PO Box 2345, Beijing 100023, China
www.wjgnet.com
wjg@wjgnet.com

ELSEVIER

World J Gastroenterol 2005;11(35):5557-5560
World Journal of Gastroenterology ISSN 1007-9327

• *BRIEF REPORTS* •

Analysis of clinical manifestations of symptomatic acquired jejunoileal diverticular disease

Chia-Yuan Liu, Wen-Hsiung Chang, Shee-Chan Lin, Cheng-Hsin Chu, Tsang-En Wang, Shou-Chuan Shih

Chia-Yuan Liu, Wen-Hsiung Chang, Shee-Chan Lin, Cheng-Hsin Chu, Tsang-En Wang, Shou-Chuan Shih, Division of Gastroenterology, Department of Internal Medicine, Mackay Memorial Hospital, Taipei, Taiwan, China
Chia-Yuan Liu, Department of Medical Research, Mackay Memorial Hospital, Taipei, Taiwan, China
Shou-Chuan Shih, Mackay Medicine, Nursing and Management College, Taipei, Taiwan, China
Correspondence to: Dr. Shou-Chuan Shih, Division of Gastroenterology, Department of Internal Medicine, Mackay Memorial Hospital, No. 92, Section 2, Chung-San North Road, Taipei, Taiwan, China. sschuan@ms2.mmh.org.tw
Telephone: +886-2-25433535 Fax: +886-2-27752142
Received: 2004-12-10 Accepted: 2005-02-28

Abstract

AIM: To analyze systematically our experience over 22 years with symptomatic acquired diverticular disease of the jejunum and ileum, exploring the clinical manifestations and diagnosis of this rare but life-threatening disease.

METHODS: The medical records of patients with surgically confirmed symptomatic jejunoileal diverticular disease were retrospectively reviewed. Data collected included demographic data, laboratory results, clinical course (acute or chronic), preoperative diagnosis, and operative findings. Inclusion criteria were as follows: (1) surgical confirmation of jejunoileal diverticular disease and (2) exclusion of congenital diverticula (e.g. Meckel's diverticulum).

RESULTS: From January 1982 to July 2004, 28 patients with a total of 29 operations met the study criteria. The male:female ratio was 14:14, and the mean age was 62.6±3.5 years. The most common manifestation was abdominal pain. In nearly half of the patients, the symptoms were chronic. Two patients died after surgery. Only four cases were correctly diagnosed prior to surgery, three by small bowel series.

CONCLUSION: Symptomatic acquired small bowel diverticular disease is difficult to diagnose. It should be considered in older patients with unexplained chronic abdominal symptoms. A small bowel series may be helpful in diagnosing this potentially life-threatening disease.

Key words: Acquired; Symptomatic; Jejunoileal; Diverticular disease

Liu CY, Chang WH, Lin SC, Chu CH, Wang TE, Shih SC. Analysis of clinical manifestations of symptomatic acquired jejunoileal diverticular disease. *World J Gastroenterol* 2005; 11(35): 5557-5560
http://www.wjgnet.com/1007-9327/11/5557.asp

INTRODUCTION

According to the literature review by Longo and Vernava[1], the first report of jejunal diverticulosis was published by Sir Astley Cooper in 1807, and the first operation for small bowel diverticula was performed by Gordinier and Sampson in 1906. The small bowel is the least common site for diverticula in the entire GI tract. According to the literature, the duodenum is the most common location for a small bowel diverticulum[2,3]. After excluding Meckel's diverticulum, less than 30% of reported diverticula occurred in the jejunum and ileum. The reported incidence of jejunoileal diverticula on small bowel studies by enteroclysis is 2-2.3%[4,5], comparable to autopsy data demonstrating an incidence of 1.3-4.6% for acquired diverticula of the jejunum and ileum[6,7].

