Faridpur Med. Coll. J. 2026;21(2):29-33 DOI: https://doi.org/10.3329/fmcj.v21i2.90752

## Original Article

# Single vs Two Stage Solution: Outcomes of Primary Anastomosis After Uncomplicated Sigmoid Volvulus

MRR Romi[1], MH Rahman[2], S Alam[3], MMA Khan[4], A Yazdani[5], R Karmakar[6], M Noor[7]

***Abstract:***

***Background:*** *Sigmoid volvulus is a life-threatening cause of large bowel obstruction, and debate continues over whether single-stage or two-stage surgery is safer and more effective. This study directly compares both approaches in uncomplicated cases to help guide optimal surgical decisions.*

***Methods:*** *This interventional study, conducted at Shaheed Ziaur Rahman Medical College Hospital from October 2018 to April 2019, enrolled fifty consecutive patients diagnosed with uncomplicated sigmoid volvulus, while patients presenting with shock, severe comorbidities, bowel gangrene, discontinuation of treatment, or unwillingness to provide consent were excluded from participation. After careful clinical evaluation and admission for surgical management, all eligible patients were divided into two groups according to the operating surgeon's preference and intraoperative judgment. In one group, a single-stage procedure with resection and primary anastomosis was performed, whereas the second group underwent a planned two-stage surgical approach. Each group consisted of 25 patients, allowing a balanced comparison between the two operative strategies.*

***Result:*** *Both one-stage and two-stage groups were similar in age (49.4 ± 19.1 vs 50.9 ± 13.9), sex (male 84% vs 80%), diabetes (28% vs 20%), and hypertension (20% vs 28%), with no significant differences in vital signs. Operative time (92.4 ± 19.2 vs 71.6 ± 11.8 min, $p < 0.001$) and blood loss (200 ± 91.3 ml vs 156 ± 63.4 ml, $p = 0.03$) were lower in the two-stage group. The one-stage group had more anastomotic leaks (24% vs 0%, $p = 0.02$), while stomal complications were exclusive to the two-stage group (24%, $p = 0.02$). Other complications like surgical site infection (20% vs 36%), wound dehiscence (8% vs 12%), systemic infection (0% vs 16%), hospital stay (12.0 vs 12.2 days), and eventful recovery (32% vs 28%) showed no significant differences. Improvement rates were 64% vs 52%.*

**Conclusion:** *Our findings reveal that single-stage and two-stage surgeries for uncomplicated sigmoid volvulus offer similar overall outcomes, though each carries its own set of specific risks and benefits.*

**Keywords:** Uncomplicated sigmoid volvulus, Single-stage surgical procedure, Two-stage surgical procedure, Surgical outcome.

## Introduction:

Sigmoid volvulus (SV), defined as a pathological twist of the sigmoid colon around its mesenteric axis, represents a life-threatening cause of large bowel obstruction with potential for rapid progression to gangrene, perforation, or peritonitis if left untreated.[1-4] While SV accounts for nearly 50% of colonic obstructions in developing regions known as the "volvulus belt," its incidence remains much lower in

1. Md. Rezaur Rahman Romi, MBBS, FCPS (Surgery), Junior consultant (Surgery), Upazilla health complex, Dupchachia, Bogura, Email: romisbmc37@gmail.com.
2. Md. Hafizur Rahman, MBBS, FCPS (Surgery), Resident Surgeon, Department of General Surgery, Dhaka Medical College Hospital, Dhaka, Email: dipudmck66@gmail.com.
3. Shahinul Alam, MBBS, FCPS (Medicine), MCPS (Medicine), MRCP (UK), Registrar, Department of Medicine, Dhaka Medical College Hospital, Dhaka, Email: shahin.dmc66@gmail.com.
4. Md. Morshedul Alam Khan, MBBS, FCPS (Medicine), Indoor Medical Officer, Department of Medicine, Dhaka Medical College Hospital, Dhaka, Email: galib.dmc66@gmail.com.
5. Asif Yazdani, MBBS, FCPS (Surgery), Medical Officer, Casualty Block, Department of General Surgery, Dhaka Medical College Hospital, Dhaka, Email: asif.yazk66@gmail.com.
6. Rajeebshankar Karmakar, MBBS, MS (Thoracic Surgery), MRCSEd, MRCSI, FICS, Resident Surgeon, Faridpur Medical College and Hospital, Faridpur, Email: rajeebfmc16@ gmail. com.
7. Masnoon Ahmed Noor, MBBS, MS (Thoracic Surgery), Consultant (Thoracic Surgery), KPJ Specialized Hospital, Gazipur, Email : noor.rmc@gmail.com

**Address of correspondence:**

Rajeebshankar Karmakar, MBBS, MS (Thoracic Surgery), MRCSEd, MRCSI, FICS, Resident Surgeon, Faridpur Medical College and Hospital, Faridpur. Email: rajeebfmc16@gmail.com, Phone: +88019 11030354.

