

PROCEEDINGS

COMPLICATED COLONIC DIVERTICULOSIS. DIAGNOSTIC AND THERAPEUTIC STRATEGY

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ABSTRACT

Rarely diagnosed before the twentieth century, complicated diverticulosis is the most common surgically treated colon disease after colorectal cancer in Western countries.

A retrospective analysis of 213 patients with colonic diverticulosis was performed. Of them, 94 were male and 109 were female. Their mean age was 60.9 (32–91); 10% were under 50; 33% were aged 50–60; 42% were aged 60–80; and 15% were over 80.

We analyzed demographics, severity of disease, surgical outcomes: time to intervention, recovery passage, feeding, length of hospitalization, complications, reinterventions, and lethality.

Diverticulitis is classified as complicated or uncomplicated based on: CT data, medical history, the severity of clinical symptoms, and diagnostic imaging data.

Keywords: *diverticulitis, complications, surgery, outcome*

INTRODUCTION

Rarely diagnosed before the twentieth century, complicated diverticulosis is the most common surgically treated colon disease after colorectal cancer in Western countries. In 1907 was the first report of resection of complicated diverticulosis by Mayo.

According to literature data, its incidence ranges from 12% to >40% and increases with age:

- ◆ 10% in those younger than 40 years;
- ◆ 50 to 66% in patients aged 70–80.

The mean age of hospitalized patients with acute diverticulosis at first attack is 63 years. In terms of sex (1):

- ◆ Men have higher incidence of bleeding.
- ◆ Women have more episodes of obstruction or strictures.

Large bowel diverticulosis is a heterogeneous disease, which is found in uncomplicated forms in 70–75%, while in 25% of cases it can be complicated by abscess, fistula, peritonitis, bleeding, or intestinal obstruction (2).

The severity of the disease is most often defined by the Hinchey classification (1978), which has undergone numerous modifications (Table 1). The treatment depends mainly on the complications and the severity.

Current trends in surgical strategy focus on:

- ◆ reducing the duration of surgical intervention;
- ◆ reducing postoperative complications;
- ◆ improving the quality of life of patients.

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In an effort to reduce the lethality and morbidity associated with emergency surgical interventions, new approaches have been introduced (3,4):

- ◆ i.v. antibiotics and percutaneous drainage (PCD) for large abscesses;
- ◆ laparoscopic drainage and lavage of the abdominal cavity (LLD).

The lethality is significantly lower compared to the Hartmann procedure (HP).

Percutaneous drainage can be performed under ultrasound (US) or computed tomography (CT) guidance.

Complications (bleeding, visceral perforations, parenchymal organ damage, fistulization, etc.) are found in only 5%, and failed drainage ranges between 15% and 30% (5).

CLASSIFICATIONS

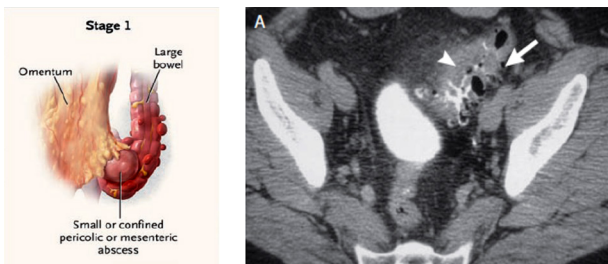


Fig. 1. Stage 1b: limited, small pericolic abscess < 5 cm.

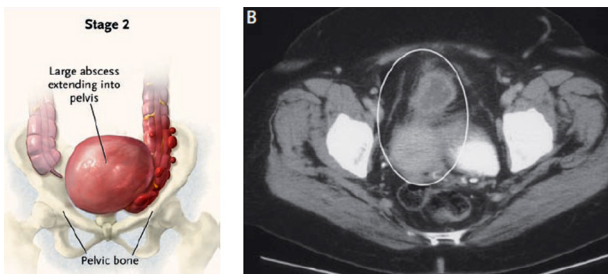


Fig. 2. Stage II.

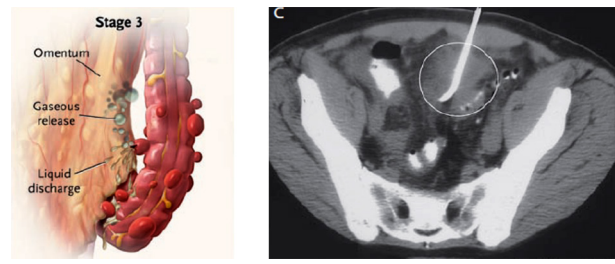


Fig. 3. Stage III.

