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Outcome of Surgical Management of Gangrenous and Non-Gangrenous Volvulus of Sigmoid Colon

*Mohammad Mustafizur Rahman,[1] Jamal E Rabby,[2] Md Kabirul Hasan,[3] Mohammad Ali,[4] Nasim E Tasnim,[5] Md Masud Zaman[6]

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ABSTRACT

Introduction: Volvulus is a condition in which the intestine twists around itself and the mesentery that supports it, creating an obstruction. *Approximately 5% cases of large bowel obstruction occur due to volvulus. Volvulus can occur in any part of small and large intestine including stomach. Among these sigmoid volvulus is most common. The aim of this study was to describe the management of sigmoid volvulus with reference to the type of surgical procedures performed and its outcome.* ***Methods:*** *This was an observational study carried out in the department of surgery, Shaheed Ziaur Rahman Medical College Hospital, Bogura from December 2006 to December 2009. Total thirty (30) consecutive patients of different age group of sigmoid volvulus had been taken purposively who underwent surgery after getting informed written consent.* ***Results:*** *Results showed that ages of the patients were from 18 to 68 years and maximum patients (33.3%) were from 5th decade. Total male patients were 21 (70.0%). Twenty-three (76.7%) patients were managed by Hartmann's procedure, four (13.3%) were managed by resection and primary anastomosis and three (10%) were managed by untwisting of the sigmoid volvulus and mesocolopexy. Among these operative procedures untwisting of the sigmoid volvulus and mesocolopexy (n-3) in two patients out of three with non-gangrenous colon were recovered uneventfully and one patient recovered with complication and with Hartmann's procedure (n-23), two patients out of twelve with gangrenous colon were died due to septicaemia and pulmonary complications and after resection with primary anastomosis (n-4) out of two with gangrenous colon were died due to faecal fistula and one patient with non-gangrenous bowel died due to septicaemia. Recovery rate was significantly high (p-0.0095) in case of non-gangrenous volvulus. It was also found that there is no significant (p-0.593) relation of gender with surgical outcome of sigmoid volvulus.* ***Conclusion:*** *In sigmoid volvulus, the most important determinant of patient outcome was bowel viability, late diagnosis and age of the patients. The research findings will help to establish better treatment plan as well as to reduce sufferings of the patients.*

1. *Assistant Professor, Department of Surgery, Shaheed M Monsur Ali Medical College Hospital, Sirajganj, Bangladesh*
2. *Assistant Professor, Department of Surgery, Shaheed Ziaur Rahman Medical College Hospital, Bogura, Bangladesh*
3. *Junior Consultant, Department of Surgery, Upazila Health Complex, Singair, Manikganj, Bangladesh*
4. *Assistant Professor, Department of Surgery, Cumilla Medical College Hospital, Cumilla, Bangladesh*
5. *Assistant Professor, Department of Surgery, OSD, DGHS, Bangladesh*
6. *Assistant Professor, Department of Urology, Jashore Medical College Hospital, Jashore, Bangladesh*

***Corresponding author:** ✉ deltam30@gmail.com

INTRODUCTION

Sigmoid volvulus (SV), first described by von Rokitansky in 1836,[1,2] is a condition in which the sigmoid colon wraps around itself and its own mesentery, causing a closed-loop obstruction (Figure 1).

Figure 1: Schematic diagram of Sigmoid volvulus

Volvulus can occur in any part of small and large intestine including stomach. Among those SV is most common. Approximately 5% cases of large gut obstruction occur due to volvulus.[3] Sigmoid volvulus accounts for two-third to three-fourth of all cases of colonic volvulus. The condition is permitted by an elongated segment of bowel, accompanied by a lengthy mesentery with a very narrow parietal attachment, a situation that allows the two ends of the mobile segment to come close together and twist about the narrow mesenteric base. Associated factors include chronic constipation and aging, with the average age at presentation being in the seventh to eighth decades of life. There is an increased incidence of the condition in institutionalized patients afflicted with neuropsychiatric conditions and treated with psychotropic drugs. These medications may predispose to volvulus by affecting intestinal motility. The increase incidence of volvulus in third world countries has been attributed to a diet high in fiber and vegetables.[4] The worldwide frequency is not known, but SV occurs frequently in young people in geographic areas with a high incidence of roundworm infestation.[5]

