

Surgery of the colon; the impact of colostomy and postoperative complications on patients' quality of life

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ABSTRACT



Introduction. This study aims to evaluate the impact of stoma formation on the quality of life of patients undergoing colonic surgery, considering both emergency and elective procedures. Several factors (demographic data, Charlson comorbidity score, type of surgical intervention, duration of hospitalization, postoperative outcomes and complications, etc.) were analyzed to understand their influence on patients' well-being. **Materials and Methods.** A retrospective analysis was performed on patients who underwent colorectal surgery that required stoma formation. A total of 270 patients were included in the study, with 69.25% undergoing emergency surgery and 30.74% undergoing elective procedures. **Results.** The Charlson comorbidity score was significantly higher in the emergency surgery group compared to the elective group, 8.51 vs 7.67, respectively ($p < 0.05$). Patients who underwent emergency surgery experienced more postoperative (including stoma-related) complications, leading to a lower quality of life score compared to those undergoing elective procedures. **Conclusions.** Especially in emergency cases, colostomy involves difficulties related to patient compliance and quality of life, a fact supported by higher scores regarding comorbidities and postoperative complications. Thus, presenting patients at early stages of disease, customized surgical techniques, and appropriate preoperative counseling can help improve both patient outcomes and overall well-being.

Category: Original Research Paper

Received: January 27, 2024

Accepted: February 16, 2024

Published: April 25, 2024

Keywords:

emergency surgery, colon surgery, colostomy, postoperative complications, patients' quality of life

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Introduction

Colostomy is generally the result of surgical interventions performed for (benign or malignant) pathologies of the colon or rectum. These pathologies are usually represented by tumoral processes, intestinal obstruction, congenital defects, ischemic pathology of the large intestine, postoperative fistulas, as well as digestive inflammatory diseases complicated by strictures or fistulas [1-3]. This diversion of the digestive tract is often transient, with the goal of allowing the affected segment to heal, followed by subsequent surgery to restore digestive continuity. Unfortunately, in some conditions such as congenital anomalies, lower rectal pathology, or when an

extended part of the colon is affected, such a therapeutic approach in the form of a stoma represents a definitive therapeutic solution [4,5]. With the formation of the stoma, changes occur in the patient's perception of his body image, negatively influencing self-esteem (the presence of the stoma, as well as the elimination of digestive or urinary waste). In addition, the ostomy bag can lead to local skin complications, associated with unusual noises or smells, all of which compromise the patient's social, sexual and even self-image/ identity [6-8].

The quality of life is influenced by the general state of health of the patient from multiple (physical, psychological, social and spiritual) perspectives [9]. However, most of the time patients with digestive ostomies

go through experiences of changing quality of life over time, as they adapt to new living and working conditions [10,11]. Other factors that may hinder rapid adaptation include the onset of postoperative complications, prolonged immobilization, lack of patient and caregiver education regarding stoma care [12-14].

This investigation is a 5-year retrospective study that analyzes the impact of stoma formation on patients' quality of life. The factors that influence the well-being of the patients are analyzed, as well as the factors that determine the increase in the mortality rate in the colonic pathology associated with the stoma (represented most frequently by complications, comorbidities - evaluated by the Charlson comorbidity index, the specifics of the therapeutic decision or unexpected decisions of the patients regarding the continuation medical care, etc.).

Materials and Methods

Patients included in this study were admitted and operated (both in emergency and elective) in the General Surgery Department of the St. Pantelimon Emergency Clinical Hospital Bucharest, between January 15, 2019 and January 15, 2024. Following the initial examination by the surgeon, in cases where the clinical examination suspected colorectal disease, patients who presented to the emergency department with a high suspicion of acute abdomen underwent serological and imaging investigations (abdominal ultrasound, computed tomography) according to internal protocols, in order to support paraclinical the initial presumptive diagnosis.

Subsequently, the patients were admitted to the department of general surgery, where the Charlson comorbidity score was calculated and specific medical treatment was initiated to correct or combat the existing disorders. They were monitored for 24 hours to follow the dynamics of the drug treatment and determine the degree of urgency, or were even transferred to the operating room in cases of acute abdomen during the first 6 hours after admission. For cases of patients with hemodynamic instability or active bleeding resuscitation was performed, being subsequently sent to the operating room. The surgical approach for these patients was through a classic open procedure in the acute surgical abdomen, thus completed intraoperatively the cause of peritonitis, hemorrhage or occlusion (eventually identifying on inspection cavities other possible associated pathologies or the presence of abdominal metastases). The interventions were completed by creating a stoma in the large or small intestine, with or without resection of the digestive segment. A similar management was applied to patients admitted to other departments of the hospital with suspected (post-admission) acute abdomen.