Most small bowel diverticula, whether duodenal or jejunoileal, are asymptomatic[1,8] and are simply incidental findings. Complicated acquired diverticular disease of the jejunum and ileum is, on the other hand, a diagnostic dilemma. The exact prevalence of complicated small bowel diverticula is difficult to ascertain, estimates in the literature range from less than 10% to nearly 40%[9,10]. In a series of 47 patients, operative intervention was required because of complications in 7 (15%) patients[11]. We conducted a retrospective review of our experience with this rare entity, with a view to expanding the cumulative information in the literature.

MATERIALS AND METHODS

General data

The chart and operative records of Mackay Memorial Hospital from January 1982 to July 2004 were reviewed for cases of surgically proven jejunoileal diverticula. During this period, 28 patients with symptomatic, acquired jejunoileal diverticular disease were managed. We retrospectively reviewed their age, sex, admission data, and outcome. We reviewed the major symptoms and recorded whether they were acute or chronic. The definition of chronic symptoms was vague complaints with no other identifiable cause persisting for at least 1 mo[7]. The preoperative laboratory data was also recorded and compared according to gender and whether the disease was acute or chronic. The preoperative diagnosis and surgical findings were recorded, including the location, number, and size of diverticula and the operative method.

Statistical analysis

Data were expressed as percentages or the mean±SD. Sigma Stat software (version 2.03, SPSS Inc., Chicago, IL) was used to perform a Student's *t*-test to compare the difference between groups of patients. Differences were considered significant at a *P* value of less than 0.05.

RESULTS

The records of 28 patients with surgically proven jejunoileal diverticula were retrieved for this study. The male:female ratio was 14:14. One woman with multiple jejunal diverticula had two episodes requiring surgery, once at age 66 and again at 77. Therefore, a total of 29 operations were reviewed. The mean age was 62.6±3.5 years (ranging from 22 to 93 years). Symptoms were acute in 15 episodes and chronic in 14. Two patients died, for a mortality of 7% (2 of 29). The length of hospital stay was 23.2±3.7 d, and the length of time between admission and surgery was 5.0±2.7 d. Six patients (21%) had colonic diverticular disease, with one tentatively diagnosed with colonic diverticulitis before surgery.

Some patients had multiple presenting symptoms. The most common was abdominal pain (25 of 29 episodes, 86%). Four patients had GI bleeding on arrival and six were febrile. One patient had a palpable left lower quadrant mass and was found to have diverticulitis of the terminal ileum with rupture. Other manifestations included nausea or vomiting in nine patients, abdominal fullness in seven, constipation in two, shock in two, and others in five.

Table 1 shows the surgical findings noted in the records. In the 29 episodes where the information was available, the diverticula were located in the jejunum in 16, the ileum in 11, and both jejunum and ileum in 2. In the 27 records where the number of diverticula was stated, 19 patients had multiple diverticula. The majority (12 of 21) of diverticula in cases where the size was recorded were greater than 3 cm. More than three quarters (22 of 29) of surgeries involved segmental resection of the intestine, and three patients had resection of the diverticula only. Additional procedures, such as enteroclysis and drainage, were done in four cases. Diverticulitis with or without perforation was the most common final surgical diagnosis (17 of 29).

Table 1 Surgical findings in 29 episodes of acquired symptomatic jejunoileal diverticular disease

Surgical findings	*n*	%
Location (*n* = 29)		
Jejunal:ileal:both	16:11:2	55:38:7
Number of diverticula (*n* = 27)		
Single:multiple	8:19	30:70
Size of diverticula (*n* = 21)		
Less than 1 cm:1–3 cm:over 3 cm	2:7:12	10:33:57
Operative method (*n* = 29)		
Segmental resection of intestine	22	76
Resection of diverticulum only	3	10
Others	4	14
Postoperation finding (*n* = 29)		
Diverticulitis with/without perforation	17	58
Hemorrhage	4	14
Intestinal obstruction	8	28

Table 2 shows the preoperative diagnoses, with acute appendicitis being the most common (6 of 29). Five patients were thought to have ileus, one of whom had an enterolith. Only four patients had a correct diagnosis before surgery, three of which were suggested by a small bowel series. The other patient had an upper GI series that disclosed a proximal jejunal diverticulum.

