

Clinicopathological Features of Elderly Patients with Colonic Volvulus

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ABSTRACT

Objective: Sigmoid volvulus is most commonly seen in patients between 60 and 80 years old. The management of volvulus depends on its location and clinical presentation. The fundamental aspects of treatment include evaluating the viability of the colon, relieving the obstruction, and preventing the possibility of recurrence. We aimed to present geriatric colonic volvulus patients treated in a single center and compare the mortality and morbidity of patients who underwent surgery with or without colonoscopic detorsion.

Methods: Patients diagnosed with colonic volvulus and treated in this hospital were included in the study. Mortality rates of patients who underwent and did not undergo preoperative colonoscopic detorsion were compared statistically. In addition, diseases that affect the quality of life and cause deterioration in bowel movements and habits were determined, and these diseases' effect on mortality was evaluated.

Results: Forty-four patients who underwent emergency surgery due to volvulus were included in our study. There was sigmoid colon perforation in two patients and cecum perforation in 1 patient. Two patients had cecal volvulus, and right hemicolectomy was performed in these patients; anastomosis was performed in one, and ileostomy was performed in the other. Sigmoid resection was performed in 36 patients, subtotal colectomy in 5 patients, right hemicolectomy in 2 patients, and sigmoidopexy with laparotomy and reduction in 1 patient. Thirteen patients (29.5%) underwent preoperative colonoscopy, and in eight cases, the procedure was conducted a day before the surgery, with the operation being carried out semi-urgently the next day.

Conclusion: Intestinal volvulus is a rare condition that can occur in any part of the large intestine. However, it is a severe medical issue that requires prompt diagnosis and treatment due to the possibility of intestinal damage and mortality.

Keywords: Mortality, Sigmoid Colon, Volvulus



INTRODUCTION

Mechanical or non-mechanical factors can cause colon obstruction (CO) in adults. The three most common mechanical causes of CO are obstruction due to colon or rectal cancer, diverticular stricture, and colon volvulus. Colon volvulus is a condition characterized by the colon twisting around its mesentery [1, 2]. The excess segment in the mesentery of the colon causes luminal obstruction in the volvulized segment and proximal to it. This process can cause compromised blood supply to the colon, which can lead to gangrene, ischemia, and even perforation [3-5].

Sigmoid volvulus is a medical condition typically affecting older men in developed countries such as the United States. It is most commonly seen in patients between the ages of 60 and 80 who may have chronic constipation, neuropsychological disorders, or other underlying health issues [3, 4, 6]. Cecal volvulus is a condition that typically occurs in younger patients and is more common in women. The treatment for volvulus is determined by its location and the symptoms it presents. The fundamental aspects of treatment include evaluating the viability of the colon, relieving the obstruction, and preventing the possibility of recurrence. It is important to note that recurrent volvulus without surgical intervention is common, and each subsequent recurrence carries the risk of ischemia and perforation. Therefore, it is crucial to seek medical attention promptly to prevent complications [7-10]. In a study evaluating 48 patients operated on for acute colonic volvulus, extraperitonealization and colon fixation were performed in 11 patients, and it was reported that 1 patient required resection due to recurrence, but this technique is a new method and studies with a high level of evidence have not yet been published in the literature. Although non-resection methods have been tried in volvulus patients, there is currently no more effective method than operations that require resection of the problematic segment [11].

We aimed to present the clinical characteristics of geriatric colonic volvulus patients treated in a single center and compare

the mortality and morbidity of patients who underwent surgery with or without colonoscopic detorsion.

MATERIALS AND METHODS

This study aims to retrospectively examine geriatric patients who made surgery procedure for colonic volvulus between August 2010 and January 2023 at the General Surgery Clinic of the Haydarpaşa Numune Training and Research Hospital of the University of Health Sciences. The institution's Ethics Committee (Ethics Committee Approval Number: E-62977267-240761645/2024) approved the study protocol. Patients were selected by scanning the hospital database. Patients diagnosed with colonic volvulus and treated in this hospital were included in the study. According to the age categories of the World Health Organization, patients are divided into two groups: old (60 years and above) and young (59 years and below). In this study, the geriatric patient group was taken into consideration. 12 patients defined by WHO as young patients were excluded from the study. Patients with no data records were excluded from the study. Comorbidities, mortality rates, gender, age, surgical procedures performed, preoperative colonoscopic decompression, demographic and clinical characteristics of the patients were examined. Mortality rates of patients who underwent and did not undergo preoperative colonoscopic detorsion were compared statistically. In addition, diseases that affect the quality of life and cause deterioration in bowel movements and habits were determined, and these diseases' effect on mortality was evaluated [4]. All patients underwent nasogastric suction and electrolyte correction and received broad-spectrum antibiotics immediately upon admission for active resuscitation.

