Comparison of Recovery Rate and Early Complications Between Primary Resection and Two-stage Operation in the Treatment of Acute Non-Complicated Sigmoid Volvulus

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Abstract

Background:
This study compares recovery rates and early complications associated with primary resection and a two-stage operation in treating acute sigmoid volvulus, a gastrointestinal emergency requiring prompt intervention. Proper diagnosis and appropriate operative approaches are crucial for lifesaving treatment.

Objectives:
This study was aim to compair of recovery rate and early complecations between two operative procedures.

Methods:
The cross-sectional analytical study was conducted from May to October 2015in National Institute Cancer Research and Hospital, Mohakhali, Dhaka, Bangladesh, involved 50 patients with acute non-complicated sigmoid volvulus, randomly divided into two groups, with the outcome variable being the only difference between two groups.

Results:
Two stage operation patients experienced 24% stomal complications, while one stage operation patients did not experience any late complication. The mean time for one stage operation was longer, and one stage operation resulted in 200 ml blood loss compared to 156 ml in two stage operations.

Conclusion:
In consideration of anastomotic leakage, operative time, operative blood loss post-operative hospital stay, two stage operation was better than primary resection.

Keywords: Sigmoid volvulus, Primary resection, Two-stage Operation, Recovery rate, Complecations

Introduction:

Acute non-complicated sigmoid volvulus poses a significant challenge in the realm of surgical interventions, demanding a careful consideration of operative strategies to optimize patient outcomes.[1] The optimal surgical approach for this condition remains a subject of ongoing debate, with primary resection and two-stage operation emerging as two prominent contenders. Sigmoid volvulus, characterized by the torsion of the sigmoid colon around its mesentery, is a relatively common cause of colonic obstruction, particularly prevalent in elderly populations.[2] While numerous conservative measures such as endoscopic

detorsion and decompression are often employed successfully, surgical intervention becomes imperative in cases of acute non-complicated sigmoid volvulus, where blood supply compromise or perforation is absent.[3]

Primary resection and two-stage operation represent two distinct surgical strategies with unique advantages and potential drawbacks. Primary resection involves the immediate removal of the affected sigmoid colon, often accompanied by primary anastomosis or the creation of a colostomy. This approach aims to swiftly alleviate the obstruction and prevent recurrence but may be associated with higher postoperative morbidity.[4] On the other hand, the two-stage operation entails an initial decompressive procedure, such as a sigmoid colectomy with colostomy formation, followed by a delayed second-stage procedure involving colostomy closure.[5-7] This approach is designed to minimize the immediate surgical burden, especially in frail or high-risk patients, yet introduces the complexity of a two-step process.

The choice between these two surgical approaches is contingent upon multiple factors, including patient characteristics, surgeon expertise, and institutional protocols. However, the dearth of robust comparative studies evaluating the recovery rates and early complications associated with these strategies impedes the formulation of evidence-based guidelines.[8-10] Consequently, our study seeks to address this gap by conducting a thorough examination of outcomes in patients undergoing primary resection versus two-stage operation for acute non-complicated sigmoid volvulus.

Understanding the nuances of recovery rates and early complications is paramount for optimizing patient care and tailoring surgical approaches to individualized clinical scenarios. By shedding light on the comparative effectiveness of these procedures, this study endeavors to contribute valuable insights that can inform evidence-based decision-making, enhance patient outcomes, and guide future research endeavors in the dynamic landscape of acute non-complicated sigmoid volvulus management.

Methods:
The cross-sectional analytical study was conducted from May to October 2015 in National Institute Cancer Research and Hospital, Mohakhali, Dhaka, Bangladesh, involving 50 patients with acute non-complicated sigmoid volvulus, randomly assigned into two groups, Group-I (patients underwent primary resection and anastomosis) and Group-II (patients underwent resection and anastomosis with de-functioning loop ileostomy and double barrel colostomy). Per-operative observations ensured inclusion criteria were met, excluding cases with ischemic alterations, gangrene, or perforation, and patients receiving conservative treatment or presenting with nonviable gut. Perioperative bleeding was measured using the gravimetric method. All study participants provided written consent that was informed for validity and safety. The relevant authority provided their ethical clearance. Data collection involved questionnaires, patient-reported information, and physical examinations, aiming for a comprehensive dataset. The data was entered into Microsoft Excel, and SPSS was used for analysis. When appropriate, t-tests were performed.