Most of the patients present with abdominal pain, distension, and absolute constipation, asymmetrically noted in upper abdomen toward right hypochondrium.[6] Predisposing factors include chronic constipation, megacolon and excessive mobility of colon. Plain abdominal radiograph findings are usually diagnostic, show a dilated air-filled sigmoid colon with an inverted U-shaped appearance or omega shaped or coffee bean shaped. Decompression may be achieved with the introduction of a sigmoidoscope. Early radiographic recognition is important to prevent mortality related to SV.[7]

Various modalities of treatment of sigmoid volvulus are available, common procedures are one stage resection and anastomosis, and two stage operations (Hartmann's procedure).[8] In two stage operation, we can do either resection or anastomosis with defunctioning loop colostomy which is closed after 6-8 weeks or resection and colostomy and closure of the distal end with anastomosis after 6-8 weeks. In the early stage deflation of the gut by insertion of flatus tube under sigmoidoscopic guidance can be tried. Failure results in an early laparotomy, with untwisting of the loop and per-anal decompression is done. When the bowel is viable, fixation of the sigmoid colon to the posterior abdominal wall may be a safer maneuver in experienced hands.[9,10]

In case of non-operative decompression and anastomotic failure in one stage resection and anastomosis procedure, resulting fistula formation leading to prolonged morbidity follows death. At present, better outcome of one stage procedure in patients with SV is achieved due to early diagnosis and treatment, better understanding of patho-physiology of the disease, better surgical technique, better post-operative management, effective antibiotics, and improvement in anaesthesia and resuscitation procedures.[11]

In this study, outcome of surgical management of gangrenous and non-gangrenous volvulus of sigmoid colon was evaluated to find out the most effective management for the patient of SV.

METHODS

This observational study was conducted in the department of surgery, Shaheed Ziaur Rahman Medical College Hospital, Bogura, during the period of December, 2006 to December, 2009.Thirty consecutive patients of different age groups of sigmoid volvulus (SV) have been taken purposively, and who underwent surgery during the study period. Strict selection criteria were applied. Patients with sigmoid volvulus proved by history, clinical examination, plain X-ray abdomen and were confirmed on laparotomy. Patients or their guardians who agreed to comply with the study protocol were included. Patient or patient's guardian who refused to be included in the study and patient who had compound volvulus (a loop of ileum wrapping around the root of sigmoid colon loop torsion) were not included in this study. Plain X-ray abdomen confirmed majority of cases and all cases were confirmed after laparotomy. Regarding treatment, initially a conservative approach was tried, such as enema simplex, and rectal tube insertion under sigmoidoscopic guidance, but later on laparotomy was done in all cases. Residents and fellow surgeons performed the operations under the supervision of senior surgeons. Data analysis was performed according to the objective of the study using computer software program and Statistical package for Social Sciences (SPSS), version 20. Level of significance was measured by using Chi-square test. A *p*- value < 0.05 was considered statistically significant.

RESULTS

In this study, ages of the patients were from 18 to 68 years. Maximum number of patients fell into 5th decade followed by 6th decade and percentage were 33.3% and 26.7% respectively (Table I).

Table I: Age groups in various decades of life (n-30)

Age groups (years)	No. of patients	Percentage (%)
11-20	1	3.3
21-30	5	16.7
31-40	5	16.7
41-50	10	33.3
51-60	8	26.7
61-70	1	3.3

All patients (n-30) of this study came to the hospital after onset of symptoms and maximum patients (53.3%) admitted to the hospital after four days to onwards (Table II).

Table II: Time of reporting after onset of symptom (n-30)

Time of reporting to hospital	No. of person	Percetage (%)
Within 24 hours	5	16.7
Within 1 to 3 days	9	30.0
Within 4 to 7 days	15	50.0
More than 7 days	1	03.3

Conditions of colon during laparotomy (n-30), 14 (46.7%) cases were gangrenous and 16 (53.3%) cases had viable colon (Figure 2).

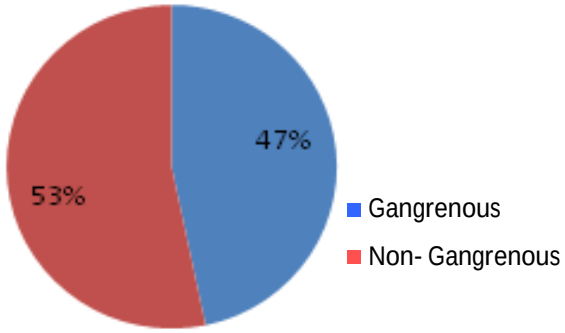

Figure 2: Condition of colon during laparotomy (n-30)

After operation, majority of the patients developed pulmonary complications 12 (40.0%) followed by wound sepsis 10 (33.3%), residual abscess 04 (13.3%) and septicemia 03 (10.0%) (Table III).

