

ORIGINAL ARTICLE

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Management of colonic volvulus: A retrospective analysis of short-term outcomes Cengiz Ceylan¹,  Bora Barut²

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**Abstract**

Colonic volvulus is the third most common cause of colonic obstruction globally. The management of colonic volvulus, comprising emergency surgery, endoscopic decompression, elective surgery following endoscopic decompression, and the specific surgical approach directly influences morbidity and mortality in these critically ill patients. This study aims to present the outcomes of patients with colonic volvulus treated at our institution. A retrospective analysis was conducted on 47 patients treated for sigmoid volvulus at our clinic between 2017-2024. The study examined demographic data, preoperative radiological assessments, management strategies for volvulus, and postoperative outcomes. The median age of the 47 patients diagnosed and treated for colonic volvulus was 73 years (25th and 75th percentiles: 55-79), with 83% of the patients being male. Endoscopic detorsion was performed in 66% of the patients, and the overall morbidity rate in the treated population was 34%, while the mortality rate was 12.8%. Univariate analyses revealed that factors such as pH, lactate, CRP, creatinine, BUN, bowel necrosis, perforation, and endoscopic detorsion were associated with morbidity. Multivariate analysis indicated that endoscopic detorsion was the only factor that significantly reduced morbidity ($p=0.01$). In sigmoid volvulus, endoscopic detorsion in patients without signs of perforation is the most important independent risk factor for reducing morbidity in the treatment algorithm. Therefore, it should be considered the first-line treatment option by clinicians.

Keywords: Volvulus, colonic, decompression, morbidity**Introduction**

Colonic volvulus is one of the most common causes of large bowel obstruction worldwide [1]. The twisting of the mesentery around the intraperitoneal segments of the colon leads to disruption of the bowel's continuity, resulting in ischemia, necrosis, and potential perforation in the affected colon segment. It most commonly occurs in the sigmoid colon, followed by the cecum, transverse colon, and, rarely, the splenic flexure [2]. Colonic volvulus is primarily a disease of the geriatric population. However, cecal volvulus is more common in women and younger individuals, making it an exception to this pattern [3]. In stable patients, abdominal plain radiographs and computed tomography (CT) should be used to rule out the presence of peritonitis and perforation. In cases of perforation, surgical intervention is required without the need for colonoscopic detorsion. However, in stable patients without perforation, the first-line approach is colonoscopic detorsion followed by elective sigmoid colon resection. Cecal volvulus,

however, is an exception to this approach, and current guidelines recommend surgical intervention without prior endoscopic detorsion [4].

In the treatment of patients with gangrenous bowel segments or perforation, sigmoid resection with Hartmann's procedure (HP) is preferred, with mortality rates ranging from 5%. In cases where resection is followed by primary anastomosis (RPA), the incidence of anastomotic leak is approximately 7% [5]. In patients who undergo endoscopic detorsion alone, recurrence rates range from 43% to 75%. In cases of recurrence, mortality rates associated with emergency surgeries are approximately 10 times higher compared to elective surgeries [6,7].

In our study, we aimed to classify morbidity and compare the factors influencing it in patient populations who underwent direct surgery for colonic volvulus, surgery after detorsion, and those who underwent detorsion alone.

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Material and Methods

Patients and Data Collection

Our study, designed as a retrospective analysis, was initiated with approval from the İnönü University Ethics Committee (approval date: 03.12.2024, approval number: 2024/6741). Demographic (age and gender) and clinicopathological data (ASA score, comorbidities, status of endoscopic detorsion, treatment plan, white blood cell (WBC), hemoglobin, C-reaktif protein (CRP), blood urea nitrogen (BUN), creatinine, pH, lactate, morbidity, and mortality) for patients treated for volvulus at our clinic between 2017 and 2024 were retrieved from the patient database. The morbidity status of the patient population was assessed according to the Clavien-Dindo classification [8]. Patients were divided into two groups: those with morbidity and those without morbidity, based on complications occurring within 30 days post-surgery.