Western countries, comprising less than 7% of cases.[2-8] The standard management for uncomplicated cases begins with endoscopic detorsion, but urgent surgery is required when this fails or complications arise.[5,6,8,9] Two major surgical strategies exist: single-stage resection with primary anastomosis, which aims for definitive cure in one operation, and the two-stage Hartmann's procedure, preferred when patient condition or bowel viability raises concerns about immediate anastomosis.[1-4,6,8,10] While single-stage surgery can minimize hospital stay and the need for stoma, controversy persists regarding its safety in compromised patients or unprepared colons[1,4]. Existing literature leaves uncertainty regarding the optimal surgical approach for uncomplicated SV, particularly in resource-limited settings and among high-risk populations.[1,6,9] This gap highlights the need for further comparative research on surgical outcomes. Therefore, our study seeks to evaluate and compare the outcomes of single versus two-stage primary anastomosis in patients with uncomplicated sigmoid volvulus.

**Materials and Methods:**

This interventional study was conducted in the Department of Surgery at Shaheed Ziaur Rahman Medical College Hospital from October 2018 to April 2019. Fifty consecutive patients presenting with uncomplicated sigmoid volvulus, defined by the presence of a viable bowel without gangrene or perforation, were enrolled using convenience sampling techniques. Prior to initiation of the study, ethical clearance was obtained from the Academic and Institutional Review Board of the hospital, and all necessary departmental permissions were secured in accordance with the principles of the Helsinki Declaration of 2011 concerning research involving human subjects. Every participant was thoroughly informed about the study objectives, possible benefits, and potential risks, and written informed consent was obtained through a transparent and respectful process. Participants were assured of their right to withdraw from the study at any stage without any consequence, while strict confidentiality of all collected information was carefully maintained throughout the research period. Patients with shock, significant co-morbidities, gangrenous gut, discontinuation of treatment, or refusal to consent were excluded from the study. Following detailed clinical assessment and preoperative preparation, the selected patients were divided into two groups according to the operating surgeon's preference and intraoperative judgment regarding the most suitable surgical strategy. In one group, twenty-five patients underwent a single-stage procedure with primary resection and anastomosis, whereas the remaining twenty-five patients were managed by a two-stage surgical approach. Data were meticulously collected and manually edited before analysis using SPSS version 17. Continuous variables were summarized as mean and standard deviation, while categorical variables were expressed as percentages, and statistical significance was determined using the Chi-square test and Student's t-test with a p-value of less than 0.05 considered statistically significant.

**Results:**

Table 1 highlights the demographic and preoperative characteristics of patients undergoing single-stage and two-stage surgical management for uncomplicated sigmoid volvulus. The findings show that both groups were remarkably well-matched in terms of age, sex distribution, comorbidities, history of previous abdominal surgery, and baseline vital signs. There were no significant differences between the two groups across any of these variables, indicating a balanced comparison and minimizing potential confounding factors.

**Table 1:** Distribution of respondents according to demographic and preoperative variables (N=50).

| Variables | | One Stage (n=25) | Two Stage (n=25) | p-Value |
|---|---|---|---|---|
| Age | | 49.4±19.1 | 50.9±13.9 | 0.7 |
| Sex | | | | |
| | Male | 21 (84%) | 20 (80%) | 1.0 |
| | Female | 4 (16%) | 5 (20%) | |
| Comorbidity | | | | |
| | DM | 7 (28%) | 5 (20%) | 0.7 |
| | HTN | 5 (20%) | 7 (28%) | 0.7 |
| Previous abdominal surgery | | 3 (12%) | 5 (20%) | 0.7 |
| Vital signs | | | | |
| Pulse | | 98.3 ±11.9 | 97.8± 9.5 | 0.5 |
| Systolic BP | | 95.2± 18.7 | 96.0±14.4 | 0.9 |
| Diastolic BP | | 60.2± 9.6 | 58.8±12.0 | 0.6 |
| Temperature | | 100.4 ±1.2 | 100.1 ±1.0 | 0.4 |
| Respiration | | 16 ±2 | 18 ±2 | 0.7 |