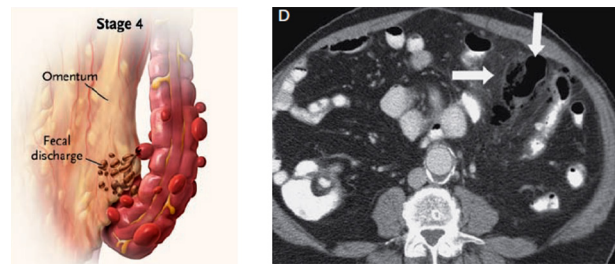


Fig. 4. Stage IV.

Table 1. Classifications of diverticulosis.

Hinchey Classification/Modification of Wasvary	CT Data According to Ambrosetti Criteria
St. 0 – clinically mild/moderate diverticulitis	Diverticula with/without wall thickening
St. IA – limited pericolic inflammation or phlegmon	Thickened colonic wall and inflammatory reaction of pericolic adipose tissue
St. IB – pericolic/mesocolic abscess < 5 cm	Thickened colon wall and inflammatory reaction of pericolic fat + pericolic/mesocolic abscess
St. II – pelvic, distal intra-abdominal abscess	Thickened colon wall and inflammatory reaction of pericolic adipose tissue with pelvic/distal intra-abdominal abscess and/or retroperitoneal abscess
St. III – generalized purulent peritonitis	Extraluminal gas, extraluminal contrast
St. IV – generalized feculent peritonitis	Extraluminal gas, extraluminal contrast