Table III: Postoperative complications after surgery (n-30)

Postoperative complications	No. of the patients	Percentage (%)
Pulmonary complications	12	40.0
Wound sepsis	10	33.3
Residual abscess	4	13.3
Septicaemia	3	10.0
Burst abdomen	2	6.7
Faecal fistula	2	6.7

*Multiple responses

Among these operative procedure (n-23, 76.7%) two patients out of twelve with gangrenous colon were died due to septicaemia and pulmonary complications after Hartmann's procedure and two patients with gangrenous colon were died due to faecal fistula after resection with primary anastomosis (n-4, 13.3%), and one patient with nongangrenous bowel was died due to septicaemia. Untwisting of the sigmoid volvulus and mesocolopexy (n-3, 10%) in two patients out of three with non-gangrenous colon were recovered uneventfully and one patient recovered with complication. Recovery rate was significantly high (*p*- 0.0095) in case of non-gangrenous volvulus (Table IV).

Table IV: Surgical outcome of gangrenous and non-gangrenous volvulus (n-30)

Condition of Bowel (n-30)	Surgical Options	Surgical outcome			*p value
		Recovered uneventful	Recovered with complications	Death	
Gangrenous Volvulus (n-14)	Untwisting and Mesocolopexy (n-0)	0	0	0	0.0095[S]
	Resection and primary anastomosis (n-2)	0	0	2	
	Hartmann`s Procedure(n-12)	3	7	2	
Non Gangrenous Volvulus (n-16)	Untwisting and Mesocolopexy (n-3)	2	1	0	
	Resection and primary anastomosis (n-2)	0	1	1	
	Hartmann`s Procedure (n-11)	9	2	0	

*Chi-square test, [S]significant

Out of 21 male patients, 17 (56.7%) survived and four (13.3%) expired. Out of nine female patients, eight (26.7%) survived and one (3.3%) expired. Total survival rate was 83.3% and mortality was 16.7%. There is no significant (p-0.593) relation of gender with surgical outcome of SV (Table V).

Table V: Mortality and survival rate according to sex distribution (n-30)

Sex	No. of Patients	Survival	Death	*p value
Male	21	17 (56.7%)	4 (13.3%)	
Female	9	8 (26.7%)	1 (3.3%)	0.593^{ns}
Total	**30 (100%)**	**25 (83.3%)**	**5 (16.7%)**	

*Chi-square test, ^{ns}not significant

DISCUSSION

Volvulus of the sigmoid colon is the most common cause of large gut obstruction in our country. Its incidence in our country is about 56.9% of all acute large gut obstruction.[6] But in worldwide sigmoid volvulus (SV) accounts for 2% to 50% of all colonic obstructions and has an interesting geographic dispersion.[12] Sigmoid volvulus accounts for 2% to 5% of colonic obstructions in Western countries and 20% to 50% of obstructions in Eastern countries.[1,13,14] In this study, the ages of the patients were from 18 to 68 years. Maximum number of patients fell into 5th decade, followed by 6th decade and percentage were 33.3% and 26.7% respectively. Rahman[5] showed that 52% of sigmoid volvulus occurred between 50-60 years of age in our country. These results are almost similar to those of Mahmood[15] and also with Karim.[16] Gibney[17]showed in his study that the mean age of 73 patients was 50.9 years. In the elderly patients, there is coexisting serious cardiovascular, respiratory, renal, gastrointestinal, neurological, and psychiatric comorbidities and chronic constipation susceptible to SV formation.

Male are more prone to SV. In this study male to female ratio was 2.3:1. Bhatnagar et al.[18] showed male to female ratio 1.7:1 in their study. They document the anatomic measurements of the sigmoid colon in 70 Indian subjects (51 live and 19 cadavers). They showed that the sigmoid mesocolon in the male is dolichomesocholic (longer than wide), whereas the female mesocolon is brachymesocholic (wider than long). The authors hypothesize that a narrower mesocolic root with a greater vertical length of the mesocolon in the male sigmoid colon makes male more susceptible to SV.

