

# World Journal of *Clinical Cases*

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## Successful management of tubular colonic duplication using a laparoscopic approach: A case report and review of the literature

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### Abstract

#### BACKGROUND

Alimentary duplication is a rare congenital disease with a reported incidence of 1 per 4500 persons, although the exact incidence has been difficult to ascertain. According to previous reports, the most common site of duplication is the ileum, and colonic duplication is rare. Due to different types and locations of the duplication, the manifestations are varied, which makes establishing an accurate diagnosis before surgery a challenge.

#### CASE SUMMARY

A 17-year-old female patient sought evaluation in our department with constipation and chronic abdominal pain for 12 years; she had difficulty defecating and had dry stools since she was a child. An abdominal computed tomography revealed two extremely enlarged loops of bowel full of stool-like intestinal contents in the left lower abdomen, which led us to consider the possibility of colonic duplication. A laparoscopic exploration was performed, which revealed a tubular duplicated colon that shared a common opening with the transverse colon. A left hemi-colectomy was performed with a side-to-side anastomosis. The pathologic results confirmed the diagnosis. At the 6-mo follow-up, the patient was doing well without constipation or abdominal pain.

#### CONCLUSION

Colonic duplication is a rare alimentary abnormality in adults. Due to the non-specific manifestations and low incidence, it is usually difficult to make an accurate diagnosis pre-operatively. Surgery is the mainstay of treatment, even though some patients are asymptomatic.

**Key words:** Colonic duplication; Diagnosis; Laparoscopy; Case report

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**Core tip:** Colonic duplication is an uncommon congenital disease, and the manifestations vary greatly according to different types and locations of duplication. Most cases are diagnosed and treated before the age of 2 years. Due to non-specific manifestations and low incidence, it is rather a challenge to make an accurate diagnosis before surgery. Surgery should be considered as first-line treatment even though some patients are asymptomatic.

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## INTRODUCTION

Duplications of the gastrointestinal tract can occur anywhere from the mouth to the anus<sup>[1-3]</sup>; however, the ileum is the most common site and accounts for approximately 80% of all abnormalities<sup>[4]</sup>. Several clinical studies have demonstrated that colonic duplication is rare, accounting for 6%-7% of cases<sup>[5]</sup>. The manifestations vary greatly depending on the types and locations of the duplication<sup>[6]</sup> and include abdominal mass, constipation, chronic abdominal pain, and its associated complications, such as obstruction, perforation, intussusception, volvulus, or even malignancy<sup>[7,8]</sup>. Surgery should be considered when the diagnosis is made. Herein, we report the case of a 17-year-old female who was later diagnosed with a tubular colonic duplication.

## CASE PRESENTATION

### Chief complaints

A 17-year-old female patient complaining of constipation and chronic abdominal pain visited our hospital.

### History of present illness

The girl presented the above-mentioned symptoms since she was a child, and her constipation gradually developed to a degree that she had to take medicines to facilitate defecation. The girl had been disturbed by chronic intermittent abdominal pain without radiation for years. As conservative treatments failed to improve her symptoms, she sought definitive surgical intervention in our hospital.

