

## CLINICAL PRESENTATION AND DIAGNOSIS OF COLONIC PERFORATIVE PERITONITIS

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### ABSTRACT

**INTRODUCTION:** Colonic perforative peritonitis (CPP) is a life-threatening surgical emergency where timely diagnosis is of ultimate impact on outcome.

**MATERIALS AND METHODS:** For a five-year period (2014 – 2018), 62 patients with CPP were treated in First Clinic of Surgery in St. George University Hospital - Plovdiv. Males were 48 (77.42%) and females 14 (22.58%), with a ratio of 3.4:1.

Patients' age ranged from 14 to 92 years, with an average age of 71 years  $\pm$ 2.4.

Colonic perforative peritonitis was more common in patients over 80 years of age (n=21; 33.87%). The main causes of CPP were: perforated colon diverticulitis (n=19), perforated colon cancer (n=18), perforation in incarceration (n=9), sigmoid volvulus (n=6), mesenteric ischemia (n=5) and miscellaneous (n=5). There were 12 patients with local peritonitis (19.36%), with diffuse peritonitis - 21 patients (33.87%), and with total peritonitis - 29 patients (46.77%). The following surgical procedures were performed: Hartmann's procedure - 21, right hemicolectomy - 13, left hemicolectomy - 9, right hemicolectomy with ileostomy - 8, diverticulectomy - 7, colon excision and suture - 4.

**RESULTS:** Twenty-four patients (38.71%) were with subacute perforation type (38.71%), while 38 (61.29%) were with acute type. Atypical clinical presentation with vague symptoms was found in 7 patients (11.29%). Early clinical symptoms in subacute and atypical forms of CPP were nonspecific. According to the elapsed time from the beginning of the perforation to the operation, the patients were divided as follows: up to the 6th hour - 24 (38.71%), from the 6th to the 12th hour - 19 (30.65%), from the 12th to the 24th hour - 12 (19.35%), and over 24 hours - 7 (11.29%). Of the total 62 operated patients with CPP, 49 patients (79.03%) survived. Postoperative mortality was 20.97% (n=13) with an average age of 78.9 years.

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**CONCLUSION:** Early diagnosis of colonic perforation can be difficult, due to omissions and inaccuracies on admission and follow-up. The correct and timely diagnosis of CPP is crucial for prompt surgery, lower morbidity and mortality and better outcome.

**Keywords:** perforative peritonitis, diagnosis, clinical signs

## INTRODUCTION

Colonic perforative peritonitis (CPP) is one of the serious and problematic surgical emergencies due to variety of clinical manifestations, difficult diagnosis and high lethality. Various etiopathogenetic factors can cause perforation of the colon - inflammatory, oncological, vascular, obstruction, foreign bodies, iatrogenic interventions and others. A major point is the damage and lesions of the large bowel wall, with a triggering moment - increased intraluminal pressure.

In most cases, due to pathological changes, bacterial translocation initially occurs near the intestinal wall, which subsequently undergoes degenerative changes in the mucosa and muscle layer. When serosa is affected, a peritoneal exudate effusion is formed and with protracted evolution and good immune response local adhesions can form. In these cases, perforation leads to an abdominal abscess, which can spread to the peritoneal cavity in several days (1). This is a more common subacute form of perforation, but due to the available adhesions, the clinical picture is nonspecific, with periods of exacerbation and recovery. In the acute form, the free perforation occurs suddenly and rapidly in the absence of previous complaints, resulting in diffuse or total peritonitis.

The presence of these variants in colonic perforation, respectively, determine both different clinical symptom complexes. Despite the advances in coloproctology and standardization in the selection of effective operating procedures in CPP, emergency interventions are a major challenge for surgeons due to the frequent complications and fatal outcome (2,3).

## AIM

The aim of this article is to analyze and investigate operated patients with CPP and their clinical symptoms, diagnosis and surgical treatment.

## MATERIALS AND METHODS

A retrospective analysis was performed for a 5-year period - 2014 - 2018, in 62 patients, diagnosed and operated for CPP at the First Surgery Clinic of St. George University Hospital - Plovdiv. Males were 48 (77.42%) and females 14 (22.58%), with a ratio of 3.4:1. Patients' age ranged from 14 to 92 years, with an average of 71 years  $\pm$  2.4. According to the elapsed

time from the beginning of the perforation to the operation, the patients were divided as follows: up to the 6th hour - 24 (38.71%), from the 6th to the 12th hour - 19 (30.65%), from the 12th to the 24th hour - 12 (19.35%) and over 24 hours - 7 (11.29%).

