Original Research Article

Assessment of Factors Associated with Morbidity and Mortality in Patients with Sigmoid Volvulus: A Cross-Sectional Study

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Abstract

Background: Sigmoid volvulus is a life-threatening abdominal emergency and one of the most common causes of large bowel obstruction. Despite its frequency in endemic regions such as India, literature assessing morbidity and mortality factors remains sparse.

Objective: To assess the clinical, radiological, and perioperative factors associated with morbidity and mortality in patients with sigmoid volvulus.

Methods: A prospective cross-sectional study was conducted from November 2022 to May 2025 at Government Erode Medical College and Hospital Perundurai. Fifty patients with radiologically confirmed sigmoid volvulus were enrolled and divided into two groups: Group A (with peritonitis, n=18) and Group B (without peritonitis, n=32). Demographic, clinical, radiological, operative, and postoperative outcomes were analyzed using IBM SPSS v23. Mann-Whitney U and chi-square tests were applied, with $p<0.05$ considered statistically significant.

Results: The mean age of patients with peritonitis was 56.1 years compared to 51.7 years in those without peritonitis. Males predominated across both groups. Patients with peritonitis had significantly longer duration of symptoms, operative time, and postoperative hospital stay. Radiologically, acute intestinal obstruction and hollow viscus perforation were significantly more common in peritonitis, with Hartmanns procedure being the most frequent surgery performed. Comorbidities such as diabetes and hypertension were frequent but not statistically significant predictors. Complications including leucocytosis and bowel necrosis were significantly higher in peritonitis. Mortality occurred in three patients (6%), all in the peritonitis group. Mortality was significantly associated with older age and longer duration of symptoms.

Conclusion: Duration of symptoms before hospital presentation and advanced age are strong predictors of morbidity and mortality in sigmoid volvulus. Early diagnosis and timely intervention are critical to improve outcomes.

Keywords: Sigmoid Volvulus, Large Bowel Obstruction, Morbidity, Mortality, Peritonitis, Hartmanns Procedure.

Introduction

Sigmoid volvulus is an acute abdominal emergency condition that is life-threatening. It is the 3rd most common cause of large bowel obstruction next to diverticulitis and malignancy. Sigmoid volvulus is a condition where the sigmoid colon twists on its own axis and its own mesentery. It leads to a closed loop obstruction that was first described in 1836 by von Rokitansky [1-3]. The incidence varies across geographic locations. It has an inconsistent global incidence but is common in the Middle East, Africa, India, South America, and Turkey that comprise the "Volvulus belt". The incidence is highest between the 4th and 8th decade of life and is 2 to 10 times more common in males [4-6].

Etiology and risk factors are yet to be determined completely. These can be congenital or acquired. It can be either primary or secondary [7]. Similarly, there has been an intense interest in understanding the factors that determine the outcome of the illness. Based on the risk factors and presentation, the patients are classified into five different classes [8]. Clinical presentation has a classic triad of constipation, abdominal pain, and distension [9].

Literature from India with regards to sigmoid volvulus and its morbidity and mortality are few. This study aimed to assess the factors associated with morbidity and mortality in patients with sigmoid volvulus.

Materials and Methods

Study Design and Setting: his was a prospective, cross-sectional study carried out in the Department of General Surgery, Government Erode Medical College and Hospital Perundurai, Tamil Nadu, India. The study was conducted over a period of 31 months, from November 2022 to May 2025.

Study Population: A total of 50 consecutive patients who were clinically suspected and radiologically confirmed to have sigmoid volvulus were enrolled in the study. The diagnosis was established based on a combination of clinical features (abdominal pain, distension, constipation, vomiting) and radiological findings (abdominal X-ray and/or contrast-enhanced CT scan of the abdomen). Patients with bowel obstruction due to causes other than sigmoid volvulus (e.g., adhesions, hernia, neoplasm, or intussusception) were excluded.

Grouping

The study participants were categorized into two groups according to the presence or absence of peritonitis at the time of presentation:

- **Group A:** Patients with clinical and radiological evidence of peritonitis (n = 18).

- **Group B:** Patients without evidence of peritonitis (n = 32).
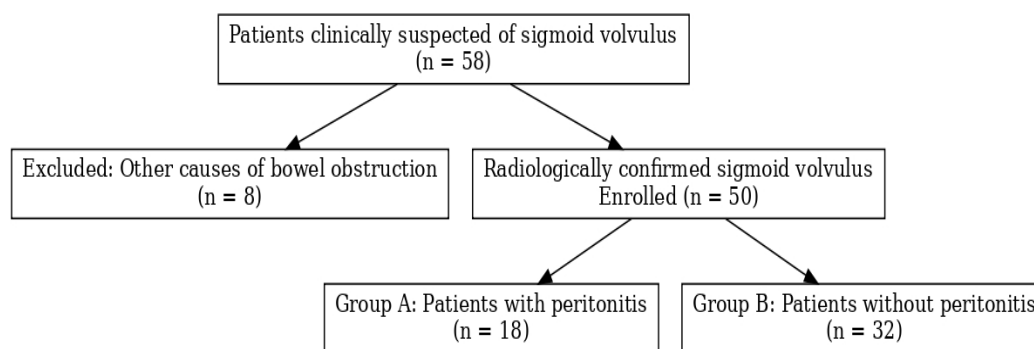
Flow Chart 1: Flow diagram of patient enrollment and grouping