Patient Management

After taking the patient history and performing a physical examination in the emergency department, patients suspected of having colonic volvulus were ordered to undergo abdominal plain radiographs, complete blood count, CRP, arterial blood gas, and biochemical tests. Emergency laparotomy was performed on patients with signs of acute abdomen and free air on the abdominal plain radiograph. In patients without free air under the diaphragm, a CT scan was used to evaluate the etiology. Endoscopic detorsion was attempted in patients with sigmoid volvulus. Patients who showed ischemia during detorsion or had failed detorsion were taken for emergency surgery. Patients who successfully underwent detorsion and agreed to elective surgery were scheduled for operation approximately three days later. Patients diagnosed with cecal volvulus were taken directly for

emergency surgery. In cases with signs of peritonitis or significant intestine diameter discrepancy, HP was performed, while RPA were performed in other cases.

Statistical Analysis

The distribution of the data was checked for normality using the Kolmogorov-Smirnov test. Descriptive statistics were provided, with continuous variables presented as medians, along with the 75th and 25th percentiles, and categorical variables presented as frequencies and percentages. Nonparametric tests, specifically the Mann-Whitney U test, were applied for non-normally distributed data. Chi-square analysis was used for categorical variables. Prospective selective multivariate logistic regression analysis was performed on variables found to be statistically significant. The Hosmer-Lemeshow test was used to evaluate the goodness of fit, with statistical significance set at $p<0.05$. Data were analyzed using the Statistical Package for the Social Sciences for Windows, version 23 (SPSS Inc., Chicago, IL).

Results

The patient population, consisting of 47 individuals, had a median age of 73 years (55-79). The majority of patients (83%) were male, and 61.7% had an ASA score of 3. Hypertension was present in 40.4% of patients, and 34% had coronary artery disease. Of the colonic volvulus cases, 46 were sigmoid volvulus and 1 was cecal volvulus. Endoscopic detorsion was performed in 66% of the patients as part of the treatment strategy. Of these, 25.53% underwent only endoscopic detorsion, while 40.43% were operated on semi-electively after detorsion. Postoperative 30-day follow-up revealed morbidity in 16 (34%) patients, and mortality in 6 (12.8%) patients (Table 1).

Table 1. Demographic data of patients who underwent treatment for volvulus

Variables		Median (Q1-Q3)	n (%)
Age, years		73 (55-79)	
Gender	Male		39 (83)
	Female		8 (17)
ASA	ASA1		5 (10.6)
	ASA2		13 (27.7)
	ASA3		29 (61.7)
DM			7 (14.9)
HT			19 (40.4)
COPD			6 (12.8)
CAD			16 (34)
Neurological disease			4 (8.5)
Volvulus	Sigmoid		46 (97.9)
	Caecal		1 (2.1)
Treatment plan	Direct surgery		16 (34.04)
	Firstly decompression		19 (40.43)
	Only decompression		12 (25.53)
Decompression			31 (66)
Morbidity			16 (34)
Mortality			6 (12.8)

ASA: American Society of Anesthesiologists, COPD: chronic obstructive pulmonary disease, CAD: coronary artery disease

When morbidities were classified according to the Clavien-Dindo classification, 6 (12.8%) patients had medical conditions that could be managed with simple pharmacological treatment, while 5 (10.6%) had organ failure involving a single system (Table 2).

Table 2. Classification of morbidities

Variables		n (%)	
CD	Absence	31 (66)	
	CD1	1 (2.1)	Postoperative course that do not require treatment
	CD2	6 (12.8)	Pharmacological treatment
	CD3a	1 (2.1)	Surgical intervention under local anesthesia
	CD3b	2 (4.3)	Surgical intervention under general anesthesia
	CD4a	5 (10.6)	Single system failure
	CD5	1 (2.1)	Mortality
CD: Clavien Dindo classification			

Morbidity was observed in all patients with peroperative bowel wall necrosis ($p<0.001$) and perforation ($p=0.001$). The group that underwent endoscopic detorsion had significantly lower morbidity ($p<0.001$), while the group that underwent direct surgery had higher morbidity ($p=0.001$). Regarding hospital stay duration, the morbidity group had a longer length of stay, with a median of 12 days (7-19) ($p<0.001$). Most patients who experienced mortality also had morbidity ($p=0.006$) (Table 3).

