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Outcome of Resection and Primary Anastomosis in Uncomplicated Sigmoid Volvulus

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Abstract **Original Research Article**

Background: Sigmoid volvulus is a critical surgical condition characterized by the twisting of the sigmoid colon along its long axis, primarily affecting elderly male patients. The condition often necessitates surgical intervention to relieve the life-threatening obstruction. ***Objective:*** This study aimed to evaluate the outcomes of resection and primary anastomosis as the preferred surgical approach for uncomplicated sigmoid volvulus cases, excluding those with perforation or gangrene. ***Methods:*** A prospective observational study was conducted on 40 patients meeting specific criteria, involving structured data collection, hand-sewn resection, and primary anastomosis. Postoperative follow-ups were performed at 24 and 6 weeks, and data were analyzed using SPSS. ***Results:*** The study found a mean patient age of 56.25 years, with a predominant male population (male-to-female ratio: 9:1). Common symptoms included abdominal distension, constipation, colicky abdominal pain, vomiting, and urinary retention. Complications, observed in 27.5% of patients, included wound infections, wound dehiscence, anastomotic leakage, pelvic abscess, and prolonged paralytic ileus. A 95% survival rate was noted, with 80% of patients staying in the hospital for 10 days or more. The mean hospital stay was 10.77 days (range: 7-19 days). ***Conclusion:*** Resection and primary anastomosis is a safe and effective single-stage procedure for uncomplicated sigmoid volvulus cases, resulting in better outcomes, shorter hospital stays, and avoidance of a staged operation without increasing morbidity and mortality.

Keywords: Sigmoid volvulus, surgical intervention, resection, primary anastomosis, outcome.

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INTRODUCTION

Sigmoid colon volvulus is a pathological condition characterized by the abnormal twisting of the sigmoid colon around its mesentery. It is a frequent cause of colonic obstruction and has significant clinical implications [1]. Sigmoid volvulus can be categorized as either complicated or uncomplicated, with the latter referring to cases without intraoperative evidence of gangrene or perforation [2]. The clinical presentation of sigmoid volvulus can be classified into two distinct categories: Fulminant and Indolent. Fulminant cases manifest as a sudden onset of severe pain, early vomiting, and a rapidly deteriorating clinical course. In contrast, Indolent cases present with an insidious onset, a slowly progressive clinical course, less severe pain, and delayed vomiting.

Sigmoid volvulus ranks as the third most common cause of large bowel obstructions, following colorectal cancer and diverticulitis [3]. Notably, its prevalence varies widely, constituting approximately 4% of all large bowel obstruction cases in developed countries, but rising to a staggering 50% in developing nations [4]. The condition is particularly prevalent in Eastern Europe, African, and Indian populations, while it remains relatively rare in Western populations [5].

Moreover, sigmoid colon volvulus predominantly affects males and is exceedingly rare in children and neonates [6]. Several primary predisposing factors have been identified, including a long sigmoid loop with a narrow mesentery, chronic constipation, a high-fiber diet, overladen redundant pelvic colon, and the use of anticholinergic drugs, sedatives, and anti-Parkinson agent [7]. The clinical presentation of sigmoid volvulus is relatively uniform, typically featuring abdominal pain, distension, and constipation. Vomiting is initially absent, and digital rectal examination often reveals an empty rectum. On radiographic imaging, the

hallmark findings include a "tyre-like" appearance, "Omega Loop," or the "Coffee Bean Sign" [8]. Computed tomography (CT) scans can further confirm the diagnosis [9].

However, there is no consensus regarding the optimal surgical management for patients with an acute presentation of sigmoid volvulus. Initial management may involve sigmoidoscopy or rectal tube insertion [10]. Surgical procedures employed in these cases include resection and primary anastomosis, Hartmann's procedure, mesosigmoidoplasty, and total colectomy [11]. Over the past two centuries, resection and primary anastomosis have emerged as the preferred choice of surgical treatment for sigmoid volvulus [12]

In developing countries, mortality following emergency surgery for acute sigmoid volvulus is relatively low [13]. However, postoperative mortality rates can still range widely [14]. In many cases, antegrade on-table colonic lavage is performed to decompress and clean the proximally obstructed colon, aiming to decrease distention, facilitate abdominal closure, and improve colonic blood supply. However, recent evidence suggests that complete cleansing of the colon from fecal matter may not be necessary to ensure anastomotic integrity [15].

This study was conducted to evaluate the outcomes of resection and primary anastomosis without colonic lavage in uncomplicated sigmoid volvulus cases, focusing on postoperative complications and hospital stay. Understanding the effectiveness and safety of this approach is critical in guiding clinical decision-making and improving patient outcomes.