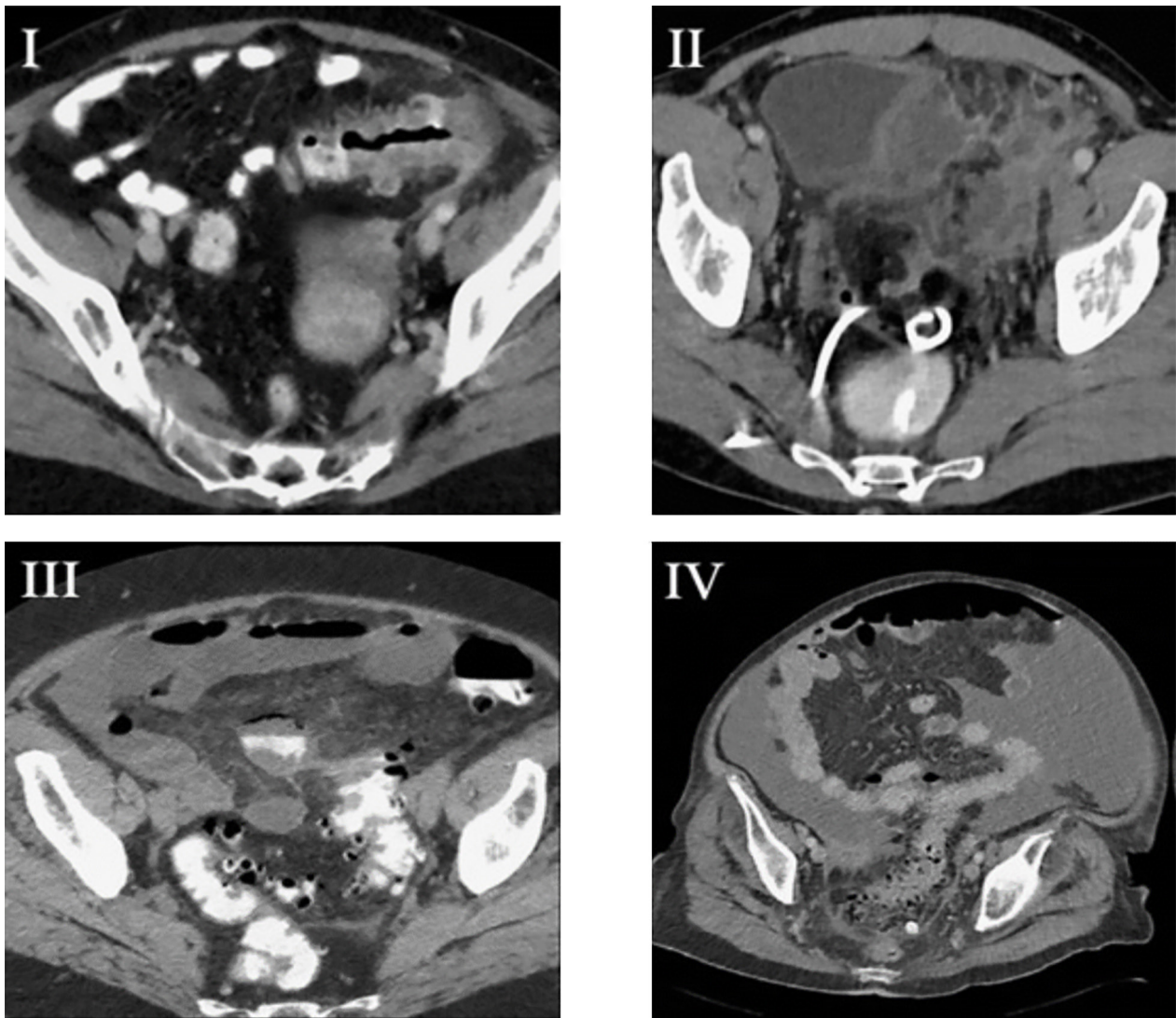


Fig. 5. CT in diverticulosis.

MATERIALS AND METHODS

A retrospective analysis of 213 patients with colonic diverticulosis was performed. Of them, 94 were male and 109 were female. Their mean age was 60.9 (32–91).

- ◆ 10% were under 50;
- ◆ 33% were aged 50–60;
- ◆ 42% were aged 60–80;
- ◆ 15% were over 80.

There was a prevalence of diverticulosis in males under the age of 50 (74% vs. 26%; ratio: 2.9:1)

We have analyzed the following parameters:

- ◆ demographics;

- ◆ severity of disease;
- ◆ surgical outcomes: time to intervention, passage recovery, feeding, length of hospitalization, complications, reinterventions, and lethality.

According to the anatomical localization, diverticulosis was found:

- ◆ primarily in the colon descendens and/or colon sigmoideum: 89%;
- ◆ less frequently in the cecum and colon ascendens: 11%.

In the cecum and ascending colon, it was at an earlier age.

Allocation according to severity:

- ◆ Hinchey stage 0, IA and IB—145 patients;

- ◆ H, II, III and IV, or with complications (stenoses, fistulas)—68 patients.

DIVERTICULITIS

- ◆ the most common complication;
- ◆ detected in 15–25%;
- ◆ abdominal pain—for several days, before temperature rise;
- ◆ fever with chills in 57–100%;
- ◆ only 16–18% of patients have symptomatology for less than 24 hours;
- ◆ right-sided diverticulitis is characterized by right lower abdominal quadrant pain;
- ◆ prior pain episodes of the same nature in ¼ of patients (remitting disease);
- ◆ associated symptoms:
 - ◆ nausea/vomiting—20–60%;
 - ◆ constipation—over 50%;
 - ◆ diarrhea—25–35%;
 - ◆ urinary symptoms—10–15%.

ABSCCESS

- ◆ found in 15–18%;
- ◆ PCD followed by elective surgery can be performed in 60–80% of the patients;
- ◆ PCD: US- or CT-guided;
- ◆ drainage is left until secretion reduction < 10 mL/24 hrs;
- ◆ transcatheter lavage and control of:
 - ◆ daily flow rate;
 - ◆ communications /fistulas/ between abscess and intestinal tract, bladder.
- ◆ Small abscesses (< 2 cm) can be treated with antibiotics only. These patients usually do not require surgical interventions.
- ◆ PCD failure rates range between 15% and 30% of cases;
- ◆ incidence of re-drainage reaches 40%, higher in size > 5 cm;
- ◆ the advantages of PCD are:
 - ◆ allows conservative treatment of the septic condition;
 - ◆ reduces the risk of emergency surgical intervention;
 - ◆ allows elective resection with primary anastomosis.

PERITONITIS

- ◆ brief resuscitation;
- ◆ antibiotics;
- ◆ emergency surgical intervention;
- ◆ lethality depends on time of diagnosis and severity:
 - ◆ 6% for purulent peritonitis
 - ◆ up to 35% for feculent peritonitis

FISTULAS

- ◆ detected in many patients (up to 65–75% of cases require surgery);
- ◆ main types:
 - ◆ colovesical fistula—60–65%;
 - ◆ colovaginal fistula—25–30%;
 - ◆ colonic, colouterine—10–12%.