Table 3. Impact of demographic factors on morbidity within the patient population

Variables		No morbidity		Morbidity		P-value
		Median (Q1-Q3)	n (%)	Median (Q1-Q3)	n (%)	
Age, years		73 (50-79)		75 (72-82)		0.132
Gender	Male		27 (87.1)		12 (75)	0.296
	Female					
ASA	ASA1		5 (16.1)		0 (0)	0.092
	ASA2		10 (32.3)		3 (18.8)	
	ASA3		16 (51.6)		13 (81.3)	
DM			5 (16.1)		2 (12.5)	0.741
HT			13 (41.9)		6 (37.5)	0.769
COPD			4 (12.9)		2 (12.5)	0.969
CAD			9 (29)		7 (43.8)	0.313
Neurological disease			1 (3.2)		3 (18.8)	0.071
Necrosis			0 (0)		6 (37.5)	<0.001
Perforation			0 (0)		5 (31.3)	0.001
Decompression			26 (83.9)		5 (31.3)	<0.001
Treatment plan	Direct surgery		5 (16.1)		11 (68.8)	0.001
	Firstly decompression		13 (41.9)		4 (25)	
	Only decompression		13 (41.9)		1 (6.3)	
Operation type	Only decompression		13 (41.9)		1 (6.3)	0.025
	Lap RPA		5 (16.1)		4 (25)	
	Op RPA		3 (9.7)		3 (18.8)	
	Op HP		4 (12.9)		8 (50)	
	Lap HP		1 (3.2)		0 (0)	
	Ileosigmoid bypass		4 (12.9)		0 (0)	
	Right hemicolectomy		1 (3.2)		0 (0)	
Length of stay, days		5 (2-7)		12 (7-19)		<0.001
Mortality			1 (3.2)		5 (31.3)	0.006

ASA: American Society of Anesthesiologists, COPD: chronic obstructive pulmonary disease, CAD: coronary artery disease, RPA: resection and primary anastomosis, HP: Hartmann procedure

In patients who developed morbidity, laboratory tests revealed elevated levels of acidosis (p=0.003) and lactate (p=0.029). Additionally, BUN (p=0.021) and creatinine (p=0.008) levels were significantly higher in those with morbidity. CRP levels were also higher in the morbidity group (p=0.026) (Table 4).

Table 4. Impact of laboratory findings on morbidity in the patient population

Variables	No morbidity	Morbidity	P-value
	Median (Q1-Q3)	Median (Q1-Q3)	
WBC, mm³	10.6 (7.6-11.8)	7.05 (5.55-11.75)	0.13
Hgb, gr/dL	12.9 (11.2-13.8)	14.1 (12.05-14.6)	0.167
CRP, mg/dL	1 (0.5-1.8)	2.4 (1-7.7)	0.026
BUN, mg/dL	19.7 (14.1-27.1)	33.45 (19.55-39.7)	0.021
Creatinine, mg/dL	1 (0.7-1.1)	1.4 (0.85-2)	0.008
LDH, U/L	243 (204-295)	270 (206-388)	0.34
pH	7.4 (7.37-7.43)	7.35 (7.29-7.39)	0.003
Lactate, mmol/L	1.1 (0.8-1.3)	1.6 (1.05-2.05)	0.029

WBC: white blood cell, BUN: blood urea nitrogen, CRP: C-reactive protein, LDH: lactate dehydrogenase

In multivariate analysis, endoscopic detorsion was the only independent risk factor affecting morbidity in sigmoid volvulus (p=0.006; Odds ratio: 10.691, Confidence interval: 1.976-57.825) (Table 5).

Table 5. Multivariate logistic regression analysis results

Variables	Multivariate logistic regression		P-value
	OR	95.0% CI	
BUN, mg/dL	1.002	0.922-1.088	0.967
CRP, mg/dL	1.241	0.944-1.631	0.122
Creatinine, mg/dL	3.325	0.274-40.384	0.346
Lactate, mmol/L	1.511	0.601-3.795	0.380
Decompression	10.691	1.976-57.825	0.006

OR: Odds ratio, CI: confidence interval, BUN: blood urea nitrogen, CRP: C-reactive protein, p<0.05 was considered statistically significant

Discussion

Colonic volvulus is a common condition, particularly in the elderly population, and is a significant cause of acute abdomen that can have a fatal outcome when complicated. Furthermore, following a structured treatment algorithm can positively impact morbidity and mortality. In our study group, the overall mortality rate was 12.8%, with morbidity observed in 16 patients (34%). Endoscopic detorsion was performed as the first treatment option in 31 patients (66%). Multivariate analysis revealed that endoscopic detorsion was the only protective risk factor for morbidity, reducing the risk by 10-fold.