Objectives

General Objective

- To assess the outcomes of resection and primary anastomosis in uncomplicated sigmoid volvulus.

Specific Objectives

- To profile the socio-demographic characteristics of patients with uncomplicated sigmoid volvulus.
- To determine the proportion of patients with favorable outcomes after resection and primary anastomosis.
- To document complications associated with this surgical procedure.
- To calculate the mortality rate among patients undergoing resection and primary anastomosis.

MATERIALS AND METHODS

Study Design

This prospective observational study was conducted in the Department of Surgery at Rajshahi Medical College Hospital, Rajshahi, Bangladesh, from January 2018 to June 2019. It utilized purposive sampling, selecting patients with a diagnosis of uncomplicated sigmoid volvulus based on the absence of gangrene or perforation found during intraoperative examination.

Inclusion Criteria

- Patients admitted to the surgery ward of Rajshahi Medical College Hospital (RMCH).
- Diagnosed with uncomplicated sigmoid volvulus.
- Absence of gangrene or perforation found intraoperatively.

Exclusion Criteria

- Moribund patients with ASA (American Society of Anesthesiologists) grade III and IV.
- Patients with severe co-morbidities such as ischemic heart disease (IHD), chronic kidney disease (CKD), thyroid disorders, and chronic obstructive pulmonary disease (COPD).
- Patients with large bowel obstructions presenting as emergencies other than sigmoid volvulus.
- Patients with complicated sigmoid volvulus, including those with gangrene or perforation.

Study Procedure

This prospective observational study was conducted in RMCH. A sample of forty patients was selected for inclusion in the study, all of whom had uncomplicated sigmoid volvulus with a viable colon and no evidence of gangrene or perforation. Patient enrollment was achieved through purposive sampling.

To ensure eligibility, each patient underwent a comprehensive evaluation, including a thorough medical history, clinical examination, and relevant investigations. A semi-structured data collection sheet was utilized as the primary research tool. Informed consent was obtained from all participants before the surgical procedures. Experienced consultant-grade surgeons performed the surgeries under general anesthesia. Preoperatively, patients were resuscitated, and a nasogastric tube and Foley's catheter were inserted to monitor fluid intake and output. During laparotomy, the viability of the affected bowel was assessed through a lower midline incision. Gaseous distention of the colon was relieved through aspiration using Foley's catheter inserted through a colotomy, which was subsequently closed with a purse-string suture. The redundant sigmoid colon was divided using non-crushing occluding clamps, with exteriorization from the surgical field. Manual decompression was employed, and the bowel ends were cleansed before performing an end-to-end anastomosis using 3/0 polyglycolic acid sutures in an interrupted fashion. The peritoneal cavity was thoroughly irrigated with 3-4 liters of normal saline.

Patients were followed for six weeks post-surgery, with assessments conducted at the 2nd, 4th, and 6th weeks to monitor surgical outcomes and potential complications. These evaluations included the examination of superficial wound infections, wound dehiscence, intra-abdominal abscesses, anastomotic leakage, sepsis, prolonged paralytic ileus, and any reported cases of mortality among the patients.

Data Collection

Data was collected through a structured, semi-structured data collection sheet by evaluating patients' medical history, clinical examinations, and relevant investigations. Preoperative data was used to assess eligibility, and postoperative data was gathered at 2nd, 4th, and 6th weeks post-surgery to monitor surgical outcomes and complications.

Data Analysis

Statistical analysis was performed using SPSS version 23. Categorical variables were expressed as frequencies and percentages, while quantitative data were presented as means with standard deviations. Qualitative data were conveyed as percentages and ratios, enabling an in-depth understanding of surgical outcomes and complications in uncomplicated sigmoid volvulus cases.

Ethical Considerations

This study prioritized ethical considerations by obtaining clearance from RMCH's Ethics Review Committee. Participants were comprehensively informed about the study's purpose, risks, and benefits. Their consent was secured before data collection, minimizing physical and psychological risks. Privacy was upheld during physical examinations and interviews. Anonymity and confidentiality were ensured through unique patient IDs. Participants were guaranteed proper treatment for complications and the freedom to withdraw. Signed informed consent emphasized privacy maintenance and potential compensation for work time loss. The study did not involve new drugs, experimental medications, or placebos, eliminating related risks.

RESULT

The age distribution of the study's 40 patients with uncomplicated sigmoid volvulus. The majority (40%) fell in the 51-60 age group. The mean age was 56.25 years with a standard deviation of 12.03. The age range spanned from 36 to 78 years, reflecting the diversity within the patient cohort.