Charlson comorbidity Index (CCI) is an evaluation parameter that shows preoperative mortality and 10-year survival in patients with Colonic Volvulus. Preoperative CCI was evaluated statistically in the groups in which patients developed and did not develop mortality. The patient groups were compared by estimating the mortality of the groups with and without preoperative detorsion colonoscopy using CCI [12]. The laboratory parameters of the patients were examined and evaluated and it was reported whether there were any statistical differences between these groups. Values were given using the Clavien Dindo complication classification to evaluate the complications of the patients in the postoperative period [13].

Main Points;

- Evaluating the suitability and implementation of colonoscopic detorsion in colonic volvulus patients presenting to the emergency department can reduce hospital mortality.

Statistical Analysis

Statistical analyses were performed using IBM SPSS software, version 23.0 (IBM Corporation, Armonk, NY, USA). The average age, gender, and clinical findings of the individuals included in the study were determined by descriptive statistical methods, as well as their frequencies and percentages. It was examined whether the numerical variables showed normal distribution using visual and analytical methods. Comparisons were made using the Student’s t-test to compare normally distributed numerical variables and the Mann-Whitney U test for non-normally distributed parameters. The chi-square and Fisher’s exact test were used for categorical and nominal variables in pairwise comparisons. In all analyses, $p < 0.05$ was considered statistically significant.

RESULTS

Forty-four patients who underwent emergency surgery due to volvulus were included in our study. Demographic data of the patients included in the study are presented in Table 1. 25 (56.8%) of the patients had chronic diseases that could cause constipation or immobilization. Out of the total number of patients examined, 3 (6.8%) had a cerebrovascular accident (CVA), 2 (4.5%) had hypothyroidism, 2 (4.5%) had Parkinson’s disease, 5 (11.3%) had Alzheimer’s disease, 3 (6.8%) had epilepsy, 2 (4.5%) had Chronic Renal Failure (CRF), 8 (18.8%) had Congestive Heart Failure (CHF), 7 (15.9%) had Chronic Obstructive Pulmonary Disease (COPD), and 12 (27.2%) had diabetes mellitus.

There was sigmoid colon perforation in two patients and cecum perforation in 1 patient. Two patients had cecal volvulus, and right hemicolectomy was performed in these patients; anastomosis was performed in one, and ileostomy was performed in the other. Sigmoid resection was performed in 36 patients, subtotal colectomy in 5 patients, right hemicolectomy in 2 patients, and sigmoidopexy with laparotomy and reduction in 1 patient. A colostomy was performed in 21 (80.7%) patients, and an ileostomy was performed in 5 (19.3%) patients who developed necrosis during the operation and were thought to have an anastomosis leak. The median value of the length of the removed colon is 36 (18-104) cm, the average value of the width of the colon is 17.63 ± 6.7 cm, the average value of the wall thickness of the colon is 0.43 ± 0.21 cm, the average value of the width of the mesocolon is 5.68 ± 2.85 .

Table 1. Demographic data

	Mean \pm SD/N (%)	Min-Max
Age	77,36 \pm 8,16	60-92
Gender		
Male	33 (%75)	
Female	11 (%25)	

SD: Standard Deviation, Min: Minimum value, Max: Maximum Value

Thirteen patients (29.5%) underwent preoperative colonoscopy, and in eight cases, the procedure was conducted a day before the surgery, with the operation being carried out semi-urgently the next day. One of the patients declined the operation after the colonoscopy and left the hospital. However, he returned 33 days later with abdominal pain and was then taken for surgery. Table 2 compares patient age in both groups, the effect of preoperative colonoscopy on mortality, whether the finding of perioperative perforation causes mortality, and the effect of chronic disease on mortality in volvulus patients who are mortal and do not develop mortality. Table 3 statistically presents the perioperative ostomy opening rates of patients who underwent preoperative colonoscopy and the effect of preoperative colonoscopy on the perioperative ostomy opening rate. Preoperative abdominal tomography imaging and operative images are shown in Figure 1-3.