In cases presenting with complicated conditions (perforation, necrosis) at the time of hospital admission, patients should be taken directly for surgery without attempting decompression, after distinguishing these conditions through physical examination and diagnostic tests. Perforation can be easily diagnosed using computed tomography and plain radiographs. However, predicting the presence of bowel gangrene and necrosis is much more challenging. One study has shown that elevated CRP, LDH, potassium levels, and leukocyte counts <4000/mm³ or >12000/mm³ are indicators of bowel gangrene [9]. Using this model,

bowel gangrene can be predicted before endoscopic evaluation, providing clinicians with valuable assistance in decision-making.

In a study by Ceylan et al., Hartmann's procedure was preferred for complicated cases, particularly those with gangrene and perforation. In this patient group, morbidity was lower compared to resection and anastomosis (p=0.048) [10]. Although Hartmann's procedure is typically recommended in septic patients, or those in poor general condition, this study demonstrated its advantage in terms of morbidity. In our study, regardless of the type of surgery, patients who underwent emergency surgery without prior endoscopic detorsion had higher morbidity. This reflects the clear impact of performing direct surgery without endoscopic detorsion, especially in complicated cases like perforation. Additionally, in the group that only underwent endoscopic detorsion, although short-term follow-up showed lower mortality and morbidity initially, the potential for recurrence should always be considered. A previous study emphasized the necessity of elective or delayed surgery after endoscopic detorsion, as mortality rates are nearly doubled in surgeries performed after recurrence [11]. Dehydration, fluid-electrolyte imbalances, compression atelectasis in the lungs secondary to abdominal

distension, acute compartment syndrome, renal failure, and respiratory failure can occur as a result of mechanical bowel obstruction. Therefore, in patients without signs of peritonitis on physical examination, it is suggested that instead of proceeding directly to surgery, colon decompression should be performed first to reduce intra-abdominal pressure, correct any organ failures if present, and address fluid-electrolyte imbalances, as this approach is believed to reduce morbidity and mortality.

The increasing incidence of colonic volvulus, particularly in the elderly population, can be attributed to the rising life expectancy. Due to the frailty of the elderly population, morbidity and mortality rates are inevitably higher in emergency or semi-elective surgeries [12]. However, studies suggest that the key factor is not chronological age but physiological age. While organ system reserves decline with age, the physiological condition of the individual remains critically important. In colorectal surgeries involving octogenarian and nonagenarian patients, contamination (such as purulent or fecal peritonitis due to ischemia or perforation) has been identified as an independent risk factor affecting patient mortality [13]. However, as demonstrated in our study, age did not have a direct effect on morbidity. Nonetheless, the presence of preoperative perforation or gangrene and postoperative complications, due to reduced organ reserves in elderly patients, resulted in higher mortality compared to the younger population. Another study has shown that in the geriatric population, while endoscopic detorsion and delayed surgery increase hospital stay and costs, they also reduce cardiac side effects and the need for diversion ostomy [14].

Percutaneous endoscopic colostomy (PEC) is also considered an alternative to surgery in the management of recurrent sigmoid volvulus in frail, comorbid patients who are either unfit for or refuse surgery. A systematic analysis has shown that the best outcomes were achieved in patients where two PEC tubes were inserted and remained in situ indefinitely [15].

Study Limitations

The predominance of sigmoid volvulus in our population, as opposed to cecal, transverse colon, and splenic flexure volvulus, represents a limiting factor in the scope of the study. Furthermore, although the number of cecal volvulus cases was small, the treatment algorithm differs from that of sigmoid volvulus, which serves as a constraint when making more generalizable conclusions.

Conclusion

In colonic volvulus, which is increasingly common with the rise of the geriatric population and is predominantly seen in the sigmoid colon, endoscopic detorsion should always be the first-line treatment option in patients without acute abdomen

findings such as perforation, as it helps reduce morbidity and, consequently, mortality.

Conflict of Interests

The authors declare that there is no conflict of interest in the study.

Financial Disclosure

The authors declare that they have received no financial support for the study.

Ethical Approval

The study was approved by İnönü University Ethics Committee (Decision no: 2024/6741, Date: 03.12.2024).

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