Table 1: Distribution of Patients According to Age (n=40)

Age Group (in years)	Frequency	Percentage
31-40	4	10.0%
41-50	5	12.5%
51-60	16	40.0%
61-70	14	35.0%
70-80	1	2.5%
Gender		
Male	36	90%
Female	4	10%
Male-to-Female Ratio	-	9:1
Age Range (in years)	36-78	
Mean Age ± SD (in years)	56.25 ± 12.03	

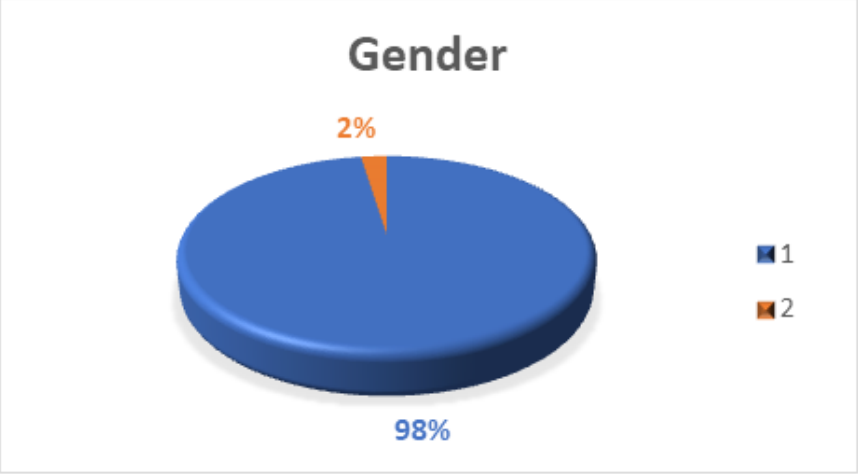

Figure 1: Distribution of Patients According to sex (n=40)

Table 2: Distribution of Patients According to Clinical Presentation

Clinical Presentation	Frequency	Percentage (%)
Abdominal distension	40	100%
Constipation	37	92.5%
Abdominal pain	36	90%
Vomiting	9	22.5%
Retention of urine	3	7.5%

Table 3: Postoperative Outcome after Surgery (n=40)

Outcome	Frequency	Percentage (%)
Uneventful Outcomes	29	72.5%
Complications	11	27.5%
Complications		
Wound Infection	6	15%
Wound Dehiscence	3	7.5%
Anastomotic Leakage	2	5%
Pelvic Abscess	2	5%
Prolonged Paralytic Ileus	1	2.5%
Mortality		
Survival	38	95%
Mortality	2	5%
Hospital Stay Duration		
≥10 Days	32	80%
<10 Days	8	20%
Mean Hospital Stay	-	10.77 ± 1.76
Range (in days)	-	7-19 days