Table 2. Association of age, preoperative colonoscopy, perforation, and chronic disease with mortality

Patients(N=44)	With Hospital Mortality (N=13)	Without Hospital Mortality (N=31)	p
Age(year) ($\mu \pm$ sd)	79,84 \pm 7,69	76,32 \pm 8,25	0,195*
Chronic Disease			0,682**
Yes	8 (%61,5)	17 (%54,8)	
No	5 (%38,5)	14 (%45,2)	
Perforation			1***
Yes	1 (%7,7)	2 (%6,4)	
No	12 (%92,3)	29 (%93,6)	
Colonoscopy before surgery			0,282***
Yes	2 (%15,4)	11 (%35,4)	
No	11 (%84,6)	20 (%64,6)	

*Student’s t-test **Chi-Square Test***Fisher’s exact testi

Table 3. The relationship between preoperative decompression colonoscopy and ostomy creation

	With Ostomy (N=26)	Without Ostomy (N=18)	p
Colonoscopy Before Surgery			0,071**
Yes	5 (%19,2)	8(%44,4)	
No	21 (%80,8)	10 (%55,6)	

**Chi-Square Test

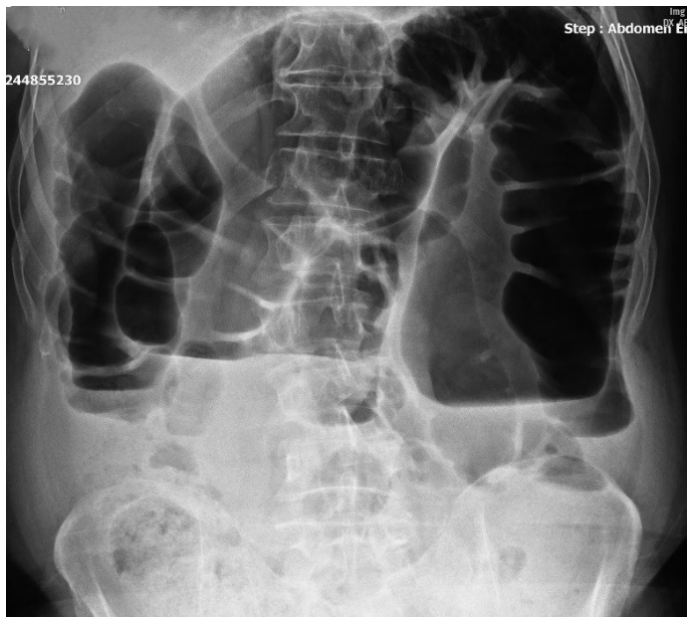


Figure 1. Volvulus Standing Direct Abdominal Radiograph

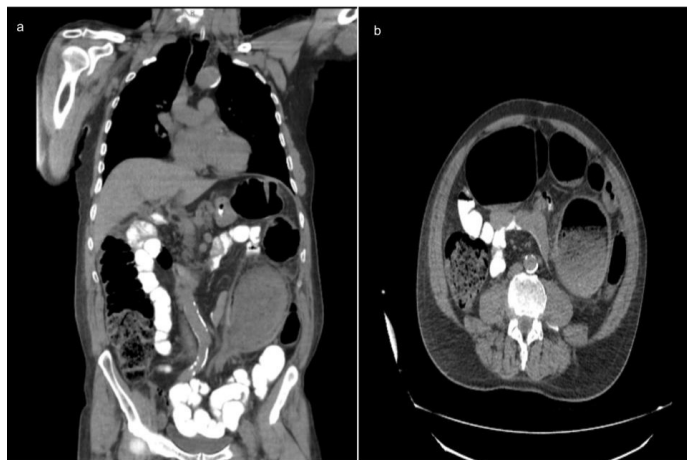


Figure 2. Volvulus Computerized Tomography Image, a : Coronal section view, b: axial cross-sectional view



Figure 3. Image of Sigmoid Colon in Laparotomy Due to Volvulus

When the American Society of Anesthesiologists (ASA) scores of the patients in our study were examined; 4 (9%) patients were classified as ASA-2, 21 (47.7%) patients were classified as ASA-3, and 19 (43.18%) patients were classified as ASA-4. Mortality was higher in the group with ASA 4. (p=0.002) (Table 4). When patients who developed hospital mortality and those who did not develop hospital mortality were compared, WBC, Hb, neutrophil, plt, CRP, albumin, BUN, creatinine, ALT, AST, pH, lactate, bicarbonate values between the groups. No significant difference was detected between. When the groups with and without colonoscopy were compared, pH and bicarbonate values were statistically significantly higher in the group with preoperative colonoscopy (pH 7.4 vs. 7.36 p=0.021, bicarbonate 24.5 vs. 22.41 p=0.003). No significant difference between these two groups was detected in other laboratory parameters (WBC, Hb, neutrophil, plt, CRP, albumin, BUN, creatinine, ALT, AST, lactate) (Table 5).