Fig. 6. Colovesical fistula.

TREATMENT OF FISTULAS

- ◆ surgery is the cornerstone of radical treatment;
- ◆ resection of the affected colon (look for the beginning/origin of the fistula!);

- ◇ elimination of the fistula if possible;
- ◇ suture (closure) of large defects;
- ◇ catheter is left in for 7–10 days.

BLEEDING

- ◇ common cause of active hematochezia - 30-45% of patients;
- ◇ 8–15% of PD patients may have bleeding;
- ◇ 70–75%—bleeding in PD stops without the need for intervention;
- ◇ risk of recurrence—12–35% (one third);
- ◇ after a second episode of bleeding, the risk of subsequent bleeding—21–50%;
- ◇ the right colon is the source of diverticular bleeding in 50-90%;
- ◇ colonoscopy after quick and brief preparation:
 - ◆ localize the site;
 - ◆ offers options for therapeutic intervention;
- ◇ angiography:
 - ◆ acute localization;
 - ◆ 30–47% sensitivity;
 - ◆ 100% specificity.
- ◇ therapeutic procedures: embolization, vasopressin (but with caution—12 to 20% risk of intestinal ischemia and infarction).

SURGERY

- ◇ segmental resection;
- ◇ if the site is accurately localized;
- ◇ risk of recurrence—2–14%;
- ◇ subtotal colectomy;
- ◇ bleeding is rare;
- ◇ high incidence of complications and lethality (11–33%).

In patients with Hinchey stage III and IV in previous years, the main surgical intervention was Hartmann surgery.

In the last 5 years, 32 patients (stage II and III) have undergone successful PCD followed by elective surgery. The distribution is as follows:

- ◇ primary anastomosis in 24;
- ◇ Hartmann in 8.

The mean duration of hospitalization was 7–9 days with only 7 patients spending over 10 days in the hospital. There was lethal outcome in 3 patients with peritonitis and severe comorbidities.

The choice of the most appropriate methodology for the patient depends on:

- ◇ severity/stage of disease;
- ◇ condition of the intestinal segment with regard to possible anastomosis (inflammatory changes, vascularization);
- ◇ clinical condition of the patient, comorbidities;
- ◇ experience of the surgical team.

Surgical intervention was performed in 68 patients (31.9%). The indications were:

- ◇ perforation—6.3%;
- ◇ intra-abdominal abscess—5.7%;
- ◇ ileus (strictures/stenosis)—5.2%;
- ◇ fistulas—2.1%;
- ◇ recurrent diverticulitis—12.6%.

Resection + primary anastomosis is preferred (but should be used in selected patients!) (6):

- ◇ much less postoperative complications compared to HR;
- ◇ reduces postoperative lethality significantly;
- ◇ reduces length of hospital stay;
- ◇ avoids the need for a second operation to restore the passage, which also carries operative risks (7,8).

LLD is a modern minimally invasive approach consisting of (9):

- ◇ aspiration of purulent fluid from the abdominal cavity;
- ◇ debridement of adhesions between the anterior abdominal wall and the inflamed colon;
- ◇ abscessotomy and extensive lavage followed by drains;
- ◇ postoperative i.v. antibiotic therapy.

With appropriate equipment and an experienced team, this approach is appropriate in Hinchey stage III, IV, and high-risk patients. Its adequate application in selected patients results in reduction of lethality and morbidity below 5%.

The advantages of LLD are (10,11,12):

- ◇ reduces the risk of fatal resection in the acute stage;
- ◇ reduces clinical symptomatology;
- ◇ avoids the need for stoma;
- ◇ rapid improvement of clinical symptomatology and shortening of hospital stay;

- ◆ allows subsequent elective surgical intervention;
- ◆ LLD efficiency—95.7%, complication rate—10.4%, and lethality—1.7%.

CONCLUSION

Diverticulitis is classified as complicated or uncomplicated based on:

- ◆ CT data;
- ◆ medical history;
- ◆ the severity of clinical symptoms;
- ◆ diagnostic imaging data.