As for the patients who presented to the general surgery department for elective surgery, they were mainly

represented by patients with uncomplicated malignant pathology, confirmed paraclinical for staging by colonoscopy (which allowed biopsy of the lesions), computed tomography (chest, abdomen and pelvis), as well as the collection of serological markers CA.125, CEA and CA19.9. For patients with rectal tumors, they were treated after local radiotherapy and after evaluation by a multidisciplinary committee consisting of an oncologist, surgeon, pathologist and medical psychotherapist.

Postoperatively, patients were transferred to the intensive care unit, where they were evaluated by a mixed team of surgeon and anesthetist for postoperative follow-up (identifying possible local or general complications), even if the need for reoperation was not necessarily suspected. After postoperative stabilization, the patients were transferred to the general surgery department where the treatment initiated in the intensive care unit was continued. Patients and their caregivers were trained in stoma management before discharge, being discharged when their general and local condition was satisfactory.

Twenty-one days after discharge, the patients were reevaluated, monitoring their general condition, the appearance of the wound and the stoma. Patients were also assessed by questionnaires regarding the impact of the surgery and the ostomy on the quality of life, which was assessed according to the quality-of-life score in good (score of 20-39), adequate (40-59) and high (60-80).

For patients who died within the first 21 days after surgery, data related to clinical presentation, associated pathology, postoperative complications, interval from surgery to death, and cause of death were analyzed.

Inclusion criteria for this study consisted of patients over 18 years of age, admitted in both emergency and elective cases to the general surgery department and who underwent surgery for primary colonic or rectal pathology (confirmed by endoscopic examination, intraoperative, computed tomography and histopathological exam), with the formation of a permanent or temporary stoma for the elimination of intestinal contents. The exclusion criteria were inoperable cases or non-neoplastic diseases of the colon (endometriosis, peritoneal carcinomatosis secondary to another digestive tumor, invasion of the colon by other neighboring cancers), as well as intraoperative death, the patient's inability to complete the questionnaire (refusal, physical or intellectual incapacity), reduced patient compliance at follow-up for 21 days after discharge or patient non-agreement to be enrolled in the study. All patients received informed consent forms to participate in the study.

Results

Following the application of inclusion and exclusion criteria, 270 patients were identified, including 51.11% male and 48.89% female, 173 of the patients living in urban areas,

and the rest in rural areas. The age range of patients ranged from 27 to 95 years, with a mean age of 69.61 years. The mode of presentation of the patients in the study cohort was in 187 cases as emergencies, the rest accessing specialized treatment in a scheduled regime. Patients who presented as emergencies were diagnosed primarily through computed tomography in 76.47% of cases, while the remainder were diagnosed with a form of acute abdomen through plain abdominal radiography, confirmed during intraoperative examination. The pathology that brought patients to our department in a scheduled manner was the presence of a tumor formation located in the colon or rectum at various stages. The presence of distant metastases was evident in 10.78% of enrolled cases. The Charlson evaluation score among the patients included in the study ranged from 1 to 18 points, with a mean of 8.25 points. Regarding the underlying pathology, most patients who presented as emergencies for surgical intervention had a clinical picture of intestinal obstruction in a proportion of 62.56%, with various etiologies, among which neoplastic pathology had the highest proportion. 29.94% of patients presented with symptoms of peritonitis, while 7.48% presented to the emergency room with lower gastrointestinal bleeding (Figure 1).

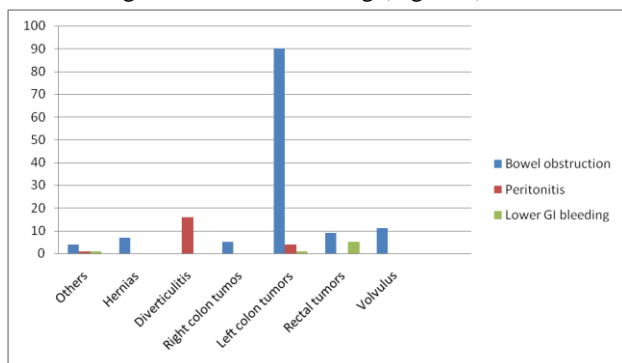


Figure 1. Etiology of acute abdomen

The type of surgical intervention performed on the patients in the study varied. The most common procedure was segmental colectomy, performed in 27.03% of cases, while pelvic exenteration was the rarest, performed on only one patient. Data regarding the types of surgical interventions performed are represented in Figure 2.