Results:
The mean age of the group I was 49.4 ± 19.08 years while mean age of group II was 50.96 ± 13.96 years. There was no significant age difference between the two groups (p=0.69). Mean pulse, systolic BP, diastolic BP, temperature and respiratory rate of the patients in group I were 98.32±11.90 bpm, 95.20±18.74 mm hg, 60.20±9.63 mm hg, 100.40±1.19°F and 16±2 respectively. In group II patients' mean pulse, systolic BP, diastolic BP, temperature and respiratory rate were 97.84±9.50 bpm, 96.00±14.43 mm hg, 58.80±12.01 mm hg, 100.12±1.05°F and 18±2 respectively. (Table-I)

Table-I: Pre-operative vital signs of the patients

|	One stage (n=50)	Two stage (n=50)	t, p-value
Mean age	49.4±19.08	50.96±13.96	0.41, 0.69
Vital sign			
Pulse	98.32±11.90	97.84±9.50	0.87, 0.48
Systolic BP	95.20±18.74	96.00±14.43	0.17, 0.88
Diastolic BP	60.20±9.63	58.80±12.01	0.46, 0.65
Temperature	100.40±1.19	100.12±1.05	0.88, 0.38
Respiration	16±2	18±2	0.65, 0.68
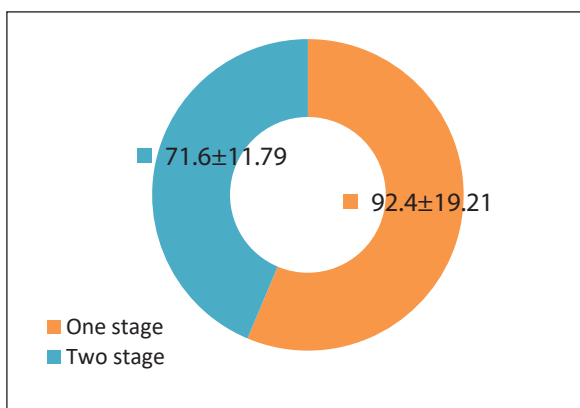
Figure-1: Operative time
The mean time of one stage operation (Group -I) was 92.4 ± 19.21 minutes while it was 71.6 ± 11.79 minutes in case of two stage operation (Group-II). This finding was statistically significant (p=<0.001). (Figure-1)

Table-II: Pre-operative findigs of perticipants

| Per operative finding | Type of operation | | Total (%) | χ2, p-value |
	One stage no. (%)	Two stage no. (%)		
Band in antimesenteric border	1(4.0)	1(4.0)	2(4.0)	
Long pelvic mesocolon	6(24.0)	5(20.0)	11(22.0)	
Narrow attachment with long pelvic mesocolon	9(36.0)	9(36.0)	18(36.0)	0.18, 0.99
Overloaded sigmoid colon	4(16.0)	4(16.0)	8(16.0)	
Redundant colon	5(20.0)	6(24.0)	11(22.0)	
Total	25	25	50	

Narrow attachment with long pelvic mesocolon was found in 36% cases whether looking total or separately. In group I and group II, long pelvic mesocolon and redundant colon were found in 24%, 20% and 20%, 24% cases respectively. (Table-II)
The mean blood loss in group I and group II was 200 ± 91.29 ml and 156 ± 63.44 ml respectively. More blood was lost in one stage operation and this result was found significant (p=0.05). (Figure-2)
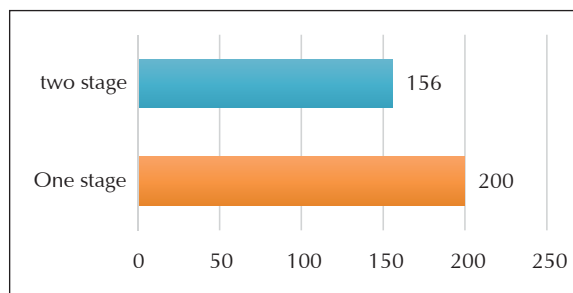

Figure-2: Per operative blood loss (ml)