Fifty-one patients (82.26%) were with comorbid conditions, such as arterial hypertension, ischemic heart disease, hearth rhythm and conduct disorders, cerebrovascular disease, diabetes, COPD among the most common accompanying diseases. The main etiological factors leading to CPP were:

*Table 1. Main Causes of CPP*

Main Causes of Colonic Perforative Peritonitis (CPP)	n	%
Perforated colonic diverticulitis	19	30.64
Perforated colon cancer	18	29.03
Colonic perforation due to incarceration	9	14.52
Sigmoid volvulus with perforation	6	9.68
Mesenteric thrombosis with perforation	5	8.06
Perforated ulcer due to Crohn's disease	3	4.84
Perforation of the colon from foreign bodies	2	3.23
<b>Total</b>	<b>62</b>	<b>100</b>

Data for local peritonitis were found in 12 patients (19.36%), with diffuse - in 21 (33.87%) and total - in 29 (46.77%). The following types of surgery were performed for colonic perforative peritonitis:

*Table 2. Types of operations in patients with colonic perforative peritonitis*

Types of Surgical Procedures	n %
Hartmann's procedure	21 33.87
Right hemicolectomy	13 20.97
Left hemicolectomy	9 14.52
Right hemicolectomy with ileostomy	8 12.90
Diverticulectomy	7 11.29
Excision and suture of the colon	4 6.45
<b>Total</b>	<b>100</b>

Cancer perforation was found in the left colon in 12 patients (19.35%) and in the right colon - in 6 patients (9.68%). It should be noted that 4 cases with advanced tumor obstruction and diastatic perforation of the caecum were not included in this study. In 9 patients (14.52%), with intoxication and poor general condition, a short 1-2-hour preoperative resuscitation for correction of hemodynamic and metabolic disorders was performed. In all patients, complete clinical and paraclinical examinations were performed, including ultrasound, abdominal radiography and contrast CT scan of the abdomen with contrast. In all patients nasogastric tube and urethral catheter were placed preoperatively, and complex intensive treatment was performed with an anesthesiologist-resuscitator, including antibacterial, resuscitation and detoxification therapy.

## RESULTS AND DISCUSSION

In the analysis of our patients we found that with subacute perforation type were 24 patients (38.71%) and with acute type were 38 (61.29%). All of them were admitted urgently to our clinic with the following admission diagnosis: subileus - 18 (29.03%), acute appendicitis - 12 (19.36%), perforation of duodenal ulcer - 10 (16.13%), incarcerated ventral hernia - 9 (14.52%), colon cancer - 4 (6.45%), mesenteric thrombosis - 3 (4.84%), acute cholecystitis - 3 (4.84%) and sigmoid volvulus - 3 (4.84%). Atypical clinical presentation with uncharacteristic symptomatology in the retrospective analysis was found in 7 patients (11.29%). Most often, subacute and atypical forms of CPP have a characteristic nonspecificity of their early clinical symptoms. In subacute form, due to the delay in the progression of complaints, there is a local pressure, persistent dull pain, nausea, fatigue, subfebrility with the onset of intoxication syndrome. In 9 healthy patients (14.52%), perforation was the first clinical symptom to be established.

CPP requires a timely diagnosis, followed by immediate surgical treatment (4,5). Diagnosis of colonic perforation is based on clinical, laboratory and instrumental tests, namely expressed leukocytosis, ultrasound, radiographic and CT data for free gas or fluid are detected in the peritoneal cavity, with evidence of peritoneal irritation and intestinal paresis. Preoperative diagnosis in acute type of perforation is easier due to more obvious symptoms, while and in

the subacute type the diagnosis is made on the basis of accurate history and paraclinical studies (6).

Acute diverticulitis usually initiates after stercolith or foreign body obstruction, as well as in added intestinal infection. The evolution of pathological progression goes from acute paracolic infiltrate or perforative diverticulitis to paracolic abscess and perforative peritonitis (7). In the absence of treatment, the abscess turns into purulent peritonitis and then into fecal peritonitis. There have been a number of changes in the treatment of complicated bowel diverticulitis in recent years, with conservative behavior currently prevailing (8,9). Depending on the volume and type of inflammatory changes, the following is undertaken:

- ◆ Conservative tactics - adequate antibacterial and anti-inflammatory therapy;
- ◆ Minimally invasive laparoscopic intervention for abscess drainage with subsequent local lavage (in small pericolic abscess) (10,11);
- ◆ Aggressive (surgical) tactics - when clinical data shows progression of the inflammatory process and the development of diffuse peritonitis (12).