Table 2 Preoperative diagnoses in 29 episodes of acquired jejunoileal diverticular disease

Preoperative diagnosis	
Acute appendicitis	6
Ileus	5
Small bowel diverticula	4
GI tract bleeding	4
Perforated peptic ulcer	3
Intussusceptions	2
Colonic diverticulitis	1
Intra-abdominal tumor	1
Volvulus	1
Others	2

Table 3 lists the laboratory data. The mean blood sugar, leukocyte count and amylase were slightly elevated, while the mean albumin, calcium were mildly decreased. When we compared the data between patients with acute or chronic symptoms and between males and females, we found no significant statistical differences.

Table 3 Laboratory data in 29 episodes of acquired symptomatic jejunoileal diverticular disease

Laboratory data	mean±SD	Normal range
Hemoglobin	11.6±3.0	11.0-16.0 g/dL
Leukocyte count	11 540±4 656	4.0-10.0×10^3/μL
Platelet count	237 541±99 860	140-450×10^3/μL
Blood sugar	133.6±47.0	70-120 mg/dL
Blood urea nitrogen	16.9±12.6	7-24 mg/dL
Creatinine	1.1±0.4	0.5-1.2 mg/dL
Albumin	3.0±0.6	3.4-4.8 g/L
Calcium	7.8±0.7	8.4-10.0 g/L
Aspartate aminotransferase	26.9±18.7	5-35 IU/L
Bilirubin	0.80±0.5	0.2-1.3 mg/dL
Amylase	129.2±165.4	25-125 U/L

DISCUSSION

Our study confirms the rarity of symptomatic acquired jejunoileal diverticular disease, with only 28 patients seen with this disorder in our hospital in the past 22 years. It is more common in older patients, with a mean age in our series being 62.6±3.5 years. This is in general agreement with the findings of previous studies, with few young patients reported[1,7,12]. Although other investigators have reported a male predominance[1,2], this was not the case in our series. Because of the small number of patients in any one of the series, it is difficult to collect enough data to determine a clear pattern of gender distribution.

Most acquired jejunoileal diverticula are false diverticula,

occurring along the mesenteric border of the small bowel[1,10]. The incidence decreases distally progressively from the ligament of Treitz. The pathogenesis of jejunoileal diverticula has been ascribed to a pulsion phenomenon with local increases in intraluminal pressure. The mucosa and submucosa are forced through vascular channels in the muscle layer[13-15]. It is also possible that smooth muscle abnormalities create localized weakness in the wall. Diverticula are thought to occur more frequently in the proximal jejunum because of the larger size of the vasa recta at this area[7]. Another theory is that abnormalities of the myenteric plexus may result in uncoordinated smooth muscle activity, producing high pressure in localized area[1,2]. In our series, the distribution of diverticula was similar to the findings of others, with 55% in the jejunum, 38% in the ileum, and 7% in both.

Of patients with jejunoileal diverticula reported in the literature, more than 60% have been asymptomatic, another 30% minimally symptomatic, and only 10% have developed serious complications[13]. The rarity of symptomatic acquired jejunoileal diverticula often results in missed or delayed diagnosis. de Bree *et al*., advocated earlier diagnosis and timely treatment to reduce the morbidity and mortality[16]. Only four patients in our series (14%) were correctly diagnosed before surgery. Geroulakos reported an even worse record, with none of their patients being correctly diagnosed preoperatively. Three of the thirteen patients in their series were once labeled as psychoneurotic because diagnostic studies failed to demonstrate obvious pathology. The correct diagnosis was made only at emergency laparotomy[17]. This demonstrates the importance of remembering that there are such uncommon entities that are difficult to diagnose but which, if unrecognized, may result in serious complications.

