**Name of Journal:** *World Journal of Clinical Cases*

**Manuscript NO:** 55640

**Manuscript Type:** CASE REPORT

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

Li GB *et al*. Tubular colonic duplication

Gan-Bin Li, Jia-Gang Han, Zhen-Jun Wang, Zhi-Wei Zhai, Yu Tao

**Gan-Bin Li, Jia-Gang Han, Zhen-Jun Wang, Zhi-Wei Zhai, Yu Tao,** Department of General Surgery, Beijing Chaoyang Hospital, Capital Medical University, Beijing 100020, China

**Author contributions:** Han JG participated in the management of this case, designed and collected materials for this report, and was in charge of revising the manuscript; Wang ZJ participated in the management of this case and was in charge of revising the manuscript; Li GB participated in the management of this case, collected the material of this case, and drafted the manuscript; Zhai ZW and Tao Y participated in the management of this case; All authors issued final approval for the version to be submitted.

**Corresponding author: Jia-Gang Han, MD, PhD, Assistant Professor,** Department of General Surgery, Beijing Chaoyang Hospital, Capital Medical University, No. 8, South Gongti Road, Chaoyang District, Beijing 100020, China. hjg211@163.com

**Received:** March 26, 2020

**Revised:** May 25, 2020

**Accepted:** July 14, 2020

**Published online:**

**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

Li GB, Han JG, Wang ZJ, Zhai ZW, Tao Y. Successful management of tubular colonic duplication using a laparoscopic approach: A case report and review of the literature. *World J Clin Cases* 2020; In press

**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.

**INTRODUCTION**

Duplications of the gastrointestinal tract can occur anywhere from the mouth to the anus[1-3]; however, the ileum is the most common site and accounts for approximately 80% of all abnormalities[4]. Several clinical studies have demonstrated that colonic duplication is rare, accounting for 6%-7% of cases[5]. The manifestations vary greatly depending on the types and locations of the duplication[6] and include abdominal mass, constipation, chronic abdominal pain, and its associated complications, such as obstruction, perforation, intussusception, volvulus, or even malignancy[7,8]. 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.

**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[9,10]. Cystic duplication is the most common type; only 20% of colonic duplications are tubular[11], which can be further divided into T- and Y-shaped duplications[12]. 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[2,3].

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[4-6,13,14]. 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[14-16]. Due to the non-specific presentation and low incidence, it is a challenge to make an accurate diagnosis before surgery[17,18].

Malignancy arising from colonic duplication is rare; only 13 cases have been previously reported[18] and adenocarcinoma is the most common type[19]. Kang *et al*[18] 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[17]. 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[14]. 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[20].

Abdominal x-ray is a primary tool for differential diagnosis. Jimenez *et al*[21] 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[22,23]. Sobhani *et al*[2] 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[7]. An intraluminal transparent spherical lesion was found by colonoscopy[10]. A case presented with non-specific abdominal pain was reported by Asour *et al*[7]; 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[24,25]. Most surgeons advocate that symptomatic patients should undergo elective surgery following accurate diagnosis[3,4,20,26]. It has been reported that symptomatic patients are treated successfully by surgery[8,16,19,26,27]. 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[28,29]. 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 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[30]. 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[20]. 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*[24] 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[13,16]. The recurrence might be related to surgical technique, as reported by Prasil *et al*[31], 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.

**REFERENCES**

1 **Ricciardolo AA**, Iaquinta T, Tarantini A, Sforza N, Mosca D, Serra F, Cabry F, Gelmini R. A rare case of acute abdomen in the adult: The intestinal duplication cyst. case report and review of the literature. *Ann Med Surg (Lond)* 2019; **40**: 18-21 [PMID: 30962926 DOI: 10.1016/j.amsu.2019.03.002]

2 **Sobhani R**, Fatemi MJ, Ayoubi Yazdi N, Alsaeidi S. Tubular Duplication of the Sigmoid Colon with Acute Abdomen: An Adult Case Report. *Indian J Surg* 2015; **77**: 1005-1007 [PMID: 27011499 DOI: 10.1007/s12262-014-1110-x]

3 **Banchini F**, Delfanti R, Begnini E, Tripodi MC, Capelli P. Duplication of the transverse colon in an adult: case report and review. *World J Gastroenterol* 2013; **19**: 586-589 [PMID: 23382641 DOI: 10.3748/wjg.v19.i4.586]

4 **Siamionava Y**, Varabei A, Makhmudov A. Transverse colon duplication with chronic constipation in adult. *BMJ Case Rep* 2019; **12**: e226450 [PMID: 30954954 DOI: 10.1136/bcr-2018-226450]

5 **Rattan KN**, Bansal S, Dhamija A. Gastrointestinal Duplication Presenting as Neonatal Intestinal Obstruction: An Experience of 15 Years at Tertiary Care Centre. *J Neonatal Surg* 2017; **6**: 5 [PMID: 28083491 DOI: 10.21699/jns.v5i4.432]

