








Diverticulitis Surgery Outcomes: Insights from Our Clinical Practice

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Abstract

Aim: To assess outcomes of diverticulitis surgery, focusing on various patient phases at a tertiary center and incorporating literature insights.

Methods: Analysis included diverticular disease surgeries at Cukurova University's General Surgery Clinic over five years, examining demographics, disease specifics, surgical details, stoma aspects, and complications. Patients were categorized into emergency and elective groups for comparison based on Hinchey scores and stoma status.

Results: Of the patients, 72% were male, with an average age of 58.46. The sigmoid colon was predominantly affected (84%). Percutaneous drainage was used preoperatively in 44%, and 56% required a stoma, primarily Hartmann colostomies (36%). The median stoma closure time was 5 months, with 10 patients unable to have their stoma closed. Emergency surgeries were associated with higher Hinchey stages (III-IV) and an increased need for stoma creation (81% vs. 16% in elective surgeries).

Conclusions: The study indicates a median 5-month duration for stoma reversal, with sigmoid colon being the common site regardless of gender. Emergency surgeries showed a higher rate of stoma creation, suggesting elective surgeries could reduce stoma necessity. Further investigation is needed for broader applicability.

Keywords: Diverticular disease, Hinchey classification, Hartmann procedure, complications, stoma closure

1. Introduction

Diverticular disease of the colon is an acquired condition resulting from herniation of the mucosa through defects in the muscle layer. Colonic diverticular disease is a common ailment of the digestive system. Diverticulosis has become increasingly prevalent in industrialized societies over the last century. Particularly in Western countries, it is found in about 50% of individuals over the age of 60. Most patients with diverticular disease remain asymptomatic, but up to 25% of patients with diverticulosis will develop symptoms of diverticulitis such as abdominal pain, bloating, and changes in bowel habits over their lifetime. Complications such as abscess, fistula, obstruction, bleeding, or perforation will develop in up to 20% of patients with diverticular disease.¹⁻⁴


Diverticular disease encompasses various stages of illness and, consequently, treatment strategies. While acute diverticular perforation is considered an absolute indication for emergency surgery, the surgical approach to acute diverticular disease,

whether complicated or uncomplicated, largely depends on the stage and the patient.^{5,6} Due to the challenges in the disease course and individual differences in management, numerous guidelines have been published.⁶⁻⁸ Recently, the latest updated version of the German national guideline on sigmoid diverticular disease was published.⁸ After a successful resolution of an acute diverticulitis episode, the purpose of proceeding with elective colon resection in patients is defined as the prevention of future hospitalizations, reducing the risk of needing emergency colon resection, and achieving long-term recovery without abdominal symptoms or recurrent diverticulitis, even though the literature does not fully support this recommendation.^{9,10}

This study aims to present the findings related to the presentation, preoperative, perioperative, and postoperative periods of patients operated for diverticular disease of the colon at a tertiary center, alongside a review of the literature.

2. Materials and methods

After obtaining permission from the local ethics committee dated 08.12.2023 and numbered 139/37, patients who underwent surgery for diverticular disease of the colon at the General Surgery Clinic of Cukurova University in the last five years were included in

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our study. Patients with incomplete data or malignancy in pathology results were excluded. Data were retrospectively analyzed using the hospital's electronic medical records system.

Demographic data, history, and localization of diverticular disease, mode of presentation, type of operation, necessity for stoma creation, type of stoma, and timing of stoma closure, as well as perioperative complications, were analyzed. Additionally, patients were divided into emergency and elective groups, and these groups were analyzed based on their Hinchey scores and stoma statuses.

Patients in the diverticulitis group were divided into four stages according to the Hinchey classification based on abdominal CT findings.¹¹ Our institution considered the recommendations of the American Society of Colon and Rectal Surgeons for elective and emergency management of diverticular disease.¹²

2.1. Statistical evaluation

Statistical analysis was performed using SPSS 22.0 (IBM Corp) software. The normal distribution fit of numerical data was assessed with the Kolmogorov-Smirnov test. Numerical variables with normal distribution were presented as mean ± standard deviation; those without normal distribution were presented as median (minimum-maximum) values. Categorical data were expressed as numbers and percentages (%). Differences between categorical data were analyzed using the chi-square test. A p-value of less than 0.05 was considered statistically significant.

3. Results

Fifty patients were included in our study. The average age was 58.46. Male gender was predominant (72%). The average number of episodes was 2. The most common location was the sigmoid colon (84%), and percutaneous drainage was performed in 44% of the patients. The average duration of the disease was 12 months, with the most common Hinchey stage being 4 (42%). Demographic and clinical data are shown in Table 1.

Table 1
Demographic and clinical data

Variable		
Gender	Male	72% (n:36)
	Female	28% (n:14)
Age		58.46±14.38
Number of episodes		2 (1-4)
Smoking		60% (n:30)
Localization	Sigmoid Colon	84% (n:42)
	Ascending Colon	6% (n:3)
	Total Colon	6% (n:3)
Percutaneous Drainage		44% (n:22)
Disease length (month)		12 (0.1-84)
Median(min-max)		
Hinchey Score		
• I		24% (n:12)
• II		12% (n:6)
• III		22% (n:11)
• IV		42% (n:21)

Emergency presentations were frequent, with loop colostomy being the most common stoma type (36%), and 70% of patients had undergone open surgery. The most common complication was surgical site infection. Perioperative period data are shown in Table 2.

Emergency surgery patients had higher stages of Hinchey

classification (III-IV) (p<0.001). Also, the study found a higher need for stoma in emergency cases (81% vs 16% p<0.001). Hartmann colostomy was the most common type of stoma in both emergency and elective cases (64% vs 67% p=0.927). Comparative analyses are shown in Table 3.