In terms of one stage operation, post-operative recovery was uneventful in 68% cases while in the rest cases it was eventful. In two stage operation 72% cases were uneventful and the rest was eventful. Early complications of one stage operation and two stage operation are assessed and listed in Table-III. When one stage operation was done in 36% cases there was no abnormality detected, anastomotic leakage occurred in 24% cases and surgical site infections occurred in 20% cases. While looking in patients of two stage operation surgical site infections occurred most in 36% cases, no complication occurred in 28% cases, systemic infection occurred in 16% cases. And these differences are found significant (p=0.04). (Table-III)

Table-III: Aetiological findings of volvulus per-operatively

| Aetiological findings | Type of operation | | Total (%) | χ2, p-value |
	One stage no.(%)	Two stage no.(%)		
Post-operative recovery Uneventful	17(68)	18(72)	35(70)	
Eventful	8(32)	7(28)	15(30)	0.1, 0.78
Early Complications Nothing abnormality	9(36.0)	7(28.0)	16(32.0)	
Surgical site infection	5(20.0)	9(36.0)	14(28.0)	
Wound dehiscence	2(8.0)	3(12.0)	5(10.0)	11.79, 0.04
Anastomotic leakage	6(24.0)	0	6(12.0)	
Systemic infection	0	4(16.0)	4(8.0)	
Others	3(12.0)	2(8.0)	5(10.0)	
Total	25	25	50	

No complication occurred in one stage operation while in 76% cases of two stage operation had no complication but stomal complications (bleeding, prolapsed, retraction, parastomal hernia etc.) were found in 24% cases and this difference is found significant (p=0.009). (Figure-3)
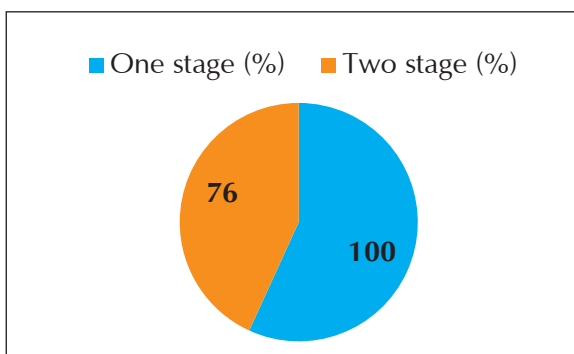
Figure-3: Late complication of the patients

Table-IV showed that the percentage of improvement in one stage type of operation is 64%, 24% cases were deteriorated and 12% cases were static. In case of two stage type of operation 52% cases were improved, 32% cases were static and 16% cases were deteriorated. The association between the type of operation and the outcome was not found statistically significant.

Table-IV: Outcome of operation

Outcome of operation	Type of operation		Total (%)	χ2, p-value
	One stage no.(%)	Two stage no.(%)		
Improved	16(64.0)	13(52.0)	29(58.0)	
Static	3(12.0)	8(32.0)	11(22.0)	2.98, 0.23
Deteriorated	6(24.0)	4(16.0)	10(20.0)	
Total	25	25	50	

In total 76% patient was alive. In group I, 16% patients died due to re-intervention and 12% patients died due to septicemia. While in group II, most of the deaths occurred due to pulmonary infection (12%) followed by re-intervention (4%) and septicemia (4%). This difference was not found statistically significant. The patients who developed post-operative complications like anastomotic leakage, stomal retraction, and needed re-intervention and among them 4% patients expired due to eventful anesthetic recovery. (Table-V)

Table-V: Rate and causes of mortality

Mortality	Type of operation		Total (%)	χ2, p-value
	One stage no.(%)	Two stage no.(%)		
Alive	18(72.0)	20(80.0)	38(76.0)	
Causes of mortality				
Re-intervention after surgery	4(16.0)	1(4.0)	5(10.0)	5.91, 0.12
Septicaemia	3(12.0)	1(4.0)	4(8.0)	
Pulmonary infection	0	3(12.0)	3(6.0)	
Total	25	25	50	

There was no significant difference found between one stage and two stage operation in case of hospital stay. (t=1.98, p=0.05) (Figure-4)
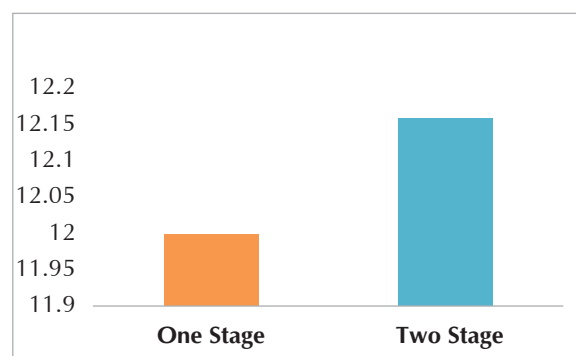
Figure-4: Postoperative hospital stay