Data Collection Procedure: For all enrolled patients, a detailed clinical history was obtained, including demographic data, presenting complaints, duration of symptoms, comorbidities, and previous episodes of bowel obstruction. A thorough physical examination was performed, with particular attention to abdominal signs suggestive of volvulus and peritonitis. All patients underwent routine laboratory investigations such as complete blood count (CBC), renal function test (RFT), liver function test (LFT), serum electrolytes, and coagulation profile. Radiological investigations included plain erect abdominal X-ray, which demonstrated the classical "coffee-bean sign" or related features, and contrast-enhanced CT abdomen where required to confirm the diagnosis and assess for complications.

Data Management and Statistical Analysis: All collected data were systematically recorded in a Microsoft Excel spreadsheet. Statistical analysis was performed using IBM SPSS Statistics for Windows, Version 23.0 (IBM Corp., Armonk, NY, USA). Categorical variables were expressed as frequencies and percentages, while continuous variables were summarized as mean ± standard deviation (SD) or median with interquartile range (IQR), depending on data distribution.

For comparison between the two groups, categorical variables were analyzed using the Chi-square test or Fisher's exact test, as appropriate. Continuous variables were compared using the Mann–Whitney U test due to non-normal distribution. A two-tailed p-value < 0.05 was considered statistically significant

Results

Demographics: The mean age of the participants in patients with peritonitis is 56.1 years (SD=7.6 years, n=18). The mean age of patients without peritonitis is 51.7 years (SD=2.1 years, n=32). Among patients with peritonitis, majority of them were males (n=17 out of 18 patients) and in patients without peritonitis, there were 28 males and four females. Table 1 shows the age distribution and Figure 1 shows the gender distribution of the participants.

Table 1: Age of the participants

	Group	N	Mean	Std. Deviation
Age	Patients With Peritonitis	18	56.128	7.6289
	Patients Without Peritonitis	32	51.667	2.0817
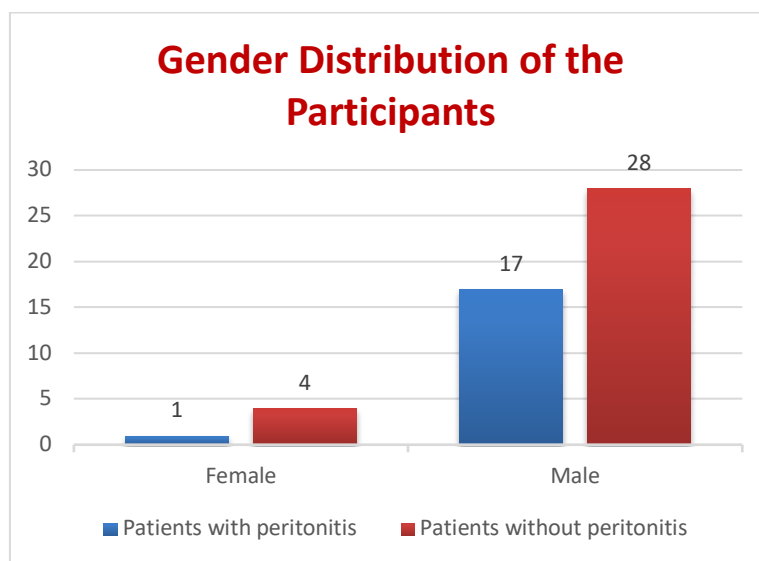
Figure 1: Gender distribution of the participants