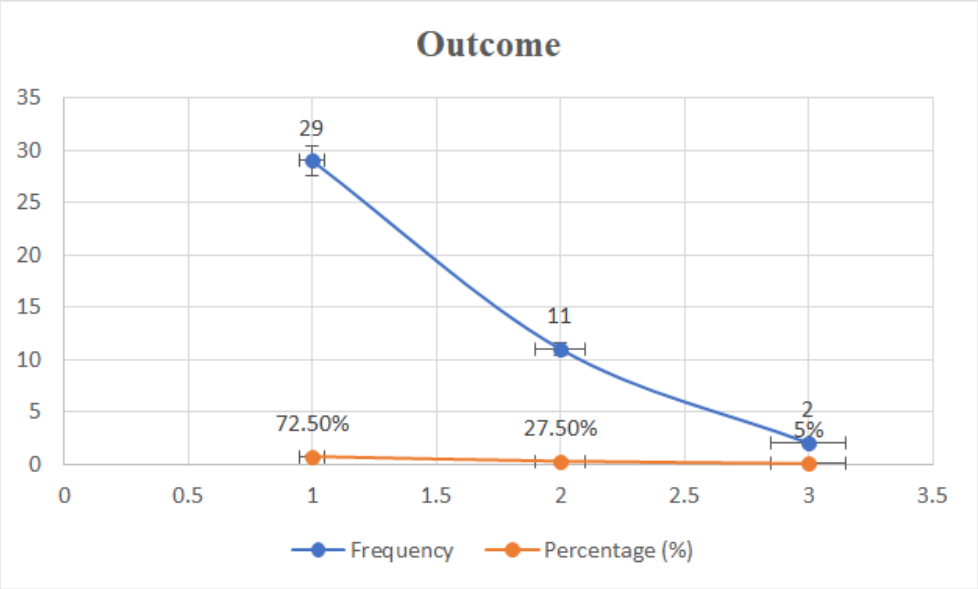

Figure 2: Overall Outcomes, Complications with Mortality

The study's variables encompass patient demographics, clinical presentation, outcomes after surgery, complications, mortality, and hospital stay duration. Notably, the majority of patients were male (90%) with a significantly higher male-to-female ratio of 9:1. Clinical presentations primarily included abdominal distension (100%) and constipation (92.5%). After surgery, 72.5% experienced uneventful outcomes, while 27.5% faced complications such as wound infection, wound dehiscence, anastomotic leakage, pelvic abscess, and prolonged paralytic ileus. Despite these complications, survival remained high at 95%. Most patients had a hospital stay duration of ≥10 days (80%), with a mean stay of 10.77 days. These variables provide valuable insights into the study's patient population, clinical characteristics, and postoperative outcomes.

DISCUSSION

Sigmoid volvulus is a challenging and potentially life-threatening condition that requires

careful consideration of treatment options. The discussion will explore various aspects of sigmoid volvulus, including its clinical presentation, diagnostic methods, treatment strategies, and outcomes.

Sigmoid volvulus typically presents with a combination of symptoms, including abdominal pain, abdominal distension, constipation, and, in some cases, vomiting [16]. These symptoms result from the torsion of the sigmoid colon around its mesentery, causing a closed-loop obstruction. The severity and acuteness of these symptoms can vary among patients. In some cases, the condition may manifest as fulminant sigmoid volvulus, characterized by a sudden onset, severe abdominal pain, early vomiting, and a rapidly deteriorating clinical course [10]. On the other hand, an indolent sigmoid volvulus may have a more gradual onset, a slower progressive course, less severe pain, and delayed vomiting [16]. In this study, the clinical presentation of sigmoid volvulus is consistent with these common features. All patients exhibited abdominal distension, and the majority experienced constipation and abdominal pain. Vomiting was observed in a significant portion of the patients. However, the presentation of vomiting varied among patients, likely due to differences in the timing of hospital presentation. Vomiting is typically a late presentation in sigmoid volvulus, often occurring after other symptoms have become severe [10].

The diagnosis of sigmoid volvulus is primarily based on clinical presentation, physical examination, and radiological findings. Abdominal X-rays are often the initial diagnostic modality, revealing characteristic findings such as the "coffee bean sign" or the "omega loop" [17]. These radiological signs provide essential clues for diagnosis, although further confirmation through additional imaging techniques, such as computed tomography (CT) scans, may be necessary. The use of CT scans can be particularly helpful in confirming the diagnosis and assessing the extent of bowel distension. In some cases, it can also reveal the presence of complications such as perforation, ischemia, or gangrene [9] While not explicitly mentioned in the study, it is reasonable to assume that these diagnostic methods were employed to confirm the presence of uncomplicated sigmoid volvulus and exclude gangrene or perforation.

The management of sigmoid volvulus can involve both non-operative and operative approaches. Non-operative measures may include sigmoidoscopy, rectal tube insertion, and endoscopic detorsion [10]. These methods are often considered in patients who are stable and present without signs of ischemia, gangrene, or peritonitis. In cases of uncomplicated sigmoid volvulus, where the bowel remains viable and there is no evidence of gangrene or perforation, surgical intervention is usually not an immediate necessity. However, patients may undergo elective sigmoid resection to prevent future recurrences, as non-operative measures have a higher risk of recurrence [10]. In contrast, when patients present with an acute abdomen, signs of ischemia, gangrene, or perforation, emergency surgery becomes necessary. Surgical procedures for sigmoid volvulus may include resection and primary anastomosis, Hartmann's procedure (creating a colostomy and closing the rectal stump), mesosigmoidoplasty, or total colectomy, depending on the patient's condition and the surgeon's preference [10].

In this study, the choice of treatment was resection and primary anastomosis in patients with uncomplicated sigmoid volvulus. Resection and primary anastomosis is a well-established approach for this condition. It involves the resection of the affected sigmoid colon and the creation of an anastomosis to restore intestinal continuity. This approach is favored as it avoids the need for a colostomy and subsequent reversal surgery. The study results indicated that resection and primary anastomosis was practically feasible in patients without perforation or gangrene and with well-vascularized and non-distended remaining bowel. It offered the advantage of being a safe and single-stage procedure with favorable outcomes [12].