Discussion:
According to our research, the middle-aged patients had a volvulus condition requiring surgery. Other study likewise discovered that the age range was between 40 and 60.[12] The results are consistent with this study's findings. In our study, men made up the majority of the patients. In their investigation, previous studies discovered that more men than women experienced sigmoid volvulus.[13] Our study yielded comparable results. According to some investigation women were more impacted than men. This resulted from their lengthier research duration. According other researchs, up to 90% of patients experience recurrence following endoscopic distortion.[14] During the procedure, intestinal abnormalities were noted. About 36% of cases had a lengthy pelvic mesocolon with a limited connection. Furthermore, extra colons (22%) and long pelvic mesocolons (22%) were discovered. In earlier studies found evidence favoring the theory that sigmoid volvulus results from a long, wide

mesosigmoid rotating on a constant mesosigmoid root width[7]. Their findings and ours are comparable.[12-14]In this study we look early complication did not occur in 32% cases. Most common was the SSI (28%) followed by anastomotic leakage (12%), wound dehiscence (10%) and others (10%). But when the comparison was done between one stage and two stage type of operation significant result was found. Less complication occurred in one stage operation. The most common one that occurred in one stage operation was anastomotic leakage (24%). Surgical site infection occurred in one stage operation in 20% cases and in two stage operation in 36% cases. The rate of surgical site infection is more in two stage operation because of exteriorization of gut. In two stage operation systemic infection also occurred in 16% cases. Anastomotic leakage was not occurred even not in a single case where two stage operation was done. M. Anastomotic leak as a common early complication and cause of death in one stage operation and in two stage procedure sepsis was the common.[3] Previous studies found superficial wound infection in 20% and no case of anastomotic leakage.[10,12,13] They did bowel decompression with resection and primary anastomosis to all their patients. These findings are similar to our study.We also discussed the late complications that can arise from one- and two-stage surgery. There were no complications in one-stage operations, but stomal complications appeared in two-stage operations (24% of cases). When the procedure's overall results were documented, we discovered that 58% of the cases had improved, 22% had remained unchanged, and 20% had gotten worse. When we compared the two techniques, we discovered that the one-stage operation had higher improvement (64%) than the two-stage process (52%), and the one-stage treatment also had more cases that deteriorated (24%) than the two-stage procedure (16%). Patients in static two-stage operations (32%) had more than one stage of the process (12%).Overall mortality rate was 24%. When the cause was searched it was found that reintervention was the commonest (10%) cause followed by septicemia (8%) and pulmonary infection (6%). Now when the comparison was done between one stage and two stage operation it was found that in one stage operation most common cause was reintervention (As most

patients' systemic condition was very much compromised, after reintervention surgery their anesthetic recovery was eventful and some of them expired) followed by septicemia. But in two stage operation pulmonary infection was the commonest cause though pulmonary infection did not occur in one stage operation. The rate was less than our study as he did only one stage operation to all of his patients. In the study of Michael Safioleas et al. mortality rate was 40%.[14] They applied more than one surgical procedure and their mortality rate was more than present study.

Conclusion:
Overall, one-stage surgery was deemed superior to two-stage surgery when considering systemic effects and wound infection following surgery. However, a two-stage operation was preferable when taking into account anastomotic leakage, operating time, operative blood loss, and post-surgical hospital stay. The patient had to be readmitted to the surgical indoor facility after a two-stage procedure because the stoma needed to be reversed, which increased the risk of post-operative problems and other surgical risks. Therefore, patients with acute, non-complicated sigmoid volvulus can have a one-stage procedure.

Limitation:
Complicated sigmoid volvulus, such as those with nonviable, ischemic, gangrenous, or perforated gut, were not included in this study, making it impossible to evaluate the sigmoid volvulus treatment procedure as a whole.A multicenter comparison was not conducted to evaluate the similarities and differences between centers, and the study was limited to one clinical environment.

Recommendation:
For beginner surgeons, two-stage surgery is generally a safer approach. However, this kind of study may be carried out at a more specialized facility with a bigger sample size and a more extended study duration to create a better management protocol.

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