Giant Colonic Diverticula

Review of Diagnostic and Therapeutic Options

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Key Words

Giant colonic diverticula · Diverticulosis · Barium enema · Colectomy

Abstract

Background: A rare complication of diverticulosis of the colon is giant colonic diverticula (GCD). The condition was first described in English literature in 1953 [1, 2]. **Methods:** A Medline search was undertaken for English, French and German language articles on 'giant colonic diverticula'. **Results:** A total of 135 patients were identified, presenting with a total of 155 GCD [1–98]. With a complication rate of 28% and an operative mortality of 5%, GCD seems to have a high clinical significance. Radiological examination of choice seems to be plain abdominal X-ray and CT examination, barium enema carries the risk of perforation of the diverticulum, and should not be performed. **Conclusions:** There are different therapeutic options, in our opinion diverticulectomy alone is not the treatment of choice. Because of the possibility of recurrence and oncological reasons, colectomy seems to be the best treatment. The creation of a protecting colostomy depends on other operative findings.

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Introduction

Diverticulosis of the colon was a rare condition at the beginning of the 20th century with an incidence of 5%, but now up to 50% of the people present with diverticulosis of the colon [99]. It is postulated that one of the reasons for this increase is a change of diet into a low-fiber diet [100]. Usually, colonic diverticula are asymptomatic, but bleeding or inflammatory conditions can necessitate surgical intervention. A rare complication of diverticulosis of the colon is giant colonic diverticula (GCD). The condition was first described in the French literature in 1946, and in the English literature in 1953.

A GCD is defined as a large colonic diverticulum, 4 cm in size or larger. Through a secondary ball-valve mechanism, gas enters the diverticulum, but is unable to leave the diverticulum, this leading to the formation of a GCD.

Methods

Published literature concerning GCD is mainly in the form of case reports, the largest reports describe only 5 cases [2, 27]. A Medline search was undertaken for English, French and German language articles on 'giant colonic diverticula'. Further papers were identified by cross-referencing from the reference lists of relevant articles. A total of 135 patients were identified, presenting with a total of 155 GCD [1–98, 101]. Presenting symptoms and signs are reported. Relevant radiological work-up is discussed and therapeutic possibilities are reviewed.

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Table 1. Symptoms of GCD

Symptoms	Patients (n = 135)	Percentage
Abdominal pain	93	68
Constipation	24	18
Abdominal distention	17	11
Diarrhea	17	11
Vomiting	16	12
Nausea	14	10
Abdominal mass	13	10
Rectal bleeding/melena	11	13
Micturition problems*	11	8
Weight loss	6	4
Asymptomatic	6	4
Anorexia	5	4
Vaginal bleeding	2	1

* Hematuria, dysuria, pyuria, pneumaturia, retention, urinary frequency and enuresis.

One patient can have more complaints, therefore there are more than 135 complaints.

Results

Many different names describing GCD circulate. Giant sigmoid diverticulum is the most commonly used term (45%), other names are: giant colonic diverticulum (36%), giant gas cyst (9%), giant air cyst (5%), giant cyst (2%) and other names (3%). Because giant diverticula appear mostly (81%), but not solely, in the sigmoid, the name giant colonic diverticulum is preferred [84].

From the 135 patients, 121 patients presented with a single diverticulum, 12 presented with a double GCD [6, 7, 22, 26, 29, 42, 44, 51, 61, 81, 84, 102], and 2 patients presented with multiple GCD [71, 93]. Most diverticula are found in the sigmoid 109/135 (81%). The mean age of patients who present with a GCD is between 60 and 79 years.

Most GCD are 4–9 cm in diameter, with only a very small number which are larger than 25 cm. There was no difference in size between the different histological types. The size of a GCD can vary over time. Nano et al. [78] discuss the phenomenon of a intermittently palpable mass, the reason they call it a phantom tumor, similar findings are reported by others as well [5, 50, 52, 71]. Objective enlargement of the mass is found in 15 patients [2, 17, 18, 33, 38, 50, 51, 65, 68, 79, 86, 103]. As Choong et al. [84] discuss, this increase in volume of a GCD can be related to differences in the intracolonic and GCD

Table 2. Physical signs of GCD

Physical signs	Patients (n = 135)	Percentage
Abdominal mass, non-tender	44	33
Abdominal mass, tender	34	25
Fever	28	21
Abdominal tenderness	15	11
Normal	12	9
Acute abdomen	10	7
Abdominal distension	8	6

One patient can have more findings on physical examination, therefore there are more than 135 findings.

pressure through the communicating ostium. Higher intracolonic pressure would lead to higher pressure in the GCD, explaining the growth of GCD over time, this could also explain the phenomenon of the phantom tumor or the decrease in size of a GCD [23].