Table 2
Peroperative Period

Presentation Type	Emergency	64% (32)
	Elective	36% (18)
Stoma Requirement	End Colostomy	36% (18)
	Loop Ileostomy	20% (10)
Operation Type	Open	70% (35)
	Laparoscopic	30% (15)
Complications		%,n
Abscess		8% (n:4)
Anastomotic Leak		4%(n:2)
Incisional Hernia		6% (n:3)
Ileus		8% (n:4)
Surgical Site Infection		14% (n:7)
Stoma Closure	Closed	64.2% (n:18)
	Not Closed	35.7% (n:10)

Table 3
Comparative Analysis

		Emergency Surgery	Elective Surgery	P value		
Hinchey Classification	IA	0 ^a	66.7%(12)	<0.001		
	II	3.1 ^a %(1)	27.8%(5)			
	III	31.3%(10)	5.6%(1)			
	IV	65.6%(21)	0			
Stoma Requirement	Yes	81.3%(26)	16.7%(3)	<0.001		
	No	18.8%(6)	83.3%(15)			
Stoma Type	Hartmann	64%(16)	66.7%(2)	0.927		
	Loop Ileostomy	36%(9)	33.3%(1)			
Stoma Status	Closed	68%(17)	33.3%(1)	0.236		
	Not Closed	32%(8)	66.7%(2)			
Stoma Closure Time		Median 5 (3-24)				
Hinchey Classification		IA	II	III	IV	P value
Stoma Closure Failure		20%(2)	0	0	80%(8)	<0.05

4. Discussion

In this study, which presents the outcomes of surgical treatment for diverticular disease of the colon, we found that the most common site of diverticula was the sigmoid colon. The highest rate of presentation was at Hinchey stage 4. The majority of patients underwent conventional surgery under emergency conditions. There was a greater need for stoma in emergency presentations, with one-third of patients who had a stoma ending up with it being permanent. Patients with non-closable stomas were mostly classified as Hinchey 4 at the time of presentation.

The severity of diverticulitis is categorized using the modified Hinchey classification. Uncomplicated diverticulitis includes stage 0 (clinically mild diverticulitis) and stage Ia (pericolonic inflammation), successfully treated non-surgically in 70 to 100% of cases. Complicated diverticulitis includes stage Ib (abscess near primary inflam-

mation <5 cm), stage II (intraoperative, pelvic, or retroperitoneal abscess, or abscess distant from primary inflammation), stage III (generalized purulent peritonitis), and stage IV (fecal peritonitis).¹¹⁻¹³ Evaluating our patient population, the high frequency of Hinchey 4 suggests a composition of complicated cases, which could explain the high rates of emergency surgery and stoma.

Historically, the Hartmann procedure was the gold standard for the surgical treatment of perforated diverticulitis. Its advantages include a relatively short operation time and avoidance of anastomosis; it was especially applied in unstable patients. However, current surgical practices are evolving, emphasizing adaptation to the Hinchey stage.³ Laparoscopic lavage has emerged as an acceptable alternative to resection for patients presenting with generalized purulent peritonitis (Hinchey III disease). Three randomized clinical trials compared outcomes following laparoscopic lavage with the standard Hartmann procedure. Overall, results from all three trials were similar, suggesting that laparoscopic lavage may have lower mortality, fewer stoma and wound-related issues, but potentially higher postoperative interventions.¹⁴⁻¹⁶ Primary sigmoid resection and anastomosis (PRA) have emerged as an alternative for perforated diverticulitis with purulent or feculent peritonitis (Hinchey III/IV). Various systematic reviews and meta-analyses have compared PRA with the Hartmann procedure (HP).^{17,18} Ryan OK et al. included 12 studies with 918 patients in their meta-analysis and found no difference in 30-day mortality between groups, but overall mortality and major postoperative complications were lower after PRA. The initial and permanent stoma rates were also lower in the PRA group.¹⁹ In our population, the rate of Hartmann procedure was 36%, and our stoma rate was 58%, with one-third of these being permanent. Our permanent stoma rate was associated with Hinchey 4 classification. We did not observe a relationship between the urgency of the operation (emergency or elective) and the permanence of the stoma.

The literature shows that patients experiencing more than two attacks do not have higher morbidity and mortality risks when compared to patients with fewer attacks. This suggests that the nature of this disease process is not progressive and that individuals presenting with complicated disease are likely to do so at their initial presentation. When discussing surgery with a patient, treatment should be individualized, and the surgeon should consider the patient's medical condition, the risks of surgery, the impact of recurrent attacks on the patient's lifestyle (occupational and personal), the possibility of undiagnosed carcinoma, the severity of the attacks, and chronic or persistent symptoms.^{2,12} In our population, all patients were individually assessed when making decisions about elective colectomy. In our population with a median number of two attacks, 44% had a history of percutaneous drainage, and some had experienced four attacks; colectomies were planned with all these parameters in mind.

The main limitations of our study were its retrospective and single-center nature. The limited number of patients reduced the level of scientific evidence.

5. Conclusion

Diverticular disease represents a spectrum of clinical presentations ranging from mild, self-limiting diverticulitis to free colonic perforation requiring the resection of the diseased colon, with or without permanent colostomy. Surgical decision-making is increasingly based on a combination of individual patient and disease factors. Careful preoperative planning, intraoperative decisions, and technical considerations are crucial for successful postoperative outcomes in this patient population.

Statement of ethics

The study was established, according to the ethical guidelines of the Helsinki Declaration and was approved by Institutional Review Board of the Çukurova University Faculty of Medicine 08.12.2023 and numbered 139/37. Informed consent was obtained from all patients and/or their legal guardian(s).

Conflict of interest statement

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Author Contributions

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Availability of data and materials

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Originality Assertion

The authors have not submitted this article to another journal previously.

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