### Physical and laboratory examination

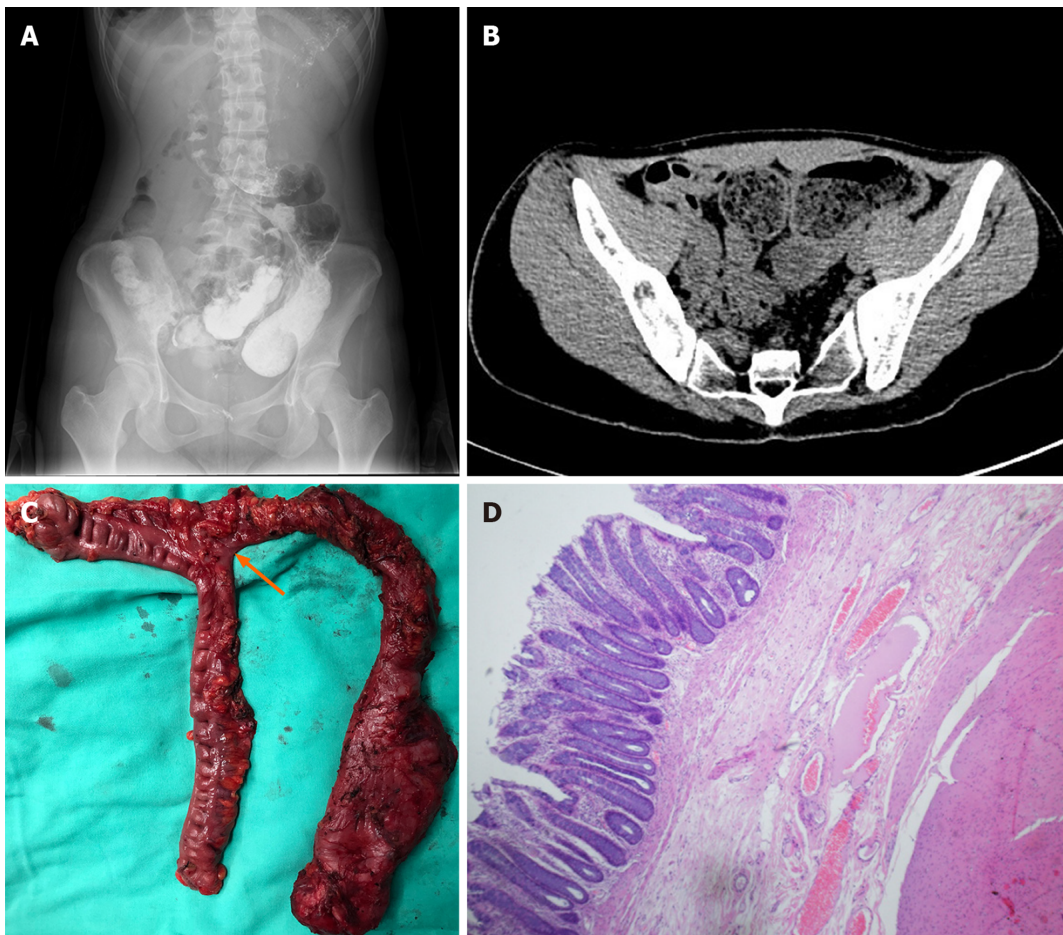
The physical examinations revealed left lower abdominal tenderness with a normal bowel movement, and the laboratory results showed no abnormalities.

### Imaging examinations

The x-ray examination after oral intake of barium (Figure 1A) suggested two enlarged loops with accumulated barium in the left lower quadrant. An abdominal computed tomography (CT) (Figure 1B) revealed two dilated lumen with a massive amount of stored feces in the left abdominal region. Considering clinical manifestations and imaging results, we suspected a diagnosis of colonic duplication.

## FINAL DIAGNOSIS

Tubular colonic duplication.



**Figure 1** Related figures demonstrating the clinical characteristics of tubular colonic duplication. A: Abdominal x-ray showed two large dilated loops filled with barium in the left lower abdomen; B: Abdominal computed tomography scan revealed two enlarged lumens with massive stored feces in the left abdominal region; C: Surgical specimen of the duplicated colon, an intestinal loop (as shown by the arrow) was separated from the transverse colon adjacent to the splenic flexure and extended to the left iliac fossa with a dead end; D: Histopathologic evaluation revealed normal alimentary structures with well-formed mucosa and smooth muscular layer, which further confirmed the diagnosis.

## TREATMENT

A laparoscopic exploration and left hemi-colectomy were then performed. During surgery, an intestinal loop was separated from the transverse colon adjacent to the splenic flexure and extended to the left iliac fossa with a dead end (Figure 1C). After dissociating the mesentery from the duplicated colon, a side-to-side anastomosis was made. The histopathologic examination revealed normal alimentary structures with well-formed mucosa and a smooth muscular layer, which further confirmed the diagnosis of a tubular colonic duplication (Figure 1D).

## OUTCOME AND FOLLOW-UP

The patient was discharged after an uneventful post-operative clinical course. At the 6-mo follow-up evaluation, the patient was doing well without nausea or constipation.