Outcome and Complications:

The study's findings regarding the outcomes of resection and primary anastomosis in uncomplicated sigmoid volvulus provides valuable insights. The majority of patients (72.5%) had an uneventful recovery, demonstrating the effectiveness of this approach in selected cases [10]. However, a significant proportion (27.5%) experienced various complications. These complications included wound infection, wound dehiscence, anastomotic leakage, pelvic abscess, and prolonged paralytic ileus. Wound infection, including superficial wound infections, is a known complication in abdominal surgeries. The study results indicated a rate of 15%, which is within the range reported in the literature [18]. High rates of wound infection can be attributed to factors such as unprepared bowel, contamination during surgery, and poor nutritional status.

Wound dehiscence was observed in 7.5% of the patients, which is higher than the rates reported in other studies, such as 4.59% [19]. Factors contributing to wound dehiscence may include increased intra-abdominal pressure following anastomotic leakage and postoperative coughing [10]. Anastomotic leakage is a major concern in patients undergoing resection and primary anastomosis. The study found an anastomotic leakage rate of 5%, which is consistent with other studies [6, 9]. Factors contributing to anastomotic leakage may include the extension of gangrene beyond the anastomotic site and fecal contamination [11].

Pelvic abscess, another complication, was observed in 5% of the patients, a rate similar to that reported Patients with pelvic abscess required re-

exploration and proper drainage to address this complication. Prolonged paralytic ileus was observed in 2.5% of the patients, which falls within the range reported in the literature [19]. The causes of prolonged paralytic ileus may include factors such as postoperative complications, ileus secondary to sepsis, or adhesions.

Mortality was reported in 5% of the patients in this study, similar to the findings [10]. Mortality is a critical outcome in sigmoid volvulus, and its occurrence is often associated with delays in sigmoid decompression, leading to intestinal ischemia and gangrene. The mean hospital stay for patients in this study was 10.77 days, which is consistent with the results reported by [20]. Hospital stay duration is influenced by various factors, including postoperative recovery and the occurrence of complications.

The findings of this study align with existing research, supporting resection and primary anastomosis as a valuable approach for uncomplicated sigmoid volvulus [12, 13]. This one-stage procedure reduces cumulative anesthetic risk, improves patient quality of life by avoiding colostomy, and shortens hospital stays. The study emphasizes the importance of addressing risk factors, particularly nutritional status, to achieve better postoperative outcomes. Malnourished patients faced a higher risk of complications, underlining the need for nutritional optimization and support in the preoperative and postoperative phases [11]. Complication rates vary across studies, reflecting the influence of surgical techniques, bowel preparation, and patient selection on outcomes [6]. These findings underscore the complexity of managing sigmoid volvulus and the necessity of personalized approaches based on each patient's unique condition.

Resection and primary anastomosis prove safe and effective for uncomplicated sigmoid volvulus without gangrene or perforation. However, mitigating complications such as wound infection, dehiscence, anastomotic leakage, pelvic abscess, and prolonged paralytic ileus remains essential [19]. The study underscores the significance of early intervention and nutritional optimization to enhance postoperative outcomes and decrease mortality risk. Future research and larger studies are warranted to assess long-term outcomes and recurrence rates related to this surgical approach [21].

This study adds to the accumulating evidence favoring resection and primary anastomosis as an effective treatment for uncomplicated sigmoid volvulus. While individual cases should be carefully considered, this approach offers promise in terms of patient recovery, avoidance of colostomy, and reduced hospital stay. By addressing risk factors and optimizing nutritional status, healthcare providers can enhance postoperative experiences and reduce complications, ultimately improving patient outcomes and survival rates. Further extensive research is necessary to bolster these findings and provide comprehensive insights into sigmoid volvulus management.

CONCLUSION

Resection and primary anastomosis is a safe and effective single-stage procedure for uncomplicated sigmoid volvulus, provided bowel viability is preserved. This approach ensures a permanent cure, avoids the need for a colostomy, and reduces the associated morbidity and mortality. Bowel viability remains the key factor influencing patient outcomes in sigmoid volvulus cases.

Limitations:

The study's limitations should be considered. It is a single-center study with a limited sample size. Larger, multicenter studies could provide more comprehensive insights into the outcomes and complications of resection and primary anastomosis in uncomplicated sigmoid volvulus. The study did not provide data on long-term outcomes and recurrence rates, which could be valuable for assessing the durability of this surgical approach.

Recommendations:

- Perform a case-control study for a detailed analysis of outcomes.
- Extend the study duration for long-term insights.
- Collaborate with multiple centers to enhance generalizability.

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