From the 135 studied cases, in 126 there is information about associated diverticulosis. In a total of 114/126 (90%) patients associated diverticulosis is present. There was no relationship between associated diverticulosis and different histological subgroups.

Symptoms and Signs

Abdominal pain (68%), constipation (18%) and vomiting (12%) are the most reported symptoms of patients with GCD (table 1). On physical examination the typical patient presents with a non-tender abdominal mass (table 2). In total 28% (38/135) of GCD present with complications in which perforation and abscess formation are the two most reported complications. There is also a risk of the formation of carcinoma within the GCD, with a risk of 3/135 (2%).

Histological Confirmation

Histologically, there are three different types of GCD [65]. The first type of a GCD is called a pseudo-diverticulum. A pseudo-diverticulum of the colon gradually increases in size, remnants of muscularis mucosa and muscularis propria may be found in the wall of the diverticulum. The mucosa is most of the times not completely intact. If no mucosal remnants at all are found, the GCD is considered a type II. Type II is called an inflammatory giant colonic diverticulum, which is actually a result from a local perforation of the mucosa with an abscess cavity

that remains in contact with the lumen of the colon. The wall of the diverticulum contains no portion of the bowel, but only reactive scar tissue. The third type of a GCD is the true diverticulum, in which the wall contains all layers of normal bowel wall, including serosa, muscularis, submucosa and mucosa [65].

There is no information about the histological diagnosis in 27 cases. This is largely due to two reasons, one is conservative treatment (10 cases) and the other reason is that it is simply not reported. The cases in which histological examination was performed revealed that 24 cases (22%) could be classified as pseudodiverticula (type I GCD), 71 (66%) as inflammatory giant colonic diverticulum (type II GCD) and 13 (12%) as true diverticula (type III GCD).

Male to female ratio is equal in histological type I and type II. In histological type III (true diverticulum) there was a 6:1 male to female preponderance.

Diagnostic Findings

Plain X-Ray

Of 135 patients, 104 patients underwent a plain abdominal X-ray. Only one X-ray did not describe the classical picture of a gas-filled structure, in that case the diagnosis was made on lower abdominal contrast examination [28]. Pneumoperitoneum or pneumo-mesenterium, suggesting perforation of the gastrointestinal tract, was shown in 8 cases [2, 8, 29, 55, 58, 59, 66, 91]. Besides the gas-filled cyst or free air, abdominal X-ray can show calcification [62]. On upright abdominal X-rays or lateral views a fluid level could be demonstrated in 15 (14%) cases. This percentage would probably be higher, because in most cases, no upright X-ray is performed [4, 5, 9, 13, 15, 18, 28, 32, 36, 39, 40, 50, 69, 75, 80]. A GCD can also be found on a plain X-thorax [68], but a normal X-thorax, does not exclude the presence of a GCD [36].

Ultrasound Examination

Ultrasound examination is described in 4 adult patients with a GCD [78, 87, 91, 98]. Only in 1 case, where there was a diagnosis of perforation of a GCD, the ultrasound seemed helpful in the diagnosis [78]. In all other cases no abnormalities were seen. One case is described in which fetal ultrasound at 33 weeks of gestation was able to show an intra-abdominal cystic lesion, which turned out to be a GCD [97]. Ultrasound examination, in an adult patient, does not seem to be the radiologic examination of choice for detecting a GCD.

Computed Tomography

The CT demonstrates a thick-walled, air-filled cavity in close apposition to the adjacent colon [83]. CT examination revealed the GCD in all 17 patients in which CT examination was performed [61–63, 65, 67, 74, 80, 82, 84–91, 98]. Not only does it seem to be a sensitive investigation, it is also capable of identifying an existing communication between the cyst and the gastrointestinal tract, even when this could not be shown by barium enema investigation [63]. It can give additional information on the number of GCD [61], and on the presence of complications not seen on regular plain X-ray [88].

Upper Barium Examination

A barium meal (upper barium enema) was performed in 12 cases. In 2 cases a communication between the cystic lesion and the gastrointestinal tract could be detected [33, 36]. In the other 10 cases (83%) no communication was found [19, 26, 38, 41, 53, 63, 72, 80, 82, 89].

Barium Enema

A total of 111 barium enemas were performed, in a total of 71 (64%) patients a communication could be visualized. Ritchie et al. [70] proved a communication of the GCD and the gastrointestinal tract, not by demonstration of barium inside the cyst, but on the expanding of the GCD on insufflation of air, if these 2 cases are also considered as positive, the total comes to 66%. One of the complications of a barium enema examination in case of a GCD is perforation of the GCD, necessitating urgent surgical solution. Perforation of the GCD after barium enema within 24 h [38, 58] and after 48 h [81] has been described.

