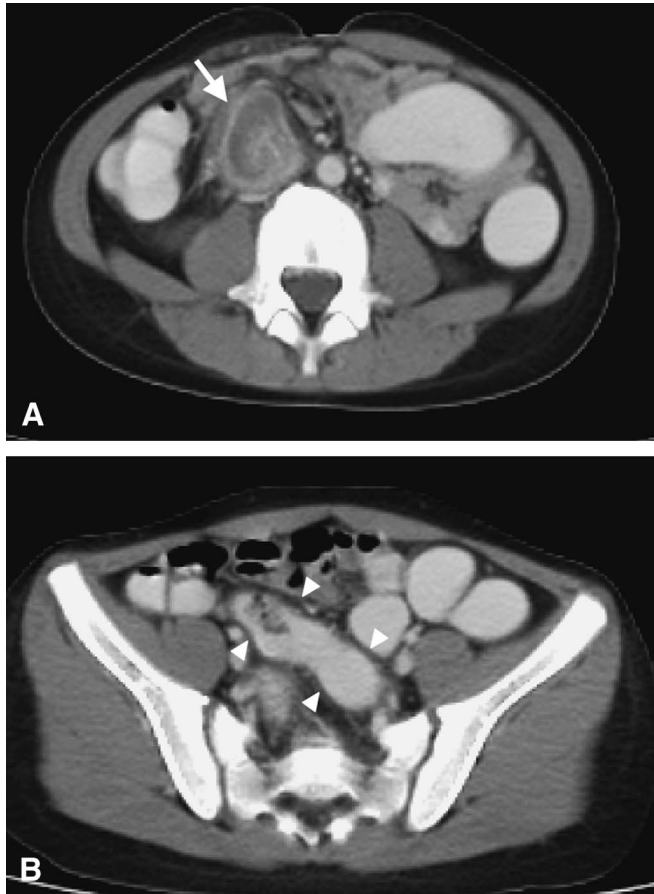
Laparoscopic surgery was performed using a 10-mm trocar in an epigastric position and two 5-mm trocars on the left midclavicular line in the upper and mid-abdominal position, respectively. Exploration of the abdominal cavity revealed a large inflammatory mass that had burrowed into the sigmoid mesocolon. It was difficult to assess the exact extent of disease. At this point, colonoscopy was performed, which showed a luminal communication between the duplication and the sigmoid colon. The colonoscope was inserted into the duplication and reached its blind end, defining the extent of dissection that should be done. After careful dissection using a harmonic scalpel, a tubular duplication 7 cm in length was identified with a broad base at the mesenteric side of the sigmoid colon (Fig. 3). The blind pouch was severely inflamed, compressing the inferior vena cava, and was supplied by a branch of inferior mesenteric artery that was ligated with metallic clips. After the duplication was mobilized from the surrounding tissue, the 5-mm trocar on the left lateral to the umbilicus was exchanged with a 12-mm one to introduce the endoscopic GIA stapler. The duplication was resected completely with endoscopic GIA stapler under the guidance of colonoscopy to prevent the luminal narrowing and to assess any possible bleeding from the stapled area (Fig. 4). The resected specimen was put into the endopouch and delivered through the 12-mm trocar site. Histologic examination revealed that the tubular structure was composed of a 2-layer muscular coat and the luminal surface was lined by colonic mucosa.

The postoperative recovery was uneventful. Enteral feeding was initiated on the third postoperative day, and the patient was discharged on seventh postoperative day. She is doing well at 5 months postoperatively.

## DISCUSSION

Duplications of the alimentary tract are confirmed when fulfilling the following criteria: (1) are adherent to some part of the alimentary tract; (2) contain double smooth muscular coat; and (3) internal surface is lined by enteric mucosa.<sup>3</sup> Morphologically, they can be divided into spherical and tubular types. The latter is less common and communicates more frequently with the adjacent normal bowel than the former.<sup>4</sup> The jejunoileal involvement is most common, constituting more than 50% of cases. Colonic duplications occur in 13% of patients, with the cecum being the most common site and decreasing incidence for the distal part of the colon.<sup>1</sup> Most of the cases present in childhood, with about 70% of cases presenting before the age of 2 years.<sup>1</sup>

The clinical presentation depends on the location and size of the lesion and the presence of heterotopic mucosa. Usually, the patient with colonic duplication presents with vague abdominal pain, palpable abdominal mass, constipation, and acute intestinal obstruction with the adjacent normal bowel being compressed by the blind pouch of the duplication.<sup>5,6</sup>



**FIGURE 1.** A, Abdominal-pelvic CT shows 6-cm hypodense tumor with central fluid density surrounded by enhanced thick wall (white arrow). B, It was connected to sigmoid colon by a segment of bowel filled with enhanced material (arrowhead).

Ulcerative perforation or bleeding that is attributed to the heterotopic gastric mucosa is rarely found in colonic duplication.<sup>5</sup> The colonic duplications may be associated with abnormalities of the spine and genitourinary tract such as double bladder and urethra, anomalous genital tract, and spina bifida.<sup>7</sup> None of these were found in our patient.

Ultrasonography is useful for distinguishing the spherical type of enteric duplication from other cystic abdominal masses by the characteristic triple layer effect. However, this is not diagnostic for the tubular type. Computed tomography and magnetic resonance imaging scans show the location of the duplication and its relationship to adjacent structures. Contrast barium enema can demonstrate a filling defect or luminal communication between the duplication and the normal bowel in colonic duplications, as in this case.