Duration of Symptoms, Procedure, and Hospital Stay: Table 2 & Figure 2 shows the duration of symptoms (in hours), duration of procedure (in minutes), and duration of post-surgery hospitalisation (in days). In patients with peritonitis, the duration of symptoms was longer (32.8 vs. 30.0 hours). The duration of procedure and post-operative hospitalisation was longer in patients with peritonitis (114 vs. 103 minutes for procedure; 12.1 vs. 9.7 days for hospital stay). Mann–Whitney U test shows that the results are statistically significant ($p < 0.05$).
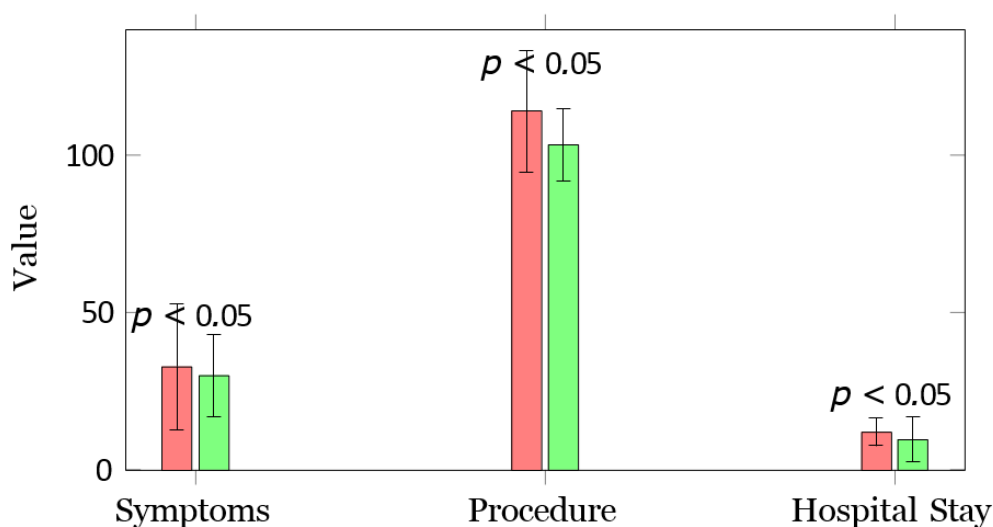


Figure 2: Duration Metrics by Group

Table 2: Duration of symptoms, procedure and post-operative duration of stay in hospital

	Group	N	Mean	Std. Deviation	Mann-Whitney U test
Duration Of Symptoms Before (In Hours)	Patients With Peritonitis	18	32.830	19.8914	P<0.05
	Patients Without Peritonitis	32	30.000	13.1149	
Duration Of Procedure (In Minutes)	Patients With Peritonitis	18	114.043	19.4108	P<0.05
	Patients Without Peritonitis	32	103.333	11.5470	
Postoperative Duration Of Stay In Hospital (In Days)	Patients With Peritonitis	18	12.106	4.4489	P<0.05
	Patients Without Peritonitis	32	9.667	7.2342	

Radiological Findings and Procedures: Radiologically, acute intestinal obstruction was identified in 14 patients with peritonitis, three with hollow viscus perforation and one with sigmoid volvulus in peritonitis group. In patients without peritonitis, two of them had subacute intestinal obstruction and one of them had sigmoid volvulus. Hartmann's procedure was performed in predominant cases, while sigmoidopexy was done in only 2 cases without peritonitis. Table 3 shows the radiological findings and procedure done.
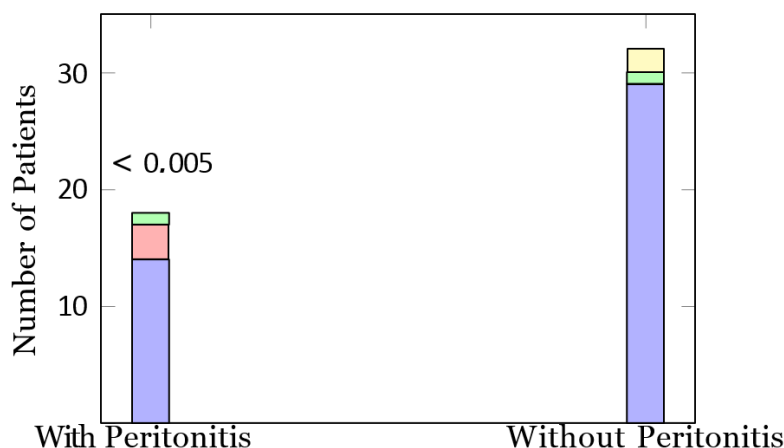
Figure 3: Radiological findings

Table 3: Radiological findings and procedure done

		Group		Total	Chi square analysis and p-value
		Patients with peritonitis	Patients without peritonitis		
Radiological Finding	**Acute Intestinal Obstruction**	14	29	43	P<0.005 Statistically highly significant
	Hollow Viscus Perforation	3	0	3	
	Sigmoid Volvulus	1	1	2	
	Subacute Intestinal Obstruction	0	2	2	
Procedure Done	**Hartmanns Procedure**	18	30	48	P<0.005 Statistically highly significant
	Sigmoidopexy	0	2	2	

Comorbid Conditions: Table 4 shows the presence of comorbidities. Results were not statistically significant (p>0.05). Comorbidities such as diabetes, hypertension, coronary artery disease, and

respiratory disease were recorded. No significant differences were noted between groups.