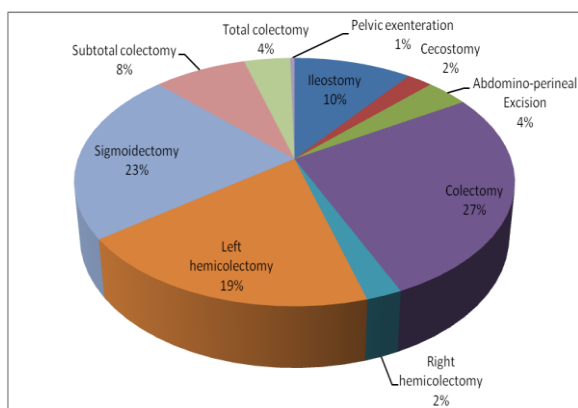


Figure 2. Surgical procedures performed in the study

The postoperative follow-up of patients showed high mortality rates within the first 21 days, exceeding 30%. The majority of patients died due to severe sepsis secondary to local or distant colonic perforation, cardiac complications, as well as Mendelson syndrome.

Regarding the deaths of individuals who presented as emergencies, in 47.70% of cases, death occurred within the first 72 hours, in 12.7% of cases between 72 and 120 hours, and in 39.44% after 120 hours. The mean comorbidity score for the first group of patients was 9.82 points, for the second group was 8.9 points, and for those who died after 120 hours was 9.74 points.

At 21 days post-discharge, 153 patients were evaluated regarding their quality of life, obtaining scores ranging from 23 to 72, with an average of 44.53 points. Regarding postoperative complications observed in the study cohort at a rate of 43.13%, complications related to stoma appearance were most often observed in 66 patients, followed by wound-related complications in 16.66% of cases, as well as pressure ulcers or the formation of intraperitoneal abscesses without the need for reintervention. The postoperative complications after colorectal surgery observed in this study are summarized and presented in the Table 1.

Complications	Emergency	Elective	Total
Related to ostomy	34 (51.51%)	10 (15.15%)	44 (66.6%)
Skin Complications	15 (22.72%)	4 (6.06%)	19 (28.78%)
Ischemia	7 (10.60%)	2 (3.03%)	9 (13.63%)
Retraction	6 (9.09%)	0	6 (9.09%)
Prolapse	4 (6.06%)	2 (3.03%)	6 (9.09%)
Stenosis	2 (3.03%)	2 (3.03%)	4 (6.06%)
Wound complications	13 (19.69%)	4 (6.06%)	17 (25.75%)
Wound infections	8 (12.12%)	3 (4.54%)	11 (16.66%)
Dehiscence	5 (7.57%)	1 (1.51%)	6 (9.09%)
Other complications	4 (6.06%)	1 (1.51%)	5 (7.57%)
Pressure ulcer	2 (3.03%)	1 (1.51%)	3 (4.45%)
Intraperitoneal abscess	1 (1.51%)	0	1 (1.51%)
Small bowel obstruction	1 (1.51%)	0	1 (1.51%)
Total	51 (72.27%)	15 (22.72%)	66 (100%)

Discussions

The formation of a stoma with the role of allowing the elimination of defecation products is an intervention (temporary or permanent) that is indicated especially in complicated neoplastic pathologies, which can lead to a decrease in the quality of life, but without which some of the operative procedures would not be possible [15,16]. In the present study, more than 69.25% of patients referred to our department for emergency surgery. Such an intervention completed with a stoma, involves a greater risk of chronic pain, sleep disturbances, decreased mobility, social integration and, last but not least, changes in self-esteem (especially affecting women under 60 with a good health and without a history of chronic pain) [17-19]. The psychological impact of emergency surgery is often more pronounced in females, as noted by Hoh and Watters [20]. In our cohort, 48.89% of subjects were women with a mean age of over 60 years. Among female respondents, we observed a decrease of up to 14.51% in the scores given to the questions in the forms, especially those related to social interaction, sex life, and other potential disadvantages of a stoma.