*p-value was calculated by using chi-square test for categorical and t-test for quantitative variables. Fisher's exact test was done if any of cell had expected value less than 5*

Table 2 presents a comparison of per-operative findings. Most intraoperative characteristics, such as anatomical features and the presence of complicating factors, were similar between the groups, ensuring a fair basis for outcome assessment. Statistically significant difference was observed in both operative time and blood loss, favoring the two-stage approach for shorter surgery duration and reduced bleeding. This statistical significance highlights the practical impact of surgical technique on operative efficiency and patient safety.

**Table 2:** Distribution of respondents according to per-operative variables (N=50).

| Variables | One Stage (n=25) | Two Stage (n=25) | p-Value |
|---|---|---|---|
| Operative time | 92.4±19.2 | 71.6±11.8 | <.001 |
| Band in antimesenteric border | 1 (4%) | 1 (4%) | 1.0 |
| Long pelvic mesocolon | 6 (24%) | 5 (20%) | 1.0 |
| Narrow attachment with long pelvic mesocolon | 9 (36%) | 9 (36%) | 1.0 |
| Overloaded sigmoid colon | 4 (16%) | 4 (16%) | 1.0 |
| Redundant colon | 5 (20%) | 6 (24%) | 1.0 |
| Per operative blood loss (ml) | 200±91.3 | 156±63.4 | 0.03 |

*p-value was calculated by using chi-square test for categorical and t-test for quantitative variables. Fisher's exact test was done if any of cell had expected value less than 5*

Table 3 explores the landscape of postoperative outcomes. While most early and late complications were comparable between groups, statistically significant differences emerged in anastomotic leakage and stomal complications. The single-stage group experienced a higher rate of anastomotic leakage, whereas stomal complications were exclusive to the two-stage approach, highlighting the unique risk profile of each technique. Despite these differences, other recovery metrics such as surgical site infection, wound dehiscence, systemic infection, hospital stay, and overall eventful recovery remained similar.

**Table 3:** Distribution of respondents according to per-operative variables (N=50).

| Variables | One Stage (n=25) | Two Stage (n=25) | p-Value |
|---|---|---|---|
| Early complications | | | |
| Surgical site infection | 5 (20%) | 9 (36%) | 0.3 |
| Wound dehiscence | 2 (8%) | 3 (12%) | 1.0 |
| Anastomotic leakage | 6 (24%) | 0 (0%) | 0.02 |
| Systemic infection | 0 (0%) | 4 (16%) | 0.1 |
| Late complications | | | |
| Stomal complication | 0 (0%) | 6 (24%) | 0.02 |
| Hospital stay | 12 ± 4.0 | 12.2 ± 2.3 | 0.4 |
| Eventful recovery | 8 (32%) | 7 (28%) | 1.0 |

*p-value was calculated by using chi-square test for categorical and t-test for quantitative variables. Fisher's exact test was done if any of cell had expected value less than 5*

Table 4 summarizes the overall outcomes following surgical management of uncomplicated sigmoid volvulus. Both groups demonstrated encouraging rates of improvement, with a majority of patients showing positive postoperative progress. Although the proportions of static and deteriorated outcomes differed slightly between the groups, these differences did not reach statistical significance, highlighting the comparable effectiveness of both surgical strategies. The absence of a statistically significant difference suggests that either approach can lead to favorable results when carefully selected for the appropriate patient.

**Table 4:** Distribution of respondents according to outcome of operation (N=50).

| Variables | One Stage (n=25) | Two Stage (n=25) | p-Value |
|---|---|---|---|
| Improved | 16 (64%) | 13 (52%) | |
| Static | 3 (12%) | 8 (32%) | 0.25 |
| Deteriorated | 6 (24%) | 4 (16%) | |

*p-value was calculated by using chi-square test for categorical and t-test for quantitative variables. Fisher's exact test was done if any of cell had expected value less than 5*