When the CCI of the cases was calculated, the average CCI value was found to be 4.74±1.44. The CCI value in the group with hospital mortality was significantly higher than in the

group without mortality (5.46 vs 4.43 p=0.031). There was no significant difference between the CCI values of the groups with and without preoperative colonoscopy (4.62 vs 4.8 p=0.706). CCI, 10-year life expectancy percentage, significantly differed between groups with and without mortality (17.2 months vs 36.3 months p=0.045). When the cases were examined according to the Clavien-Dindo complication classification, Clavien-Dindo III complications developed in 1 (2.3%) patient, Clavien-Dindo IV complications developed in 11 (25%) patients, and Clavien-Dindo V complications developed in 13 (29.5%) patients. In patients with no mortality during follow-up, there was no significant difference in the length of hospital stay between the

groups with and without preoperative colonoscopy (p=0.073).

When patients without mortality were followed, the average follow-up period was 46.4 ± 34.7 months. Survival times were significantly different in the groups with and without preoperative colonoscopy (45.5 months vs 25.1 months p=0.045). During follow-up, mortality occurred in 3 (37.5%) patients in the group in which preoperative colonoscopy was performed and in 15 (68.2%) patients in the group in which colonoscopy was not performed, and no statistically significant difference was detected between the two groups (p = 0.21).

Table 4. The effect of preoperative patients' ASA scoring values on mortality

	ASA-2 (N=3)	ASA-3 (N=21)	ASA-4 (N=19)	p
Hospital mortality				0,002*
No	4 (%100)	19 (%90,5)	8 (%42,1)	
Yes	0 (%0)	2 (%9,5)	11 (%57,9)	

ASA: American Society of Anesthesiologists , * Chi-square test

Table 5. Laboratory parameters of the patients

	Mean \pm SD/N (%)	Min-Max	Preoperative Colonoscopy		P Value	Mortality		P Value
			Yes	No		Yes	No	
WBC (10*3μl)	9,65 \pm 6,63	1,6-44,65	7,95 \pm 2,36	10,42 \pm 7,75	0,389	8,81 \pm 5,07	9,99 \pm 7,21	0,731
Hb (g/dl)	12,81 \pm 3,85	7,5-31,3	12,24 \pm 1,77	13,06 \pm 4,49	0,727	12,87 \pm 6,64	12,79 \pm 2,06	0,356
Neutrophil (10*3μl)	7,86 \pm 6,34	1,2-41,18	6,05 \pm 2,29	8,67 \pm 7,38	0,305	7,59 \pm 4,79	7,97 \pm 6,93	0,989
Plt (10*3μl)	228,83 \pm 87,31	49-434	207,76 \pm 100,87	238,27 \pm 80,64	0,301	215,16 \pm 81,12	234,3 \pm 90,41	0,528
CRP (mg/dl)	3,66 \pm 5,06	0-24,7	1,94 \pm 2,46	4,43 \pm 5,74	0,068	4,03 \pm 3,85	3,51 \pm 5,53	0,371
Albumin (g/dl)	4,31 \pm 6,24	2,1-43,6	3,64 \pm 0,61	4,62 \pm 7,53	0,167	3,13 \pm 0,66	4,79 \pm 7,36	0,117
BUN (mg/dl)	25,11 \pm 19,86	0-90,3	23,71 \pm 13,34	25,73 \pm 22,36	0,936	29,43 \pm 24,44	23,38 \pm 17,9	0,611
Creatinine (mg/dl)	1,11 \pm 0,59	0,39-3,18	0,97 \pm 0,34	1,18 \pm 0,67	0,648	1,23 \pm 0,85	1,07 \pm 0,46	0,731
ALT (U/L)	22,85 \pm 19,1	5-118	21,38 \pm 11,72	23,51 \pm 21,77	0,936	30,16 \pm 29,16	19,93 \pm 12,74	0,208
AST (U/L)	30,07 \pm 25,49	11-146	23,38 \pm 6,7	33,06 \pm 30,04	0,851	40,16 \pm 37,57	26,03 \pm 18,01	0,117
pH (mmol/l)	7,37 \pm 0,04	7,29-7,51	7,4 \pm 0,04	7,36 \pm 0,04	0,021	7,39 \pm 0,06	7,37 \pm 0,04	0,293
Lactate (mmol/)	2,02 \pm 1,75	0,4-9,2	1,38 \pm 0,81	2,3 \pm 1,98	0,06	2,6 \pm 2,35	1,78 \pm 1,43	0,229
Bicarbonate (mmol/l)	23,05 \pm 2,85	17,8-33	24,5 \pm 2,65	22,41 \pm 2,74	0,003	24,16 \pm 4,35	22,61 \pm 1,91	0,466