Colonoscopy

Diagnostic colonoscopy is not considered to be helpful in the diagnosis of GCD [83]. It is thought that the ostium might be too small to allow visualization of the interior of the diverticulum. Mehta et al. [81] discuss the fact that in case of rectal bleeding, more and more colonoscopy is the first diagnostic procedure and that sometimes colonoscopic diagnosis of GCD is possible. Colonoscopy was performed in 18 patients. Colonoscopy did not demonstrate the GCD in 15 of 18 (83%) described cases [2, 20, 26–28, 30, 40, 42, 43, 48, 54, 58, 72, 74, 78]. In 3 cases colonoscopy revealed a large ostium of several centimeters suggesting a GCD [52, 71, 81]. It seems that for the work-up of a GCD, colonoscopy is not the diagnostic tool of choice, but that incidental diagnosis of GCD is possible with colonoscopy.

Table 3. Different types of operations performed for GCD

Operation	Patients (n = 135)	Percentage
Resection, primary anastomosis	84	62
Diverticulectomy	17	13
Resection, colostomy	14	10
Conservative*	10	7
Diverticulectomy, colostomy	3	2
Drainage	3	2
Not mentioned	4	4

* Including 3 patients who refused surgery.

Therapy

Conservative treatment of an asymptomatic GCD can lead to later chronic complications, like the development of an adenocarcinoma inside the GCD, or the development of an acute abdomen [2]. One of the least invasive forms of therapy is needle aspiration of the GCD [90]. If a laparotomy is performed, there are basically two options, diverticulectomy or resection of the involved segment, which both can be combined with a protecting colostomy. Choong et al. [84] advocate diverticulectomy as first choice in case of healthy colon adjacent to the base of the GCD, for they believed that no recurrence was reported. But Cronin et al. [48] described a patient who was treated with diverticulectomy and presented with a recurrence within two months. The second strategy which Choong et al. [84] reserve for GCD with no healthy colon at their base is resection of the involved segment. We could not find a difference between diverticulectomy and colectomy in the light of non-fatal and fatal complications. Because of the possibility of recurrence colectomy seems to be the best option, the creation of a protecting colosto-

my depends on other operative findings, like associated perforation or abscess formation. Table 3 shows the different types of operations performed for GCD.

Complications

Non-fatal complications, like pneumonia or wound infection, occurred in 6 patients. From 135 studied patients, 10 patients were treated conservatively or refused surgery. The non-fatal complication rate is 5% (6/125).

A total of 125 patients were operated, fatal complications of these interventions occurred in 5 patients (5%). Fatal complications of diverticular disease are rare and occur in less than 1 in 10,000 cases of colonic diverticulosis [104]. In case of complicated diverticular disease, surgical mortality can even be 20% [105]. Fatal complications after surgical intervention for GCD is probably much higher because of selection of patients (most data in this review come from case reports). The total fatal and nonfatal complication rate is 9% (11/125).

Conclusion

A giant colonic diverticulum is a rare complication of colonic diverticular disease. In the literature, 135 patients are reported. With a complication rate of 28% and an operative mortality of 5%, GCD seems to have a high clinical significance. In 2% of the cases, a carcinoma inside the GCD is found. Radiological examination of choice seems to be plain abdominal X-ray and CT examination. There is no role for ultrasound examination, colonoscopy or barium enema examination. There are different therapeutic options; in our opinion diverticulectomy alone is not the treatment of choice. Because of the possibility of recurrence of GCD and possible oncological reasons, colectomy seems to be the best option, the creation of a protecting colostomy depends on other operative findings.

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Invited Commentary

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The authors present a comprehensive review of a rare but clinically significant condition, that of giant colonic diverticula. They highlight that although this type of diverticulum is uncommon, such diverticula are associated with significant complications in nearly a third of the patients, perforation and abscess formation being the two most common. The authors highlight the possibility that a ball-valve-type mechanism may cause these diverticula to grow larger and larger, and, in fact, of those cases that they reviewed, the majority were type II diverticula, which had resulted from an occult colonic perforation resulting in a chronic fibrotic 'diverticular cavity'. Abdominal pain was the predominant symptom in patients presenting with symptomatic giant colonic diverticula, and this was in many cases associated with a palpable abdominal mass

that could be associated with fever. Plain abdominal X-rays, computed tomography, and barium enema seem to be the most useful diagnostic tests. Although the operative mortality is quoted as being 5%, with most of the data coming from case reports, it is hard to make conclusions about surgery. Due to the high rate of complications, such diverticula should be treated electively. Importantly, the authors report a 2% incidence of carcinoma developing inside these diverticula, which, given their location and poor endoscopic visibility, could be difficult to diagnose at an early stage. With today's minimal access surgery making elective colon resection a less morbid procedure for the patient in terms of recovery time and incisional pain, elective segmental colectomy of the involved segment is the preferable treatment.