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Sigmoid volvulus: A clinical study with reference to management options

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Abstract
Introduction: A volvulus is an abnormal twisting of the bowel on its mesenteric axis greater than 180 degrees, which produces an obstruction of the intestinal lumen and mesenteric vessels. Sigmoid volvulus is a surgical emergency and significant cause of large bowel obstruction with high mortality and morbidity. The disease is more prevalent in India, especially rural population. The patient may present with features of shock, generalized abdominal tenderness and peritonitis pointing towards the presence of an underlying gangrenous segment in sigmoid volvulus. This condition can be life threatening if proper resuscitation and appropriate emergent procedures are not done. This study analyses various management options in our institute which caters mainly to patients from the surrounding rural areas.
Methods: The present work consists study of 40 cases, carried out to study the clinical course and manifestations of sigmoid volvulus and to study the various surgical methods of treatment and their outcome. This study was conducted in patients of sigmoid volvulus admitted in Department of General Surgery, Shyam Shah Medical College Rewa during the period of May 2016 to April 2018.
Results: Sigmoidopexy was done in 8(20%) patients with 50% recurrence rate. Resection and Primary anastomosis done in 14(35%) patients, of which 2(14.28%) had anastomotic leak and 2(14.28%) patients expired. Resection and Primary anastomosis with diversion colostomy was done in 10(25%) patients, all of them recovered well in postoperative period and underwent colostomy closure after 12 weeks. Hartmann's Procedure was done in 8(20%) patients. Higher mortality rate (37.5%) was observed in this group in comparison to others. Common post-operative complication was found to be wound infection. Overall mortality rate was 12.5%.
Conclusions: Although Primary resection anastomosis is considered gold standard treatment for sigmoid volvulus but in developing and resource poor nations Primary resection anastomosis with diversion colostomy is found to be a safer procedure in patients with chronic malnourishment and poor general condition. Hartmann's procedure is suitable only if the bowel is gangrenous and in elderly patients with short life expectancy. Morbidity and mortality can be reduced by early institution of appropriate resuscitative and therapeutic measures.

Keywords: Sigmoid volvulus, resection primary anastomosis, diversion colostomy, Sigmoidopexy

Introduction
"If he doesn't evacuate for a twist in the bowel and the phlegm does not find a way out then it shall rot in the belly" *Ebers papyrus.*
The name 'Volvulus' originates from the Latin (*volvere:* to twist). Sigmoid volvulus is an acute surgical emergency and the earliest description of this condition dates back to 1500 BC in the Ebers Papyrus which is one of the two oldest preserved medical documents anywhere. A volvulus is an abnormal twisting of the bowel on its mesenteric axis greater than 180 degrees [1], which produces an obstruction of the intestinal lumen and mesenteric vessels. The disease is more prevalent in the volvulus belt which includes Middle East, Africa, India, Turkey, and South America [2]. In India this pathology shows a higher incidence: 24% in East India [3], 40% in North India [4], Sigmoid volvulus is seen typically in elderly patients, presenting with constipation, abdominal pain, and distension of sudden onset.
The aetiology has been attributed to a high fibre diet in certain populations, although it also occurs in elderly patients on low-residue diet especially those excessively using laxatives. Other contributory factors include the presence of adhesive bands, high altitude, megacolon, pregnancy and Chaga's disease. Volvulus is more common in males, possibly because the large volume of the female pelvis facilitates spontaneous untwisting. Classically, the patient presents with obstipation, marked abdominal distension, nausea and vomiting. Vomiting, preceding or

coinciding with the onset of abdominal signs, may be a predictor of increased morbidity and mortality [5]. In delayed presentation the patient may present with features of shock. Generalized abdominal tenderness and peritonitis point towards the presence of an underlying gangrenous segment in sigmoid volvulus.

Methods

This study was conducted in patients of sigmoid volvulus admitted in Department of General Surgery, Shyam Shah Medical College, Rewa during the period of May 2016 to April 2018. The objective was to study the clinical course and manifestations of sigmoid volvulus and to study the various surgical methods of treatment and their outcome.

Inclusion criteria

All the patients admitted in surgical ER at Shyam Shah Medical College Rewa with clinical diagnosis of sigmoid volvulus and underwent surgical procedures, during the study period.

Exclusion criteria

1. All large bowel obstruction patients presenting as emergency other than sigmoid volvulus were excluded.
2. Patients of sigmoid volvulus who were relieved by conservative management (Flatus tube insertion, NG tube insertion, sigmoidoscopic/colonoscopic reduction) were excluded.

Patients presenting to Emergency Department with clinical features of large bowel obstruction were admitted and evaluated, resuscitation done according to their vital status. A detailed history was obtained and clinical examination was done. Patients with suspicion of sigmoid volvulus were further evaluated. The history of presenting illness, past illness related to bowel disorders, diet & bowel habits was taken. Detailed findings at physical examination were recorded. Plain x-ray of abdomen in erect posture and x-ray chest PA view was done. This confirmed the diagnosis of sigmoid volvulus in most instances pre-operatively. The highly distended Omega loop could be demonstrated in most of the cases. Patient with subacute presentation and nondiagnostic x-ray abdomen, further evaluation was done using USG Abdomen and CT Abdomen. Patients presenting with shorter duration of symptoms of intestinal obstruction and patients who were hemodynamically stable and without any signs of peritonitis were subjected to conservative management.