6 **Wu X**, Xu X, Zheng C, Li B. Tubular colonic duplication in an adult: case report and brief literature review. *J Int Med Res* 2018; **46**: 2970-2975 [PMID: 29761727 DOI: 10.1177/0300060518773016]

7 **Asour A**, Kim HK, Arya S, Hepworth C. Tubular sigmoid duplication in an adult man: an interesting incidental finding. *BMJ Case Rep* 2017; **2017**: bcr2017219474 [PMID: 29133579 DOI: 10.1136/bcr-2017-219474]

8 **Cheng KC**, Ko SF, Lee KC. Colonic duplication presenting as a huge abdominal mass in an adult female. *Int J Colorectal Dis* 2019; **34**: 1995-1998 [PMID: 31642971 DOI: 10.1007/s00384-019-03409-9]

9 **Tufiño JF**, Espin DS, Moyon MA, Moyon FX, Cevallos JM, Guzmán LJ, Molina GA. Laparoscopic approach to non-communicating intestinal duplication cyst in adult. *J Surg Case Rep* 2018; **2018**: rjy061 [PMID: 29644042 DOI: 10.1093/jscr/rjy061]

10 **Garg R**, Saravolatz LD, Barawi M. Endoscopic Treatment of Colonic Duplication Cyst: A Case Report and Review of the Literature. *Case Rep Gastrointest Med* 2018; **2018**: 6143570 [PMID: 29666719 DOI: 10.1155/2018/6143570]

11 **McPherson AG**, Trapnell JE, Airth GR. Duplication of the colon. *Br J Surg* 1969; **56**: 138-142 [PMID: 5765395 DOI: 10.1002/bjs.1800560214]

12 **AbouZeid AA**, Mohammad SA, Ibrahim SE, Fagelnor A, Zaki A. Late Diagnosis of Complete Colonic and Rectal Duplication in a Girl with an Anorectal Malformation. *European J Pediatr Surg Rep* 2019; **7**: e47-e50 [PMID: 31285983 DOI: 10.1055/s-0039-1692193]

13 **Fenelon C**, Boland MR, Kenny B, Faul P, Tormey S. A colonic duplication cyst causing bowel ischaemia in a 74-year-old lady. *J Surg Case Rep* 2016; **2016**: rjw147 [PMID: 27572680 DOI: 10.1093/jscr/rjw147]

14 **Xiang L**, Lan J, Chen B, Li P, Guo C. Clinical characteristics of gastrointestinal tract duplications in children: A single-institution series review. *Medicine (Baltimore)* 2019; **98**: e17682 [PMID: 31689788 DOI: 10.1097/MD.0000000000017682]

15 **Jeziorczak PM**, Warner BW. Enteric Duplication. *Clin Colon Rectal Surg* 2018; **31**: 127-131 [PMID: 29487496 DOI: 10.1055/s-0037-1609028]

16 **Limas C**, Soultanidis C, Kirmanidis MA, Tsigalou C, Tsirogianni O. Abscess formation of a spherical-shape duplication in the splenic flexure of the colon: case report and review of the literature. *Cases J* 2009; **2**: 158 [PMID: 19946529 DOI: 10.1186/1757-1626-2-158]

17 **Hsu H**, Gueng MK, Tseng YH, Wu CC, Liu PH, Chen CC. Adenocarcinoma arising from colonic duplication cyst with metastasis to omentum: A case report. *J Clin Ultrasound* 2011; **39**: 41-43 [PMID: 20812340 DOI: 10.1002/jcu.20739]

18 **Kang M**, An J, Chung DH, Cho HY. Adenocarcinoma arising in a colonic duplication cyst: a case report and review of the literature. *Korean J Pathol* 2014; **48**: 62-65 [PMID: 24627698 DOI: 10.4132/KoreanJPathol.2014.48.1.62]

19 **Inoue Y**, Nakamura H. Adenocarcinoma arising in colonic duplication cysts with calcification: CT findings of two cases. *Abdom Imaging* 1998; **23**: 135-137 [PMID: 9516499 DOI: 10.1007/s002619900305]

20 **Ademuyiwa AO**, Bode CO, Adesanya OA, Elebute OA. Duplication cyst of ascending colon presenting as an ileal volvulus in a child: a case report and review of literature. *Afr J Paediatr Surg* 2012; **9**: 237-239 [PMID: 23250247 DOI: 10.4103/0189-6725.104727]

21 **Jimenez SG**, Oliver MR, Stokes KB, Morreau PN, Chow CW. Case report: Colonic duplication: a rare cause of obstruction. *J Gastroenterol Hepatol* 1999; **14**: 889-892 [PMID: 10535470 DOI: 10.1046/j.1440-1746.1999.01951.x]