Acute complications of diverticula include diverticulitis with or without perforation, hemorrhage, and intestinal obstruction[18-21]. In a patient with diverticular bleeding, endoscopy is unlikely to reveal the source, although it is of benefit in excluding other source of bleeding. Mesenteric angiography or Tc^{99m} RBC scan can be more helpful in such cases[22]. The differential diagnosis of intestinal obstruction includes volvulus, adhesions, intussusception, compression by a large diverticulum, or enterolith[1,7,23]. Small bowel dyskinesia, caused by bacterial overgrowth, visceral myopathy, or neuropathy may induce pseudo-obstruction[15]. Pseudo-obstruction is in fact a more common complication than mechanical obstruction and has been reported in 10-25% of cases[24]. Most of the patients in our study (58%) had diverticulitis with or without perforation. Hemorrhage and intestinal obstruction were only minor findings in our series, with only four patients presenting with GI bleeding. One of eight patients had an enterolith in his diverticulum that resulted in obstruction.

Chronic symptoms included intermittent abdominal fullness, vague abdominal discomfort or pain, passage of oily stool, weight loss, and weakness, which resolve after treatment. These might have been caused by pseudo-obstruction or bacterial overgrowth[1,7]. In one report, 14 of 27 patients had chronic refractory symptoms[15]. In our series the result was comparable (14/29). Small bowel diverticula should be considered in patients presenting with such unexplained chronic symptoms.

Nobles described a radiographic finding suggestive of jejunoileal diverticulum, namely a segmental dilatation of the small bowel in the epigastrium or left upper quadrant. He also suggested that the diagnosis be considered whenever the triad of obscure abdominal pain, anemia, and dilated small bowel loops on abdominal radiographs is encountered[7,25]. An upper GI series with small bowel follow through is a simple method for identifying a diverticulum. Three of the four correct preoperative diagnoses in our series were made by this method. However, diverticula may protrude into the leaves of mesentery and be hidden by the mesenteric fat. They also often communicate with bowel lumen through a wide opening. These factors may prevent the lesion being seen on routine barium follow through[26]. Enteroclysis (i.e., a double contrast of small bowel series) is more reliable for detecting these lesions, because the barium is able to flow out of a wide-mouthed diverticulum after air insufflation[4,5,16]. A meticulous search of the mesenteric portion of the small bowel as well as air insufflation with a small gauge needle into isolated segments of the bowel have been used to demonstrate obscure diverticula during operation[7,14,18].

Asymptomatic non-Meckelian diverticula as an incidental finding on radiographic studies or at laparotomy usually do not need resection[20]. However, if a dilated, hypertrophied segment of bowel with large diverticula is found, it may indicate a progressive form of the disease, in which case resection of the diverticular segment found incidentally at laparotomy is recommended[1,9]. Although some patients with chronic symptoms can be treated conservatively, when symptoms are persistent or refractory to treatment, resection may be beneficial[1].

In conclusion, symptomatic acquired diverticular disease of the jejunum and ileum is an uncommon disorder. Diagnosis is often difficult and delayed, resulting in unnecessary morbidity and mortality[16]. All published studies are limited by being retrospective analyses of small numbers of cases. There has thus been an inherent bias in patient selection. Preoperative diagnosis is difficult, and the paucity of studies makes it difficult to define the optimal diagnostic method. Certainly a high index of suspicion for this often obscure disease is necessary.

ACKNOWLEDGMENT

The authors wish to thank Dr. Mary Jeanne Buttrey for critical reading and correction of the manuscript.

REFERENCES

1 **Longo WE,** Vernava AM. Clinical implications of jejunoileal diverticular disease. *Dis Colon Rectum* 1992; **35**: 381-388
2 **Chiu EJ,** Shyr YM, Su CH, Wu CW, Lui WY. Diverticular disease of the small bowel. *Hepatogastroenterology* 2000; **47**: 181-184
3 **Zhan J,** Xia ZS, Zhong YQ, Zhang SN, Wang LY, Shu H, Zhu ZH. Clinical analysis of primary small intestinal disease: A report of 309 cases. *World J Gastroenterol* 2004; **10**: 2585-2587
4 **Maglinte DD,** Chernish SM, DeWeese R, Kelvin FM, Brunelle RL. Acquired jejunoileal diverticular disease: subject review. *Radiology* 1986; **158**: 577-580
5 **Salomonowitz E,** Wittich G, Hajek P, Jantsch H, Czembirek H. Detection of intestinal diverticula by double-contrast small bowel enema: differentiation from other intestinal diverticula.