Patients with clinical and radiological evidence of sigmoid volvulus presenting with signs of peritonitis, hemodynamic instability and those not relieved by conservative management were treated surgically after adequate resuscitation. Procedures such as colopexy/sigmoidopexy, Resection of colon and Primary Anastomosis, Resection of colon and Primary Anastomosis with diversion colostomy and Hartmann's procedure. Procedures done were decided on the basis of general condition, hemodynamic status of the patient and intraoperative findings. Postoperatively patients were monitored in the wards. Patients with diversion colostomy were followed up for colostomy closure after 12 weeks.

Operative findings, treatment, complications, mortality and results of various types of operations and follow ups were recorded in the predesigned proforma.

Results

Total of 40 cases of sigmoid volvulus patients who underwent surgical treatment were included in the study. Age, sex, symptoms, signs, investigations, operative findings, operative procedure performed, morbidity and mortality were studied.

Table 1: Age wise incidence of sigmoid volvulus

S. No.	Age Group (in years)	No. of patients	Percentage (%)
1.	1-10	0	0
2.	11-20	0	0
3.	21-30	1	2.5
4.	31-40	4	10
5.	41-50	15	37.5
6.	51-60	10	25
7.	61-70	8	20
8.	>70	2	5
Total		40	100

Maximum number of cases belong to 41-50 years of age group (37.5%). Clustering of cases was noted in elderly population i.e. 40-70 years age group (82.5%).

In present study mean age of presentation was 52 years.

Table 2: Gender wise distribution of cases of sigmoid volvulus.

S. No.	Gender	No. of patients	Percentage (%)
1.	Male	27	67.5
2.	Female	13	32.5
Total		40	100

As it is evident from above table male to female ratio was 2.8:1.

Table 3: Distribution of cases according to Mode of Presentation

S. No.	Symptom	No. of patients	Percentage (%)
1.	Pain in Abdomen	36	90
2.	Abdominal Distension	40	100
3.	Constipation	34	85
4.	Vomiting	10	25
5.	Retention of urine	3	7.5

Most common and consistent mode of presentation was Abdominal Distension (100%) followed by Pain in abdomen(90%). In rare cases usually elderly patients present with retention of urine.

Table 4: Selection of procedure on the basis of Intraoperative findings

S. No.	Procedure	Viable Bowel	Gangrenous/ Pregangrenous Bowel	No. of patients	Percentage (%)
1.	Sigmoidopexy	8	0	8	20
2.	RPA* with colostomy	4	6	10	25
3.	RPA*	13	1	14	35
4.	Hartmann's Procedure	0	8	8	20
Total		25	15	40	100

*- Resection of Gangrenous/Pregangrenous/Grossly Dilated colon with Primary Anastomosis.

Patients with viable bowel without gross dilatation were treated with sigmoidopexy. Patients with viable bowel with dilatation were treated by RPA. In patients with poor general condition and hemodynamic instability and found to have gangrenous bowel intraoperatively, Hartmann's procedure was done.

Patients who were hemodynamically stable and intraoperatively found to have grossly diltated bowel or bowel with pregangrenous changes where exact line of demarcation could not be established were treated with resection of doubtful segment followed by end to end anastomosis with diversion colostomy.

Table 5: Type of Procedure and outcome

S. No.	Procedure	No. of Patients	Recovered	Expired
1.	Sigmoidopexy	8	8(100%)	0
2.	RPA* with colostomy	10	10(100%)	0
3.	RPA*	14	12(85.7%)	2(14.28%)
4.	Hartmann's Procedure	8	5(62.5%)	3(37.5%)
Total		40	35(87.5%)	5(12.5%)

In present study overall mortality was found to be 12.5%. Patients treated with Hartmann's procedure had highest mortality i.e. 37.5%. Patients treated with sigmoidopexy and RPA with colostomy had no mortality.

Table 6: Post-Operative surgical complications

S. No.	Procedure	Wound Infection	Recurrence	Anastomotic Leak
1.	Sigmoidopexy	1(12.5%)	4(50%)	NA
2.	RPA* with colostomy	3(30%)	-	-
3.	RPA*	4(28.5%)	-	2(14.28%)
4.	Hartmann's Procedure	5(62.5%)	NA	NA
Total		13(32.5%)	4(10%)	2(5%)

Wound infection was the most common post-operative complication (32.5%). Wound infection was common in patients treated with Hartmann's procedure (62.5%). 50% of patients that were treated with sigmoidopexy had recurrence. Patients that showed recurrence were treated with relaparotomy and RPA. Anastomotic leak was seen in 2 patients that were treated with RPA, whereas no anastomotic leak was seen in patients treated with RPA and diversion colostomy. Anastomotic leak patients were re explored and treated with Hartmann's procedure.