Electively performed procedures benefited from psychotherapeutic counseling (carefully coordinated in patients with neoplasms), which led to a better preoperative acceptance of the specific conditions of the stoma. Thus, compliance and the degree of patient care increased, which led to a better quality of life, especially when information measures regarding the management of the postoperative stoma were implemented [21-23]. Thus, patients who underwent elective surgery had scores 12.87%, higher than those operated on an emergency basis. Such data delineated the group of patients and increased quality of life (largely comprising those treated under scheduled conditions). In addition, the timing of surgical intervention was also directly correlated with the psychological impact and well-being of patients, with a $p < 0.0001$. The lowest score was obtained by a 56-year-old woman (with psychiatric history for which she was treated with antidepressants), undergoing emergency surgery for a perforated rectosigmoid tumor. In contrast, the highest score was obtained by a 55-year-old man with a tumor with a relatively similar location, but who benefited from psychotherapeutic counseling in the preoperative period.

The Charlson comorbidity index is a useful prognostic factor in determining short-term prognosis as well as 10-year mortality. It may be useful in evaluating patients with colon cancer for the risk of developing local complications, such as anastomotic fistula [24,25]. In the present study, the comorbidity index of emergency operated patients had an average value of 8.51, compared to 7.67 for electively operated patients. The highest values were observed especially in patients who died within 21 days of surgery, with a mean Charlson score of 9.51 points.

In the therapeutic arsenal of colorectal pathologies (malignant and benign) there are options for both local and extensive segmental resections (depending on the degree of damage to the digestive tube), some cases even requiring the total removal of the colon. After the dissection and extirpation of the segment of the large colon, the restoration of the excretion of the digestive tract can be achieved either by anastomosis or by the formation of a stoma [26-28].

Regarding the quality of life of patients with colonic pathology who underwent anastomosis, it was significantly better compared to the group of patients who underwent stoma formation [29,30].

In our study, among the patients evaluated within the first 21 days post-surgery, 126 interventions were performed on the left colon, 16 on the right colon, and 11 were represented by extended surgical interventions. The quality of life of these patients was strongly influenced by the type of surgery performed. Patients who underwent proctosigmoidectomy, segmental colectomies, or left hemicolectomies had higher scores compared to those who underwent surgeries targeting the right colon or extended colectomies, a difference supported by a p -value of less than 0.001. This may be attributed to the fact that some patients who underwent left colon and rectal surgery accepted the presence of a stoma more readily, understanding that it was the only solution for low rectal tumors/diseases. Many of them also underwent psychotherapy sessions prior to the surgical procedure and presented themselves to the hospital in a scheduled manner.

The Charlson comorbidity index can help the surgeon in deciding on the therapeutic approach for the patient presented at the hospital, both in emergency and scheduled settings [31-33]. In our study, patients with a high Charlson score mostly underwent segmental resections with the formation of stomas, avoiding prolonging the operating time and increasing the patient's chances of survival. Most of these interventions were performed at the level of the small intestine. Extensive interventions such as total colectomy, subtotal colectomy, or pelvic exenteration were chosen to be performed for patients with an index of up to 11 points.

In colorectal surgery performed on an emergency basis, a fundamental principle to be respected is the damage control surgery attitude. On elderly patients, in addition to the stress induced by surgery, other factors can lead to the decompensation of underlying pathologies, with approximately 25% of them reaching mortality rates of up to 30% [34-36]. Therefore, a careful analysis of the factors that can influence the outcome of surgical intervention is necessary, identifying preventable factors and determining the best therapeutic approach for emergency surgical interventions [37,38]. In our study, the overall mortality rate, both for patients operated on urgently and those operated on

electively, reached 42.96%. Thus, out of 116 patients, 6.89% underwent surgery as planned, while the rest presented as emergencies. The average comorbidity score was 7.35 points for the former category and 9.69 points for those operated on urgently. Initially, out of the 8 patients, 5 underwent right colon resections (1 patient), small intestine resection (1 patient), or rectal resections (3 patients) followed by an anastomosis, during which the perioperative period revealed the presence of a fistula, leading to reintervention and stoma formation. Subsequently, the patients developed local and systemic complications, with the onset of organ failure, necessitating transfer to the ICU, where they died secondary to complications of prolonged orotracheal intubation, with an average intubation time of 180 hours. Out of the remaining 3 patients who completed the surgical intervention with primary stoma formation, 1 experienced gastric content aspiration into the respiratory tract, and 2 were intraoperatively diagnosed with fecal peritonitis secondary to local rectal tumor perforations or sigmoid diverticula. Death occurred in these 3 cases within the first 60-72 hours postoperatively.