Gastrointest Radiol 1983; **8**: 271-278
6 **Noer T.** Non-Meckelian diverticula of the small bowel: The incidence in an autopsy material. *Acta Chir Scand* 1960; **120**: 175-179
7 **Ross CB,** Richards WO, Sharp KW, Bertram PD, Schaper PW. Diverticular disease of the jejunum and its complications. *Am Surg* 1990; **56**: 319-324
8 **Afridi SA,** Fichtenbaum CJ, Taubin H. Review of duodenal diverticula. *Am J Gastroenterol* 1991; **86**: 935-938
9 **Altemeier WA,** Bryant LR, Wulsin JH. The surgical significance of jejunal diverticulosis. *Arch Surg* 1963; **86**: 732-745
10 **Akhrass R,** Yaffe MB, Fischer C, Ponsky J, Shuck JM. Small-bowel diverticulosis: perceptions and reality. *J Am Coll Surg* 1997; **184**: 383-388
11 **Palder SB,** Frey CB. Jejunal diverticulosis. *Arch Surg* 1988; **123**: 889-894
12 **Kraus M,** Sampson D, Wilson SD. Perforation of diverticulum of terminal ileum presenting as acute appendicitis. *Surgery* 1976; **79**: 724-725
13 **Baskin RH,** Mayo CW. Jejunal diverticulosis: a clinical study of 87 cases. *Surg Clin North Am* 1952; **95**: 1185-1196
14 **Cooke WT,** Cox EV, Fone DJ, Meynell MJ, Gaddie R. The clinical and metabolic significance of jejunal diverticula. *Gut* 1963; **4**: 115-131
15 **Krishnamurthy S,** Kelly MM, Rohrmann CA, Schuffler MD. Jejunal diverticulosis. A heterogenous disorder caused by a variety of abnormalities of smooth muscle or myenteric plexus. *Gastroenterology* 1983; **85**: 538-547
16 **de Bree E,** Grammatikakis J, Christodoulakis M, Tsiftsis D. The clinical significance of acquired jejunoileal diverticula. *Am J Gastroenterol* 1998; **93**: 2523-2528
17 **Geroulakos G.** Surgical problems of jejunal diverticulosis. *Ann R Coll Surg Engl* 1987; **69**: 266-268
18 **Roses DF,** Gouge TH, Scher KS, Ranson JH. Perforated diverticula of the jejunum and lleum. *Am J Surg* 1976; **132**: 649-652
19 **Gliustra PE,** Killoran PJ, Root JA, Ward WW. Jejunal diverticulitis. *Radiology* 1977; **125**: 609-611
20 **Wilcox RD,** Shatney CH. Surgical implications of jejunal diverticula. *South Med J* 1988; **81**: 1386-1391
21 **Wilcox RD,** Shatney CH. Massive rectal bleeding from jejunal diverticula. *Surg Gynecol Obstet* 1987; **165**: 425-428
22 **Spiegel RM,** Schultz RW, Casarella WJ, Wolff M. Massive hemorrhage from jejunal diverticula. *Radiology* 1982; **143**: 367-371
23 **Harris LM,** Volpe CM, Doerr RJ. Small bowel obstruction secondary to enterolith impaction complicating jejunal diverticulitis. *Am J Gastroenterol* 1997; **92**: 1538-1540
24 **Eckhauser FE,** Zelenock GB, Freier DT. Acute complications of jejuno-ileal pseudodiverticulosis: Surgical implications and management. *Am J Surg* 1979; **138**: 320-323
25 **Nobles ER Jr.** Jejunal diverticula. *Arch Surg* 1971; **102**: 172-174
26 **Freimanis MG,** Plaza-Ponte M. Radiologic diagnosis of jejunal diverticulitis. *Gastrointest Radiol* 1988; **13**: 312-314

Science Editor Guo SY **Language Editor** Elsevier HK