Table 7: Mean duration of hospital stay after various procedures

S. No.	Procedure	Mean Hospital Stay
1.	Sigmoidopexy	8.3 days
2.	RPA* with colostomy	9.9 days
3.	RPA*	11.6days
4.	Hartmann's Procedure	13.6 days

Average duration of stay for patients undergoing surgical management was found to be approx 11 days. Mean duration was shortest for sigmoidopexy patients which was approx 8days. Longest duration of stay was seen in patients who underwent Hartmann's Procedure i.e, approx. 14 days.

Discussion

Sigmoid volvulus is a surgical emergency causing large bowel obstruction. Clinical presentation may be acute or subacute. Acute subtype is characterized by a sudden onset abdominal pain, vomiting, abdominal tenderness, obstipation. Gangrene usually develops early and leading to faecal peritonitis and septicaemic shock. Whereas the subacute form is characterized by an insidious onset and progression and it frequently occurs in older patients. It often shows an unspecific clinical presentation characterized by widespread cramp-like abdominal pain. It is common in low socio economic status population with history of chronic constipation. High altitude, fiber rich diet and chronic laxative use are commonly associated with sigmoid volvulus[6]. Almost all the cases could be diagnosed with clinical and radiological examination, and confirmed by intraoperative findings. Most of the time with x-ray abdomen alone (with typical coffee bean appearance), we were able to make preoperative diagnosis [7]. Ideal management of sigmoid volvulus still remains debated [8].

The treatment of sigmoid volvulus is variable. These variations depends on many factors like general condition of the patient at the onset, availability of blood transfusion and experience of the surgeon[9].Many operative procedures have been described in the literature would probably mean that no single operation is suitable in all patients and there are differences in the outcome of the disease [10]. There is a high incidence of recurrence of sigmoid volvulus after the commonly performed procedures such as rectal tube deflation, laparotomy and simple derotation, operative derotation and fixation of the sigmoid to the lateral or anterior abdominal wall or the transverse colon [11]. Sigmoidopexy, simple fixation of the colon to the intra abdominal structures can be an effective procedure in a viable redundant colon. The mortality and morbidity is almost nil in this procedure [11]. The main problem associated with this procedure is recurrence. To prevent recurrence following sigmoidopexy, Bhatnagar an Indian author described a procedure of extraperitonealization of whole sigmoid colon in 1970 in non-gangrenous sigmoid volvulus. The whole bowel is brought in to a closed space without the need to open the bowel [12]. In our study also high recurrence rate (50%) was seen in patients who underwent sigmoidopexy. Resection and primary anastomosis as an emergency procedure can be attempted in patients with short duration of history and stable general condition. In primary resection and anastomosis there are different studies showing variable cure rates and mortality rates. De and Ghosh from India supported RPA without colonic lavage in their series based on 197 patients with gangrenous or non-gangrenous bowel who underwent operation for sigmoid volvulus [13]. The overall mortality rate from this series was an

impressive 1.01%. According to most reports mortality rates are higher in the presence of gangrenous colon in comparison with viable colon at the time of emergency surgery [14, 15]. Raveenthiran reports a striking 3.5 percent mortality in his patients undergoing RPA for gangrenous volvulus with no diversion or colonic lavage [16]. Oren *et al*. also recommend resection and primary anastomosis for gangrenous volvulus in stable patients [14]. In our study 2 out of 14 patients died. This mortality can be attributed to poor preoperative general condition, malnourished status and delayed presentation of patients to emergency department. The main problem is anastomotic leak. This can be prevented by doing proximal colostomy. Wound infection rates are high, especially in unprepared bowel, with this type of procedure. This is the procedure of choice in young patients with viable colon. In present study patients with RPA and Proximal colostomy had lesser mortality and better postoperative recovery. None of the patients who underwent RPA with proximal colostomy had any anastomotic leak. Most of the patients who were treated by RPA and Proximal colostomy were malnourished with poor general condition at presentation. Diversion colostomy provided ample time for healing of anastomosis and it also enabled us to start early enteral feeding leading to better nutrition and postoperative recovery. Hartmann's procedure is a life saving procedure in emergency conditions when the bowel is gangrenous [17]. This is done in elderly patients with gangrenous bowel.

Conclusion

Volvulus of the sigmoid colon is a major cause of intestinal obstruction in both developing and developed countries and is more common in the male sex. Patients in whom gangrene or perforation is suspected should initially undergo rapid fluid resuscitation with appropriate monitoring. Broad spectrum antibiotics should be instituted as early as possible. Resection with primary anastomosis is the gold standard. Hartmann's procedure, while certainly useful, should be reserved for special situations - hemodynamically unstable patient, elderly patients, absence of a clear line of demarcation for the distal part, severe peritoneal contamination, inability to perform a tension free anastomosis. RPA with diversion colostomy is the safer treatment of choice in developing countries where chronic malnourishment is prevalent and patients delay in seeking medical help due to lack of awareness and proper medical facilities in remote areas.

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