In the group of patients whose death occurred within the first 72 hours, 20 cases of recto-sigmoid tumors with local or distant perforation with generalized fecal peritonitis were identified, along with 11 patients with colonic ischemia secondary to either lack of anticoagulant treatment administration, infectious pathologies (COVID-19, infective endocarditis), or prolonged immobilization. Of these, 8 patients had more than 2 affected segments, requiring extensive surgical interventions. Malignant involvement of the left colon and rectum resulted in 6 and 7 deaths, respectively, either due to cecal diastatic perforation or thromboembolic, pulmonary, or systemic phenomena leading to ischemic events in the periphery.

Abdominal wall pathology led to 4 deaths, including a patient with strangulated femoral hernia with uncertain onset of symptoms, 2 patients were found unconscious at home, with large postoperative hernias with intrasaccular peritonitis and primary anastomosis in these cases was not attempted, and a case of post-traumatic diaphragmatic hernia was recorded. In this case, the mesenteric avulsion was found necessitating extensive enterectomy and splenectomy.

For patients whose death occurred after 120 hours, most had complicated sigmoid tumors, with intestinal obstruction (8 cases), 3 with perforation, and 1 invading the abdominal wall with an abscess at this level.

Ischemic pathology of the colon and small intestine also had a significant mortality rate, but unlike the first group, 4 patients who died after 120 hours underwent another surgical intervention, as intestinal viability was not achieved (despite correctly administered treatment), requiring a new resection and formation of a new stoma. Sigmoid volvulus led to the death of 8 patients, with most falling within the 72-120-hour timeframe from onset.

Regarding the onset of postoperative complications, it was observed that 66 out of the patients evaluated at 21 days post-discharge experienced one or more unfavorable situations. Changes in the appearance and functionality of stomas were more frequently identified in the group of patients operated on urgently, especially if the underlying pathology led to contamination of the abdominal wall at both the stoma site and the postoperative wound. Often, alterations in the skin such as erythema, edema, and local pain, which occurred in 15 urgently operated patients and 4 scheduled patients, resulted in a lower quality of life score by 6.4 points compared to patient groups without such postoperative complications. Statistical analysis thus indicated a close correlation between the presence of parastomal complications and a decrease in quality of life, comparing with patients without complications (with a p-value of less than 0.001).

Other unfavorable situations that led to a mild decrease in the quality of life of patients include complications of the postoperative wound. Infection at this level requires rigorous wound care, antibiotic therapy, and possibly repeated debridement, which will lead to a decrease in the patient's level of independence, the onset of pain during maneuvers, and eventually the occurrence of complications related to prolonged antibiotic therapy.

The strengths of this study include the high number of subjects included, as well as the presence of both elective and urgent admissions. Elective patients had the opportunity for preoperative psychological and medical preparation, whereas urgent cases lacked postoperative coping elements. This allows for an objective comparison of quality-of-life indices between the two patient subgroups. However, the limitations of this study stem from the absence of minimally invasive techniques in managing colonic pathology, both urgently and electively. The laparoscopic approach is preferred in elective surgeries as it enables better social and mental recovery, lower rates of infectious or non-infectious parietal complications, and decreased postoperative pain [39-41].

Conclusions

The formation of a stoma as part of the management of patients with colonic or small intestine pathology requires a good understanding of pre- and postoperative risks, as well as complications related to stomas that can impact quality of life. In emergency situations, psychological preparation of patients is often brief and conducted by the surgeon, and patient cooperation may be compromised by their general condition or focus on severe symptoms, desiring relief at any cost without fully understanding what a stoma entails and its subsequent management.

The Charlson comorbidity score is utile in therapeutic decisions regarding complicated colonic pathology. Thus, reducing the duration of surgery and adhering to the principles of damage control surgery should be considered,

especially if there is suspicion of fecal peritonitis that is associated with high mortality rates.

Factors influencing patients' quality of life include the type of surgical intervention, with extensive colectomies and those performed on the right colon having a negative impact. The type of stoma, a high Charlson index, the presence of postoperative complications, and especially those related to skin changes at the stoma site also play significant roles.

Compliance with ethical standards

Any aspect of the work covered in this manuscript has been conducted with the ethical approval of all relevant bodies and that such approvals are acknowledged within the manuscript.

Conflict of interest disclosure

There are no known conflicts of interest in the publication of this article. The manuscript was read and approved by all authors.

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