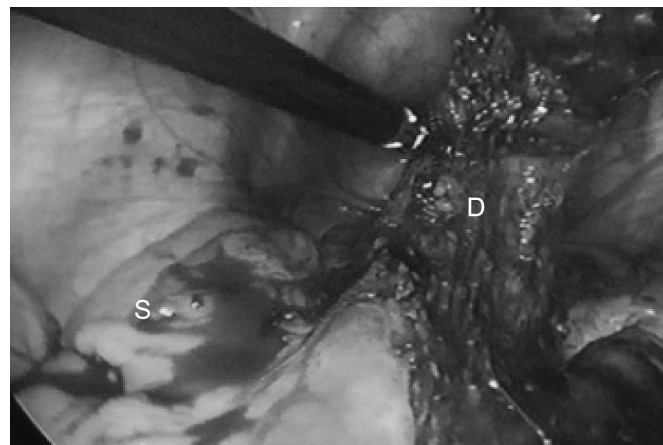
The standard of treatment is complete surgical removal of the duplication without jeopardizing the function of remaining bowel.<sup>2</sup> It provides relief of symptoms and removal of the potential risk of complications such as perforation, bleeding, and malignant change.<sup>8,9</sup> Inoue and Nakamura<sup>10</sup> reviewed 18 malignant tumors arising from alimentary tract duplications. Although the colon was the least common site of



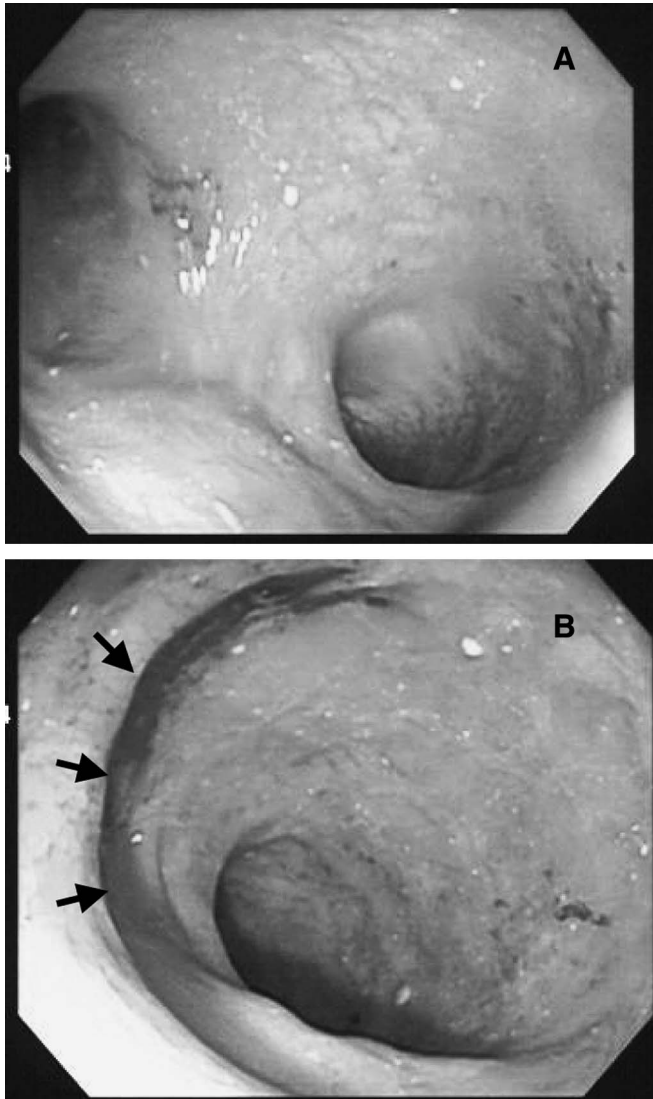
**FIGURE 2.** Barium enema shows a tubular duplication communicating with the sigmoid colon (white arrow).

duplications, 67% of malignant tumors occurred in rectum or colon. All the patients were adults. Adenocarcinoma was the most frequent cell type followed by squamous cell carcinoma.

Some authors report that the preferable procedure is resection of the duplication together with a short segment of the adjacent normal bowel because of the common blood supply.<sup>11</sup> However, once the duplication is isolated from the



**FIGURE 3.** Intraoperative view of the sigmoid colonic duplication mobilized from the surrounding tissue. D, sigmoid colonic duplication; S, sigmoid colon.



**FIGURE 4.** Intraoperative colonoscopy. A, Before resection of the duplication. The large opening of the duplication to sigmoid colon is well visualized. B, After resection of the duplication using stapling device. There was no luminal narrowing or bleeding from the stapled area (black arrow).

surrounding tissue, excision of the duplication is sufficient. This procedure does not need a primary anastomosis and is very simple especially with a stapling device. In the current case, we performed colonoscopy during the operation to preclude the luminal narrowing and to assess the possible bleeding from the stapled area.

There are few reports of laparoscopic treatment of alimentary tract duplication in the English literatures, among which only one reported colorectal involvement. It was a rectal cystic duplication in an adult.<sup>12</sup> To our knowledge, this is the first case report of tubular colonic duplication in a child successfully treated by laparoscopic resection.

In conclusion, laparoscopic resection combined with intraoperative colonoscopy is a useful and safe procedure for the colonic duplication in a child.

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