WBC: White Blood Cell, Hb: Hemoglobin, PLT: Platelet, CRP: C-reactive protein, BUN: Blood urea nitrogen, ALT: Alanine aminotransferase, AST: Aspartate aminotransferase, pH: acid–base balance, * Chi-square test

DISCUSSION

The rate of gangrene in sigmoid volvulus patients ranges from 6.1% to 30.2%, with the highest percentage being 28.2% in the most extensive published series [14]. For patients under 60 years of age, it is recommended to perform mini-laparotomy for sigmoid resection under local anesthesia to reduce mortality and protect the patient from the harmful effects of general anesthesia [15]. A study comparing patients with sigmoid volvulus under 59 and those under 60 showed that mortality and comorbidity were higher in patients under 60 [4, 16]. However, in our study, no significant age difference was found between the groups with and without mortality.

Apart from surgical treatments for colon volvulus, colonic decompression methods are not widely used as the only treatment measure, and methods usually followed by post-decompression surgery are more commonly applied in the clinic. Contrast enema has historically been used for diagnostic and therapeutic reasons in treating colon volvulus [17, 18]. Although there were rare cases described, they were elderly patients with multiple comorbidities and were not suitable for surgery, although they were not fully specified. While the success rate of colonic decompression in sigmoid volvulus is 70-90%, it is generally unsuccessful in cecal volvulus [8, 10, 18-20]. In a study by Ebrahimian et al., sigmoid volvulus decompression colonoscopy had a failure rate of 10.1% [18]. The time interval to non-emergent resection was three days. In addition, it is considered a temporary measure that allows elective or semi-elective surgery after stabilization of the underlying fluid and electrolyte disturbance caused by the disease [6]. It is not considered a definitive treatment method due to the high torsion recurrence (20%-70%) [8, 9, 16]. In our study, preoperative decompression colonoscopy was performed in 13 patients, and the mortality rate in these patients was 15.4%, and the ostomy opening rate was 38.4%. In our study, the highest waiting time after colonoscopy was 33 days for surgery.

Surgical treatment of colonic volvulus can be generally divided into procedures such as resecting the torsioned segment and fixation of the torsioned segment. In previously published series, it has been reported that decompression with fixation or operative detorsion without fixation was used in young patients who developed colon volvulus. This can be explained by the fact that young patients refuse the resective procedure, the surgeon does not want resection in the young patient, or, in some cases, the patient's general condition does not allow colon resection [21, 22]. In Halabi et al.'s study, only 17% of patients received

decompression colonoscopy without additional procedures. [4] In a different research, colon resection with restoration of bowel continuity emerged as a superior surgical option, according with a 44% recurrence rate after detorsion alone, a 30% recurrence rate after detorsion with colopexy, and a 13% mortality rate after sigmoidostomy. For uncomplicated sigmoid volvulus, a 9% recurrence and 10% mortality rates were found after colon resection [23]. In our study, reduction and sigmoidopexy were performed in one patient, and no recurrence occurred. We thought that the difficulty of complications that may occur in case of recurrence in the patient group and the delays in hospital admission might be why we did not prefer to wait for post-reduction surgery.