**Discussion:**

In our study, both the single-stage and two-stage groups were well matched in terms of age, sex, comorbidities, and baseline vital signs, providing a balanced platform for meaningful outcome comparisons. In other journals, the mean ages reported for similar patient groups were slightly higher, such as 56.25 ± 12.03 years in one recent cohort and 53.6 versus 52.2 years in a study, with some populations reporting even higher averages, up to 68.23 and 70.10 years, reflecting potential regional or referral differences in patient demographics.[4,7,11,12] Regarding sex distribution, the predominance of male patients was consistently observed elsewhere, with proportions ranging from 81.1% to 90% in different cohorts, while female representation varied between 10% and 40%, reinforcing the male preponderance seen across diverse settings.[4,11,13,14] When considering comorbidities, the prevalence of diabetes mellitus was generally lower in other papers, varying from as little as 2.7% up to 43.5%, and hypertension rates ranged from 13.7% to as high as 73.9%, suggesting variability based on population health profiles and study design.[4,6,13] Our operative findings such as the presence of anatomical variants and intraoperative features were well matched between the single-stage and two-stage groups, supporting a fair comparison of surgical outcomes. Operative time was significantly shorter in the two-stage approach, a finding echoed in other studies, though the absolute durations vary. For example, reported operative times were 103 versus 107.7 minutes in one series, while another cohort observed longer operative times, 189.5 versus 161.6 minutes, reflecting differences in surgical technique, case complexity, and institutional protocols.[7,12]

The occurrence of surgical site infection in our findings was higher in the two-stage group, though the difference was not statistically significant. In other studies, the rates of surgical site infection have ranged from 13.3% to 36.7% across groups, with some reporting lower overall rates, such as 15% or even as balanced as 15.2% versus 14.3%, depending on surgical technique and perioperative care.[4,11,12] Both surgical groups in our research experienced wound dehiscence at simillar low rates, comparable to global experience. In other studies, wound dehiscence rates were reported as 7.5% in single-stage approaches, while comparative analyses showed figures like 10.9% versus 3.6%, indicating some variability but overall low incidence.[4,12] A statistically significant difference was observed in anastomotic leakage between our groups, highlighting the importance of surgical choice. In other studies, anastomotic leakage following single-stage procedures has been reported between 4.3% and 10%, with some as low as 5%, focusing on the ongoing challenge of ensuring anastomotic integrity across different populations.[4,11,12] Stomal complications in our study were confined to the two-stage group, also showing statistical significance. This finding aligns with reports from other research, where stomal complication rates in two-stage groups ranged from 3.6% to 23.3%, underlining the additional risk associated with stoma formation and subsequent management.[4,12] The duration of hospital stay was comparable between the two groups in our study. In other studies, hospital stays ranged from approximately 8 to 10 days for both approaches, with some reports indicating shorter or longer stays depending on local protocols and recovery pathways.[11-14] Eventful recovery was similarly distributed in both groups in our series, reflecting stable overall outcomes. Other journals reported eventful recovery rates of 27.5% in single-stage surgery, while others found figures such as 56.7% versus 29.4%, highlighting the variability influenced by patient factors and postoperative care.[13] The majority of patients in both surgical groups of our study demonstrated improvement following their procedures, with comparable rates of favorable outcomes. In other studies, the proportion of improved cases was reported at 21.8%, which is notably lower than our findings, possibly reflecting differences in case selection, perioperative management, or patient populations.[15]

**Conclusion:**

Our study demonstrates that both single-stage and two-stage surgical approaches for uncomplicated sigmoid volvulus yield comparable outcomes, with each method presenting distinct profiles of complications and perioperative challenges. While statistically significant differences were observed in anastomotic leakage and stomal complications, overall improvement rates remained similar between the groups. The relatively small sample size, single-center design, and limited follow-up period may constrain the generalizability of our findings. Despite these limitations, our results provide valuable insights into the real-world application of both surgical techniques and their associated risks.

**Acknowledgment:**

The authors would like to express their deepest gratitude to the Department of Surgery at Shaheed Ziaur Rahman Medical College Hospital, for providing the necessary

support and facilities to conduct this study. Heartfelt thanks are extended to all the doctors, anesthesiologists, and nursing staff whose expertise and cooperation made this research possible. The authors also acknowledge the participation of the patients and their parents, whose trust and consent formed the foundation of this work. The authors remain indebted to their mentors and colleagues for their continuous guidance, encouragement, and constructive feedback throughout the course of this study.