## DISCUSSION

Cystic and tubular duplication are the two common types of colonic duplication<sup>[9,10]</sup>. Cystic duplication is the most common type; only 20% of colonic duplications are tubular<sup>[11]</sup>, which can be further divided into T- and Y-shaped duplications<sup>[12]</sup>. Tubular colonic duplication usually shares a common wall or has a direct communication with the native tract, as in our patient, unlike a cystic duplication<sup>[2,3]</sup>.

To discuss the diagnosis and treatment of colonic duplication, a search was



conducted in the PubMed database using the terms “colonic duplication”, and we made a list about the information, shown in Table 1. The clinical characteristics of the included literature are shown in Table 2. A total of 99 case reports were included, and approximately 57.6% were female. The common site of duplication was reported to be the sigmoid (28.2%), ascending (21.2%), complete (21.2%), transverse (15.2%), and descending colon (11.2%). Approximately 30.3% of cases were diagnosed and treated at < than 2 years of age. Chronic abdominal pain and constipation were the two most common manifestations, accounting for 27.3% and 18.2%, respectively. Of the patients, 75.8% had an uneventful follow-up; however, there were still two cases with post-operative complications and four cases with recurrence of symptoms such as abdominal pain and rectovestibular fistula. Malignancy arising from colonic duplication occurred in 7.1% of patients.

The manifestations of colonic duplication are non-specific, including abdominal mass, chronic constipation and abdominal pain, an acute abdomen, obstruction, perforation, and malignancy<sup>[4-6,13,14]</sup>. Our patient was disturbed by chronic abdominal pain and constipation since she was a child. We speculated that her constipation was caused by excessive feces accumulated in the duplicated colon with a dead end that made it more difficult to defecate. Most of the cases are diagnosed and treated before 2 years of age; colonic duplication occurring in adults is extremely rare and many of the patients are asymptomatic<sup>[14-16]</sup>. Due to the non-specific presentation and low incidence, it is a challenge to make an accurate diagnosis before surgery<sup>[17,18]</sup>.

Malignancy arising from colonic duplication is rare; only 13 cases have been previously reported<sup>[18]</sup> and adenocarcinoma is the most common type<sup>[19]</sup>. Kang *et al*<sup>[18]</sup> reported a 23-year-old female with complaint of a huge unfixed abdominal mass; CT scan revealed a cystic mass located lateral to the ascending colon. The mass was resected laparoscopically, and the pathologic diagnosis was a malignancy. A rare case of malignancy arising from colonic duplication that metastasized to the omentum was also reported<sup>[17]</sup>. As a result, much attention should be paid to patients who present with an abdominal mass, and combined resection of the normal and duplicated colon is necessary in case of malignancy.

Many tools for the diagnosis are available. A recent review concluded that the primary imaging method for the diagnosis of colonic duplication was ultrasonography<sup>[14]</sup>. The typical presence of duplication under ultrasonography was usually a cyst adjacent to the tract with a double wall. Ultrasonography was also helpful for differentiating solid and cystic masses<sup>[20]</sup>.

Abdominal x-ray is a primary tool for differential diagnosis. Jimenez *et al*<sup>[21]</sup> reported a patient with intestinal obstruction that was caused by colonic duplication, and an x-ray revealed extremely dilated loops full of stool-like substance. Similarly, the x-ray in our study also presented two large separated loops full of barium in the left lower abdomen. We speculated that this phenomenon was probably caused by excessive accumulation of barium in the duplicated colon, which had a direct communication with the native gut. Abdominal CT is another necessary examination for duplication, which might reveal a low-density cystic structure or dilated lumen running parallel to the native tract<sup>[22,23]</sup>. Sobhani *et al*<sup>[2]</sup> reported a patient in whom the abdominal CT showed an extremely dilated and air-filled loop of bowel adjacent to the sigmoid colon; colonic duplication was later diagnosed intra-operatively. In our patient, two enlarged intestinal loops running parallel from the splenic flexure to the sigmoid colon were demonstrated, and the diagnosis was confirmed during surgery. In addition, colonoscopy is an alternative, especially helpful for tubular duplication because it can be easily detected<sup>[7]</sup>. An intraluminal transparent spherical lesion was found by colonoscopy<sup>[10]</sup>. A case presented with non-specific abdominal pain was reported by Asour *et al*<sup>[7]</sup>; the patient was accurately diagnosed with tubular colonic duplication according to colonoscopy. We suggest that the pre-operative diagnosis can only be made with prior awareness of the disease regardless of which imaging tool is used.