Mortality rates of different surgical procedures are consistent with previously reported data and current studies [4, 24, 25]. There was no significant change in mortality rates compared to old data. It was noted that the mortality rates were lower for patients who were treated with laparoscopy. However, laparoscopy is typically used for patients who have lower comorbidity scores, and these procedures are performed semi-electively after decompression with endoscopy [26, 27]. The effect of semi-elective surgery after decompression with endoscopy to protect against mortality has not been addressed, contrary to previously published data [28, 29]. This effect may be masked by other factors that have a higher impact on mortality. It has been found that delaying surgery after successful colonoscopic decompression to correct the underlying fluid and electrolyte imbalance can reduce mortality rates [4]. The impact of fluid and electrolyte imbalance on mortality rates has not been considered in great detail. A recent study found similar rates of mortality, anastomotic leakage, bleeding, surgical site infection, and wound dehiscence between primary anastomosis and the Hartmann procedure [30]. The most current ASCRS guidelines recommend primary anastomosis in elective cases unless the patient's risk factors conflict with this [31]. The mortality rate varies between 1% and 9% for the colon with intact blood supply and structure and 25% for gangrenous volvulus [4, 17, 18, 22, 32]. Colonic resection in cases of nongangrenous sigmoid volvulus has an acceptably low complication rate when performed as a semi-elective procedure after endoscopic detorsion has been performed as the initial procedure [4, 18, 33]. In their study, Halabi et al., found the mortality rate to be 6.4% in patients who underwent decompression colonoscopy. Our study examines the geriatric population and shows a population with a long time until symptoms appear. Due to this delay in

application, decompression colonoscopy could not be performed on all patients and could only be performed on 13 patients. In our study, mortality was found in 2 patients who underwent decompression (15.3% in the colonoscopy group and 4.5% in the entire patient group). While not statistically significant, patients who underwent colonoscopy had lower rates of ostomy and mortality. The fact that the CCI values of these two compared groups are statistically the same in our study indicates that the groups are similar in terms of mortality risks. We believe this may be because patients who can undergo colonoscopy are typically assumed not to have gangrenous or necrotic colon and are treated accordingly, resulting in lower mortality rates. Our study's high pH and bicarbonate values suggest that this idea is confirmed.

In a study conducted, all colon obstructions admitted to the emergency department between 2002 and 2010 were examined, and it was found that 1.9% of these obstructions were due to volvulus. In the same study, heart failure was found in 16.8% of the patients, Chronic pulmonary disease in 16.8%, kidney failure in 5.8%, and Neurological disorder or paralysis in 31.3%. In their study by Ebrahimian et al., it was reported that 13.7% of those with sigmoid volvulus had signs of Congestive heart failure, 16.5% had Chronic pulmonary disease, and 10.6% had chronic renal failure [18]. Again, the same study reported that patients with frailty had high mortality and morbidity. In our study, CVO in 3 (6.8%) patients, Parkinson's disease in 2 (4.5%) patients, Alzheimer's disease in 5 (11.3%) patients, epilepsy in 3 (6.8%) patients, CRY in 2 (4.5%) patients. CCY was present in 8 (18.8%) patients, and COPD was in 7 (15.9%) patients. When the literature is examined, it is not seen that all constipation etiologies have been questioned in a single study.

Deresse et al. reported that a high ASA score caused adverse perioperative outcomes [34]. Valzdezate et al. reported that postoperative complications and mortality increased in patients with an ASA score of 3 and above [35]. The same study reported that the mortal disease group developed in ASA 4 patients who underwent emergency surgery. Our study's mortality was statistically higher in the ASA 4 patient group.

In the literature, mortality and morbidity are high in volvulus patient groups with CCI >1 [36]. Additionally, intervention with endoscopic methods has been recommended for these patient groups. In the patient group with acute cholecystitis, which is another risky surgery requirement and CCI determines the risk

of preoperative mortality, complications were more common in those with CCI>6 [37]. Satheakeerthy et al. found the median CCI score to be 4 in their study [38]. In the same study, they followed up 48% of the patients non-operatively and reported that recurrence developed in 63%. The same study reported that although non-operative follow-up reduced mortality in patients with high CCI, mortality remained high. In our research, CCI was found to be statistically high in the group with hospital mortality.

Limitations

Our study is retrospective and has its limitations. Since it is not possible to determine how long the etiology of chronic constipation has persisted in patients, it is not clear whether there is chronic exposure to these diseases or their early consequences. Some of these weaknesses can be eliminated with a well-designed prospective study, but it will take a long time to reach sufficient patients. The surgical urgency of the disease means that it would be difficult to conduct a randomized trial. Another limitation of our study is that the mechanisms involved in the decisions taken for operations and other procedures by evaluating patients under emergency conditions cannot be fully evaluated.

CONCLUSION

Intestinal volvulus is a rare condition in any part of the large intestine. However, it is a severe medical issue that requires prompt diagnosis and treatment due to the possibility of intestinal damage and mortality. Mortality can be reduced with preoperative decompression in volvulus patients. In addition, it should be aimed to reduce morbidity and mortality with non-surgical methods in patients with comorbid diseases.

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Informed Consent: All informed consents were taken from all patients.

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