**Conflict of interest:** There is no conflict of interest.

**References:**

1. Emna T, Atef M, Sarra S. Management of acute sigmoid volvulus: A tunisian experience. *Asian Journal of Surgery*. 2021 Apr;4(13):213-17.

2. Ali M, Hashmi Z, Zafar A. Management of Acute Sigmoid Volvulus, using one stage resection and Anastomosis without Colonic Lavage. *Gomal Journal of Medical Sciences* [Internet]. 2020 [cited 2025 Jul 10];7(2). Available from: https://gjms.com.pk/index.php/journal/article/view/307

3. Akcan A, Akyildiz H, Artis T, Yilmaz N, Sozuer E. Feasibility of single-stage resection and primary anastomosis in patients with acute noncomplicated sigmoid volvulus. *The American Journal of Surgery*. 2007 Apr 1;193(4):421-26.

4. Shahmoradi MK, Farahani PK, Sharifian M. Evaluating outcomes of primary anastomosis versus Hartmann's procedure in sigmoid volvulus: A retrospective-cohort study. *Annals of Medicine and Surgery*. 2021 Feb;62: 160-63.

5. Vogel JD, Feingold DL, Stewart DB, Turner JS, Boutros M, Chun J, et al. Clinical Practice Guidelines for Colon Volvulus and Acute Colonic Pseudo-Obstruction. *Diseases of the Colon & Rectum* [Internet]. 2016 Jul;59(7):589–600.Available from:https://fascrs.org/ascrs/media/files/downloads/Clinical%20Practice%20Guidelines/clinical_practice_guidelines_for_colon_volvulus.pdf

6. El-labban GM, Saber A. Single-stage procedure in management of uncomplicated acute sigmoid volvulus without colonic lavage. *Surgical Practice*. 2010 Oct 28;14 (4):136-39.

7. Agirman E, Disci E, Peksoz R, Atamanalp SS. Primary anastomosis versus stoma following urgent sigmoidectomy for sigmoid volvulus: 58-year experience in a tertiary referral center. *Pakistan journal of medical sciences* [Internet]. 2024 Dec;40(11):2513–7. Available from: https://pubmed.ncbi.nlm.nih.gov/39634902/

8. Elhassan M, Abdulkarim M, Mohammed F, Ibrahim H, Shani D, Salih N. The Outcome of Resection and Primary Anastomosis (With On-table Lavage) Management of Acute Sigmoid Volvulus, A Developing Country Experience. *Frontiers in Medical Case Reports*. 2022 Jan 1;03(06).

9. Mestiri S, Laarif R, Sassi S, Sebai F. Indication and Results of Hartmann's Operation in Colorectal Surgery: A Retrospective Study of 53 Cases. *Digestive Surgery*. 1986;3(1):32-6.

10. Ostrow B. When is primary anastomosis safe in the colon? *Annals of African Surgery*. 2009 Sep 8;1(1):15-9.

11. Islam MI, Hossain SM, Hoque ME, Rahman MH. Outcome of Resection and Primary Anastomosis in Uncomplicated Sigmoid Volvulus. *SAS Journal of Surgery*. 2023 Dec 27;9(12):970-76.

12. Lakshminarayanan M, Chandrasekar M. Study on "Comparision of Primary Resection Anastomosis with Hartmanns Procedure in the Management of Acute Sigmoid Volvulus." *IOSR Journal of Dental and Medical Sciences*. 2019 Jan 6;18(1):31-42.

13. Ceylan C, Kocaaslan H, Baran NT, Sağlam K, Angın Y, Aydın C. Outcomes of Resection Anastomosis versus Hartmann's Procedure in Sigmoid Volvulus. *Ankara Eğitim ve Araştırma Hastanesi Tıp Dergisi*. 2024 Apr 30;57(1):33-7.

14. Azmi AJ, Mohamad H, Ghani AA, Rahim FA. The Outcome Of Sigmoid Volvulus Cases: A Single Centre Experiences Over 8 Years. *Asian Journal of Medicine and Biomedicine*. 2023 Oct 20;7(2):166-72. DOI:10.37231/ajmb.2023.7.2.626

15. Mulugeta GA, Awlachew S. Retrospective study on pattern and outcome of management of sigmoid volvulus at district hospital in Ethiopia. *BMC Surgery*. 2019 Aug 9;19(1):107.doi: 10.1186/s12893-019-0561-1