This classification also determines the therapeutic strategy:

- ◆ Outpatient treatment is recommended in afebrile, clinically stable patients with uncomplicated diverticulosis.
- ◆ In patients with uncomplicated DL, antibiotics have no proven advantage in reducing symptom duration, preventing recurrence, and should be used strictly selectively (13).
- ◆ Colonoscopy is recommended in all patients with complicated diverticula 6 weeks after CT diagnosis of inflammation and in patients with uncomplicated BD, recurrent symptomatology, and inconclusive imaging findings.
- ◆ In complicated DB, non-operative treatment, including parenteral nutrition and antibiotics, is indicated for small abscesses (14).
- ◆ Those larger than 3–5 cm should be drained percutaneously.
- ◆ Patients with peritonitis and sepsis should receive brief resuscitation, i.v. antibiotic therapy and undergo emergency surgical intervention.

Indications for surgical intervention:

- ◆ large intra-abdominal abscess
- ◆ generalized peritonitis;
- ◆ presence of visceral perforation;
- ◆ failure of non-operative treatment (after the third day, progressive sepsis).

Operative interventions:

- ◆ open-access:
 - ◆ two-stage operation—Hartmann;
 - ◆ one-moment resection and primary anastomosis (with or without ileostomy).
- ◆ laparoscopic interventions:

- ◆ most authors recommend only in Hinchey stage I and II and in the presence of:
 - ◇ appropriate equipment;
 - ◇ experienced surgical team.

REFERENCES

1. Nguyen GC, Sam J, Anand N. Epidemiological trends and geographic variation in hospital admissions for diverticulitis in the United States. *World J Gastroenterol.* 2011;17(12):1600-5. doi: 10.3748/wjg.v17.i12.1600.
2. Parks TG. Natural history of diverticular disease of the colon. A review of 521 cases. *Br Med J.* 1969;4(5684):639-42. doi: 10.1136/bmj.4.5684.639.
3. Hinchey EJ, Schaal PG, Richards GK. Treatment of perforated diverticular disease of the colon. *Adv Surg.* 1978;12:85-109.
4. Wasvary H, Turfah F, Kadro O, Beauregard W. Same hospitalization resection for acute diverticulitis. *Am Surg.* 1999;65(7):632-5; discussion 636.
5. Jacobs DO. Clinical practice. Diverticulitis. *N Engl J Med.* 2007;357(20):2057-66. doi: 10.1056/NEJMc073228.
6. Garber A, Hyman N, Osler T. Complications of Hartmann takedown in a decade of preferred primary anastomosis. *Am J Surg.* 2014;207(1):60-4. doi: 10.1016/j.amjsurg.2013.05.006.
7. Gawlick U, Nirula R. Resection and primary anastomosis with proximal diversion instead of Hartmann's: evolving the management of diverticulitis using NSQIP data. *J Trauma Acute Care Surg.* 2012;72(4):807-14; quiz 1124. doi: 10.1097/TA.0b013e31824ef90b.
8. Murray JJ, Schoetz DJ Jr, Collier JA, Roberts PL, Veidenheimer MC. Intraoperative colonic lavage and primary anastomosis in nonelective colon resection. *Dis Colon Rectum.* 1991;34(7):527-31. doi: 10.1007/BF02049889.
9. Franklin ME Jr, Portillo G, Treviño JM, Gonzalez JJ, Glass JL. Long-term experience with the laparoscopic approach to perforated diverticulitis plus generalized peritonitis. *World J Surg.* 2008;32(7):1507-11. doi: 10.1007/s00268-007-9463-y.
10. Afshar S, Kurer MA. Laparoscopic peritoneal lavage for perforated sigmoid diverticulitis. *Colorectal Dis.* 2012;14(2):135-42. doi: 10.1111/j.1463-1318.2011.02606.x.
11. Myers E, Hurley M, O'Sullivan GC, Kavanagh D, Wilson I, Winter DC. Laparoscopic peritoneal la-

- vage for generalized peritonitis due to perforated diverticulitis. *Br J Surg.* 2008 Jan;95(1):97-101. doi: 10.1002/bjs.6024.
12. Rogers AC, Collins D, O'Sullivan GC, Winter DC. Laparoscopic lavage for perforated diverticulitis: a population analysis. *Dis Colon Rectum.* 2012 Sep;55(9):932-8. doi: 10.1097/DCR.0b013e31826178d0.
 13. Stewart J, Diamant RH, Brennan TG. Management of obstructing lesions of the left colon by resection, on-table lavage, and primary anastomosis. *Surgery.* 1993;114(3):502-5.
 14. Klarenbeek BR, de Korte N, van der Peet DL, Cuesta MA. Review of current classifications for diverticular disease and a translation into clinical practice. *Int J Colorectal Dis.* 2012;27(2):207-14. doi: 10.1007/s00384-011-1314-5.