This study reveals that, there is no significant (*p*-0.593) relation of gender with surgical outcome of SV rather related to delayed presentation and co-morbidities. During operation, we found 16 cases (53.3%) with viable colon and 14 cases (46.7%) with gangrenous colon. There are many modalities for the treatment of SV but which procedure is the best in regard to outcome is still controversial.[19] Moreover, non-operative procedures are contraindicated when gangrenous colon is suspected. The operative outcome was death of five cases out of which four were with gangrenous colon and one with non-gangrenous colon.

In this study, out of 30 patients 5 patients died. The mortality rate was 16.7%. Total three patients with non-gangrenous colon were treated with untwisting of SV and mesocolopexy. Among these, one patient developed only postoperative complication. So, mortality rate of untwisting of colon and mesocolopexy in non-gangrenous SV was nil, which was similar to Kaneria et al.[20] Stalinraja et al.[21] showed in non-gangrenous volvulus mortality rate following laparotomy and detorsion alone varies from 0-50%.

In this study, mortality rate of resection and primary anastomosis in gangrenous colon was 100% and in viable colon was 50%. Ballantyne et al.[22] reported 50% mortality in gangrenous colon and 7.5% in non-gangrenous colon. Rahman[5] showed36.2% mortality among gangrenous patients and 13.6% in non-gangrenous patients. This study showed more mortality than others,[5,22] possibly due to lack of intensive care unit facility at that time and delayed presentation.

Caroche et al.[23] showed mortality rate 44% and it concerned only the patients who had gangrenous sigmoid volvulus that were treated with primary resection and anastomosis. Conversely, none of the patients died in case of intestinal derotation and colopexy. In the subocclusive group, mortality was 35% and it increased up to 50% in those patients with a late diagnosis who underwent a

sigmoid resection. In the present study, overall mortality rate was 75% and among these, 50% occurred in patient with gangrenous colon and 25% occurred in patients with viable colon. This is somewhat higher than that of other emergency operation but almost similar with Cirocchi et al.[23] In two stage operation , two patients died out of twenty-three. The cause of death was irreversible septic shock from delayed presentation with peritonitis, leading to postoperative hypovolaemia due to poor intolerance of intravenous fluid and electrolyte balance and due to pulmonary complication in another patient but was not related to septicaemia, as there was no anastomotic leakage. Those with viable colon (n-11) no patient died. So, the mortality rate with two stage procedure was 8.7%. This mortality rate is very close to the study done by Shepherd[24] who showed 12% mortality. Eighteen patients out of 23 with colostomy came for colostomy closure after 2-3 months. All of them under went colostomy closure as elective operation. All patients were recovered uneventfully. This may be due to proper gut preparation and elective operation. Most of the patients were poor and one stage immediate resection with primary anastomosis had short duration of hospital stay but not good choice for gangrenous colon as of high mortality rate. Two stage procedures need twice admission for two major operations and twice postoperative treatments. Detorsion with mesocolopexy is good choice for non-gangrenous colon having high recurrence rate and need sigmoid resection in the same hospital stay. Comparing the results of one stage procedure to two stage procedures in relation to morbidity and mortality that one stage procedure has low morbidity and mortality in patients with viable colon.[25] But in gangrenous colon one stage operation has high mortality rate and the mortality was related to anastomotic leakage. In two stage procedure mortality was low and it was not related to anastomotic leakage. Moreover, a patient with colostomy is psychological problem to the society as well as to himself. In our country by considering the above points, one stage immediate resection with primary anastomosis should be the treatment of choice in comparison to two stage procedure when there is non-gangrenous colon. But Hartmann's procedure is justifiable in all cases of gangrenous colon to reduce the morbidity and mortality of the patients in comparison with resection and primary anastomosis.

This study was conducted in only one government medical college hospital of Bangladesh on limited number of patients. So, it did not represent the whole group of such patients. Further researches should be aimed to include a larger sample size selected from a larger number of different hospitals of different parts of the country.

CONCLUSION

It is concluded that immediate sigmoidoscopic reduction followed by elective resection of the sigmoid colon, and primary anastomosis should be the treatment of choice for viable colon. In case of failed tube decompression, immediate resection with primary anastomosis in viable gut and Hartmann's operation in gangrenous gut should be considered. This study also expressed the need of larger research in this issue and points out the importance of early intervention for volvulus patients.

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Conflict of Interest: Authors declare no conflict of Interest.

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