22 **Pels Rijcken TH**, Van Dorp TA, Davies GA. Case report: tubular colonic duplication in a patient with classical neurofibromatosis. *Clin Radiol* 1994; **49**: 655-657 [PMID: 7955898 DOI: 10.1016/s0009-9260(05)81888-4]

23 **Trotovsek B**, Hribernik M, Gvardijancic D, Jelenc F. Giant T-shaped duplication of the transverse colon. A case report. *J Pediatr Surg* 2006; **41**: e59-e61 [PMID: 16410093 DOI: 10.1016/j.jpedsurg.2005.10.062]

24 **Kaur N**, Nagpal K, Sodhi P, Minocha VR. Hindgut duplication--case report and literature review. *Pediatr Surg Int* 2004; **20**: 640-642 [PMID: 15278375 DOI: 10.1007/s00383-004-1248-x]

25 **Hickey WF**, Corson JM. Squamous cell carcinoma arising in a duplication of the colon: case report and literature review of squamous cell carcinoma of the colon and of malignancy complicating colonic duplication. *Cancer* 1981; **47**: 602-609 [PMID: 7226009 DOI: 10.1002/1097-0142(19810201)47:3<602::aid-cncr2820470330>3.0.co;2-8]

26 **Ho YC**. Total colorectal and terminal ileal duplication presenting as intussusception and intestinal obstruction. *World J Gastroenterol* 2012; **18**: 6338-6340 [PMID: 23180958 DOI: 10.3748/wjg.v18.i43.6338]

27 **Espalieu P**, Balique JG, Cuilleret J. Tubular colonic duplications. A case report and literature review. *Anat Clin* 1985; **7**: 125-130 [PMID: 4041270 DOI: 10.1007/bf01655513]

28 **Mourra N**, Chafai N, Bessoud B, Reveri V, Werbrouck A, Tiret E. Colorectal duplication in adults: report of seven cases and review of the literature. *J Clin Pathol* 2010; **63**: 1080-1083 [PMID: 20924093 DOI: 10.1136/jcp.2010.083238]

29 **Fotiadis C**, Genetzakis M, Papandreou I, Misiakos EP, Agapitos E, Zografos GC. Colonic duplication in adults: report of two cases presenting with rectal bleeding. *World J Gastroenterol* 2005; **11**: 5072-5074 [PMID: 16124070 DOI: 10.3748/wjg.v11.i32.5072]

30 **Bonjer HJ**, Deijen CL, Abis GA, Cuesta MA, van der Pas MH, de Lange-de Klerk ES, Lacy AM, Bemelman WA, Andersson J, Angenete E, Rosenberg J, Fuerst A, Haglind E; COLOR II Study Group. A randomized trial of laparoscopic versus open surgery for rectal cancer. *N Engl J Med* 2015; **372**: 1324-1332 [PMID: 25830422 DOI: 10.1056/NEJMoa1414882]

31 **Prasil P**, Nguyen LT, Laberge JM. Delayed presentation of a congenital recto-vaginal fistula associated with a recto-sigmoid tubular duplication and spinal cord and vertebral anomalies. *J Pediatr Surg* 2000; **35**: 733-735 [PMID: 10813337 DOI: 10.1053/jpsu.2000.6046]

**Footnotes**

**Informed consent statement:** Informed written consent was obtained from the patient for publication of this report and any accompanying images.

**Conflict-of-interest statement:** The authors declare that they have no conflict of interest.

**CARE Checklist (2016) statement:** The authors have read the CARE Checklist (2016), and the manuscript was prepared and revised according to the CARE Checklist (2016).

**Open-Access:** This article is an open-access article that was selected by an in-house editor and fully peer-reviewed by external reviewers. It is distributed in accordance with the Creative Commons Attribution NonCommercial (CC BY-NC 4.0) license, which permits others to distribute, remix, adapt, build upon this work non-commercially, and license their derivative works on different terms, provided the original work is properly cited and the use is non-commercial. See: http://creativecommons.org/licenses/by-nc/4.0/

**Manuscript source:** Invited manuscript

**Peer-review started:** March 26, 2020

**First decision:** May 22, 2020

**Article in press:**

**Specialty type:** Medicine, research and experimental

**Country/Territory of origin:** China

**Peer-review report’s scientific quality classification**

Grade A (Excellent): 0

Grade B (Very good): B, B

Grade C (Good): C, C

Grade D (Fair): 0

Grade E (Poor): 0

**P-Reviewer:** Quesada BM, Mayir B, Mayir M, Nari GA **S-Editor:** Wang JL **L-Editor:** Filipodia **E-Editor:**

**Figure Legends**

**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 lumen 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.

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

|  |  |
| --- | --- |
| **Clinical characteristics, *n* = 99** | ***n* (%)** |
| 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) |
| Others1 | 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) |

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