Table 4: Comorbid conditions

S.No	Comorbid condition	Category	Group		Total	Chi-square p-value
			Patients with peritonitis	Patients without peritonitis		
1	Diabetes	Present	17	0	17	p>0.05
		Absent	1	32	33	
2	Hypertension	Present	7	0	7	p>0.05
		Absent	11	32	43	
3	Coronary artery disease	Present	3	0	3	p>0.05
		Absent	15	32	47	
4	Respiratory Disease	Present	3	0	3	p>0.05
		Absent	15	32	47	

Complications: Table 5 shows the incidence of complications. Those with peritonitis had more complications. Statistical significance was seen for leucocytosis and bowel necrosis (p<0.005), while other complications such as hypotension, perforation, and SSI were not.

Table 5: Complications

S.No	Complications	Category	Group		Total	Chi-square p-value
			Patients with peritonitis	Patients without peritonitis		
1	Leucocytosis	Present	8	0	8	**P<0.005**
		Absent	10	32	42	
2	Hypotension	Present	4	0	4	p>0.05
		Absent	14	32	46	
3	Electrolyte imbalance	Present	1	0	1	p>0.05
		Absent	17	32	49	
4	Bowel necrosis	Present	3	0	3	**P<0.005**
		Absent	15	32	47	
5	Sigmoid perforation	Present	2	0	2	p>0.05
		Absent	45	3	48	
6	Presence of peritonitis	Present	3	0	3	**P<0.05**
		Absent	15	32	47	
7	Surgical site infection	Present	15	0	15	p>0.05
		Absent	3	32	35	
8	Ostomy related complications	Present	2	0	2	p>0.05
		Absent	16	32	48	

Mortality: Among 50 patients, three of them died in the group with peritonitis.

Two of them died on 1st and 4th post-operative day respectively. One of them died after 22 days. The mean age and the duration of symptoms were higher in the three patients. Mann-Whitney U test shows that age is statistically highly significant predictor of mortality (p=0.004) and duration of symptoms was statistically significant predictor of mortality (p=0.015). Higher age and longer duration of symptoms were correlated with high mortality rate.

Table 6: Comparison of Age and Duration of symptoms between those who died and those who were alive

	Death	N	Mean Rank	Sum of Ranks	Mann-Whitney U	Statistical Interpretation
Duration Of Symptoms Before (In Hours)	Alive	47	24.23	1139.00	.015	Significant
	Dead	3	45.33	136.00		
Age	Alive	47	24.18	1136.50	.004	Highly significant
	Dead	3	46.17	138.50		

Discussion

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This study highlights the importance of timely diagnosis and intervention in reducing morbidity and mortality in sigmoid volvulus. The mean age of patients with peritonitis was significantly higher, in line with prior studies identifying age as a major prognostic factor [16].

The predominance of males agrees with global epidemiological data [4-6]. The delay in hospital presentation and consequent prolonged symptom duration was strongly correlated with adverse outcomes. Similar findings were reported in studies from Turkey and Africa, where delayed presentation resulted in ischemia and gangrene [1, 14]. Hartmann's procedure was the predominant surgical intervention in this study, consistent with current practice in complicated cases with peritonitis and necrosis. Non-peritonitis cases could be managed with less invasive options like sigmoidopexy [11]. Comorbidities were common but not statistically significant predictors. This differs from Western literature, where diabetes and cardiovascular disease are known to increase surgical risk [10]. This discrepancy may be due to the small sample size and single-center nature of our study. Mortality (6%) was comparable to other Indian series, though lower than African reports where delayed diagnosis is more frequent [5, 14]. The strong correlation of mortality with age and symptom duration reinforces the need for early recognition and referral systems in peripheral centers [15-17]. This study has the limitations of smaller sample size, single centric study, and cross-sectional study and did not collect much data on other non-clinical aspects or follow-up. However, this study is significant from the academic perspective as it aims to fill an important gap in the knowledge of the surgeons. Further studies should focus on multicentric longitudinal studies.

Conclusion

Duration of symptoms and older age are significant predictors of morbidity and mortality in sigmoid volvulus. Patients with peritonitis have higher complication and mortality rates. Hartmann's procedure remains the mainstay in complicated cases. Early diagnosis and timely surgical intervention are crucial for improving patient outcomes.

Ethical statement: Institutional ethical committee accepted this study. The study was approved by the institutional human ethics committee, Government Erode Medical College and Hospital Perundurai [IEC/003/07/GEMCH/2022, dated 30-08-2022]. Informed written consent was obtained from all the study participants and only those participants willing to sign the informed consent were included in the study. The risks and benefits involved in the study and the voluntary nature of participation were explained to the participants before obtaining consent. The confidentiality of the study participants was maintained.

Data Availability: All datasets generated or analyzed during this study are included in the manuscript.

Informed Consent: Written informed consent was obtained from the participants before enrolling in the study

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