The patient is actively monitored daily with accurate assessment of the inflammatory process and clinical symptoms. Using contrast CT, the presence of colonic diverticulum, their location, number and size can be determined, as well as the presence of paracolic inflammatory infiltrate. Free fluid can also be found in the pelvis and the presence of gas in the upper abdominal cavity. Abdominal ultrasound also determines the presence of free fluid in the peritoneal cavity. In clinical worsening (fever, leukocytosis, evidence of peritoneal irritation and free fluid), a laparoscopic or open surgical approach is required.

The main diagnostic tasks in case of diverticulitis complications are:

- ◆ Identification of diverticulum as the source of inflammation - presence of intestinal lesion, thickening of surrounding tissues, image data for free gas and/or free fluid;
- ◆ Defining the type and stage of acute inflammation - initial diverticulitis, paracolic abscess, purulent or fecal peritonitis;

- ◆ Assessment of the inflammatory process progression;
- ◆ Signs of intoxication syndrome and abdominal sepsis.

When the cause of CPP is oncological, the stage of the disease, the presence of metastases and accompanying diseases are taken into account (13). Perforation in colon cancer often occurs acutely, and the combination with obstruction severely worsens the clinical prognosis in the patients (14). In addition to the urgency of surgery, oncologic radicality in surgical treatment is also important, requiring complete removal of the tumor and complete lymphatic dissection. Only when specific risk for the patients' life is present, the oncological radicality can be put under question and possibly delayed to nearest suitable time to undergo a radical multistage operation (15).

The surgical treatment of CPP is urgent, conditioned by the underlying symptoms, the prevalence of PP, the elapsed time after perforation, the presence of abdominal sepsis, multiple organ failure, concomitant diseases, and patient's age. Depending on these factors, a decision for single-stage or multistage surgery is taken. The correct and adequate choice of surgical tactics in CPP is fundamental to the outcome of the disease (16). Patients with CPP have a large diversity of clinical presentation and should always bear in mind that a non-standard intraoperative intervention is possible (17,18,19). Resection with primary anastomosis was applied in 30 patients (48.39%) in the early periods after the onset of perforation, in good general condition and without comorbidity.

Depending on the type, location and extent of peritoneal inflammation, surgery may result in common abdominal wall closure and drainage or with an open abdomen (OA). In severe and advanced purulent-feculent CPP, OA with either programmed or on-demand re-laparotomy strategy is advocated. It has been proved to be a reliable and effective method in abdominal sepsis, as well as in preventing the onset of compartment syndrome (20).

The choice for conventional closure or OA strategy depends on the overall assessment of the intraoperative finding, the clinical condition, the age of the patient and the surgical team expertise.

Of the total 62 operated patients with CPP, 49 (79.03%) survived.

In the postoperative period, the following complications were observed: abdominal sepsis in 8 patients, multiple organ failure in 7 patients, formation of inter-intestinal abscesses in 6 patients, evidence of adhesive bowel obstruction in 4 patients and others.

The overall mortality rate was 20.97% (n=13), with an average age of 78.9. The extent of peritoneal inflammation had a proportional impact on the lethality, resulting in: 1 deceased patient with local peritonitis, 5 - with diffuse form, and 7 - with total peritonitis, respectively.

## CONCLUSION

Early diagnosis of colonic perforation can be difficult, due to omissions and inaccuracies on admission and follow-up. The correct and timely diagnosis of CPP is crucial for prompt surgery, lower morbidity and mortality, and better outcome. Timely and adequate treatment requires accurate infection source control as the main goal of the surgical operation. Alongside the liquidation of consequences of infection in the abdominal cavity, antibiotic treatment prevents severe complications like severe sepsis and multiple organ failure.

A leading clinical marker in an adequate and effective surgical approach is the gradual improvement of the condition, the overcoming of fever, the occurrence of flatus and defecation. In case of untimely and inadequate treatment of CPP, the prognosis and outcome of the disease are often very unfavorable.

The rational tactics of CPP should comply with the principles of surgical expediency in observing the diagnostic and therapeutic algorithms for the various forms of this disease. Surgical treatment in these cases has an individual approach, in accordance with the comprehensive and complex assessment of the condition of each patient.

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