Traditional treatment of alimentary duplication is surgical resection of both the duplicated and normal colon with an end-to-end anastomosis<sup>[24,25]</sup>. Most surgeons advocate that symptomatic patients should undergo elective surgery following accurate diagnosis<sup>[3,4,20,26]</sup>. It has been reported that symptomatic patients are treated successfully by surgery<sup>[8,16,19,26,27]</sup>. Our patient also underwent surgery and was doing well post-operatively without constipation or abdominal pain; however, the management of asymptomatic patients remains controversial. Some surgeons advocate conservative treatments, while others suggest surgical resection when the diagnosis is made<sup>[28,29]</sup>. We propose that surgery should be considered as first-line treatment when the duplication is diagnosed, even though some patients were asymptomatic.

Surgery is the mainstay of treatment for colonic duplication. Greater than 90% of patients undergo laparotomy, only 10% undergo laparoscopic surgery. Our patient

**Table 1 Clinical characteristics of colonic duplication reported in the literature**

Clinical characteristics, <i>n</i> = 99	<i>n</i> (%)
Locations of duplication	
Sigmoid	28 (28.2)
Transverse	15 (15.2)
Ascending	21 (21.2)
Descending	11 (11.1)
Rectum	3 (3.1)
Complete colon	21 (21.2)
Age in yr	
0-2	30 (30.3)
> 2	69 (69.7)
Gender	
Female	57 (57.6)
Male	42 (42.4)
Symptoms	
Acute abdomen	10 (10.1)
Chronic abdominal pain	27 (27.3)
Constipation	18 (18.2)
Abdominal distension	7 (7.1)
Abdominal mass	16 (16.2)
Bleeding	5 (5.1)
Rectovestibular fistula	7 (7.1)
Perforation	5 (5.1)
Obstruction	6 (6.1)
None	3 (3.0)
Others <sup>1</sup>	17 (17.2)
Treatment	
Conservative treatment	10 (10.1)
Laparotomy	81 (81.8)
Laparoscopy	8 (8.1)
Range of resection	
Resection of duplication only	47 (52.8)
Total colectomy	5 (5.6)
Subtotal colectomy	2 (2.2)
Left hemi-colectomy	12 (13.5)
Right hemi-colectomy	12 (13.5)
Colostomy	11 (12.4)
Anastomosis	
Side-to-side	34 (38.2)
End-to-end	23 (25.8)
Others	32 (36.0)
Type of duplication	



Tubular	61 (68.5)
Cystic	38 (31.5)
Follow-up	
Uneventful	75 (75.8)
Unreported	18 (18.2)
Postoperative complications	2 (2.0)
Recurrence of symptoms	4 (4.0)
Malignant change	7 (7.1)

<sup>1</sup>Diarrhea 2 (2.0%), fever 2 (2.0%), vomiting 4 (4.0%), anorectal malformation 3 (3.0%), volvulus 2 (2.0%), imperforate anus 3 (3.0%), intussusception 1 (1.0%).

**Table 2 Clinical characteristics of included literature**

Ref.	Location	Age	Gender	Complaints	Treatment	Types	Follow-up
Ricciardolo <i>et al</i> <sup>[1]</sup>	Right colon	35	M	Acute abdomen	Right hemicolectomy	Cystic	Lost
Sobhani <i>et al</i> <sup>[2]</sup>	Sigmoid colon	27	M	Abdominal pain	Laparotomy	Tubular	Uneventful
Banchini <i>et al</i> <sup>[3]</sup>	Transverse colon	21	M	Constipation	Laparotomy	Tubular	Uneventful
Siamionava <i>et al</i> <sup>[4]</sup>	Transverse colon	18	F	Constipation	Laparotomy	Tubular	Uneventful
Wu <i>et al</i> <sup>[6]</sup>	Descending colon	25	F	Abdominal pain	Laparotomy	Tubular	Uneventful
Asour <i>et al</i> <sup>[7]</sup>	Sigmoid colon	61	M	Abdominal pain	Colonoscopy	Tubular	Uneventful
Cheng <i>et al</i> <sup>[8]</sup>	Complete colon	29	F	Abdominal mass	Subtotal colectomy	Tubular	Uneventful
Tufiño <i>et al</i> <sup>[9]</sup>	Ascending colon	36	F	Abdominal pain	Laparoscopy	Cystic	Uneventful
Garg <i>et al</i> <sup>[10]</sup>	Hepatic flexure	42	F	Constipation	Colonoscopy	Cystic	Uneventful
AbouZeid <i>et al</i> <sup>[12]</sup>	Complete colon	2	F	Rectovestibular fistula	Laparotomy	Tubular	Uneventful
Fenelon <i>et al</i> <sup>[13]</sup>	Sigmoid colon	74	F	Acute abdomen	Laparotomy	Cystic	Lost
Limas <i>et al</i> <sup>[16]</sup>	Splenic flexure	20 d	M	Abdominal pain, vomiting	Laparotomy	Cystic	Uneventful
Hsu <i>et al</i> <sup>[17]</sup>	Transverse colon	40	M	Abdominal mass, pain	Laparotomy	Cystic	Chemotherapy
Kang <i>et al</i> <sup>[18]</sup>	Ascending colon	23	F	Abdominal mass	Laparoscopy	Cystic	Chemotherapy
Jimenez <i>et al</i> <sup>[21]</sup>	Ileum to colon	8	F	Abdominal pain	Total colectomy	Tubular	Lost
Ademuyiwa <i>et al</i> <sup>[20]</sup>	Ascending colon	10	F	Abdominal pain vomiting	Laparotomy	Cystic	Uneventful
Pels Rijcken <i>et al</i> <sup>[22]</sup>	Complete colon	39	F	Perianal abscess	Laparotomy	Tubular	Lost
Trotovsek <i>et al</i> <sup>[23]</sup>	Transverse colon	6	F	Nausea vomiting	Laparotomy	Tubular	Uneventful
Kaur <i>et al</i> <sup>[24]</sup>	Complete colon	3 mo	F	Rectovestibular fistula	Laparotomy	Tubular	Recurrence
Ho <sup>[26]</sup>	Sigmoid colon	25	M	Abdominal pain	Laparotomy	Tubular	Lost
Espalieu <i>et al</i> <sup>[27]</sup>	Sigmoid colon	54	M	Constipation, pain	Laparotomy	Tubular	Lost

had a laparoscopic exploration with an excellent post-operative recovery. Compared to open surgery, minimally invasive surgery has the advantages of smaller incision, quicker recovery, less pain, and reduced blood loss<sup>[30]</sup>. Although sufficient evidence to demonstrate the superiority of laparoscopy for the treatment of colonic duplication is lacking, laparoscopic surgery should be considered for asymptomatic or stable patients.

Of the patients reported in the literature, 75.8% had an uneventful follow-up. A female patient diagnosed with cystic colonic duplication who underwent surgery was regularly followed and the symptom of constipation was significantly improved<sup>[20]</sup>. Our patient was also doing well, and the constipation or abdominal pain did not recur during a 6-mo follow-up. Post-operative complications or recurrence of manifestations have also been reported. Kaur *et al*<sup>[24]</sup> reported a case with recurrence of constipation

and a rectovestibular fistula after surgical resection of the duplicated colon. Recurrence of symptoms has also been reported by other surgeons<sup>[13,16]</sup>. The recurrence might be related to surgical technique, as reported by Prasil *et al*<sup>[31]</sup>, who considered that local excision and closure of a recto-vaginal fistula caused by complete duplication might lead to a recurrence.

## CONCLUSION

Colonic duplication is a rare congenital disease in adults. It is a great challenge to make an accurate diagnosis before surgery due to the non-specific manifestations and low incidence. Surgery should be considered as first-line treatment to prevent complications and malignancy.

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