ISSN:0975-3583,0976-2833 VOL13,ISSUE05,2022

SIGMOID VOLVULUS AND ILEOCAECAL KNOTTING: A PROSPECTIVE STUDY IN A TERTIARY CARE HOSPITAL IN SOUTHERN ODISHA INDIA

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ABSTRACT

BACKGROUND: Sigmoid volvulus is a common cause of intestinal obstruction in developing countries where it affects relatively young people compared to developed countries. No prospective study has been done on this subject in southern part of Odisha, India. This study describes in our region, the clinical presentation, management and outcome of sigmoid volvulus.

PATIENTS AND METHODS: This was a descriptive prospective study of patients operated for sigmoid volvulus at M K C G Medical College Berhampur, Odisha, India from June 2018 to May 2020.

RESULTS:A total of 196 patients (M: F = 4.1: 1) representing 14.2% of all cases of bowel obstruction were studied. The median age at presentation was 48 years. The disease significantly affected the older males compared with females (P = 0.012). The majority of the patients 183, (93.3%) presented acutely and had to undergo emergency surgical intervention, the rest were either sub-acute or chronic. Out of the 196 patients studied, 24 (12.2%) had ileo-sigmoid knotting. The majority of patients, 152(77.5%) were treated with resection and primary anastomosis, of which 83.0% were emergency cases. Colostomy was offered to 27% of cases. No patient had sigmoidoscopic derotation. Complications mainly surgical site infections were reported in 20.5% of cases. The overall median length of hospital stay was 14 days. Overall mortality rate was 14.1%. The main predictors of mortality were advanced age (>60 years), concomitant medical illness, late presentation (≥24 hours), presence of shock on admission and presence of gangrenous bowel (P < 0.001). The follow up of patients in this study was generally poor as more than half of patients were lost to follow up.

ISSN:0975-3583,0976-2833 VOL13,ISSUE05,2022

CONCLUSION: Sigmoid volvulus is not uncommon in our setting and commonly affects males than females. Most of thepatients presented acutely, requiring immediate resuscitation and surgical approach. Findings from this study suggest that in viable bowel, sigmoid resection and primary anastomosis is feasible as it may not adversely affect outcome. Temporary colostomy should be considered if the bowel is gangrenous or perforated. Early diagnosis and timely definitive treatment are essential in order to decrease the morbidity and mortality associated with this disease.

Keywords: Sigmoid volvulus, Colostomy, Intestinal obstruction.

INTRODUCTION:

Sigmoid volvulus, first described by von Rokitansky in 1836 [1], is a condition in which the sigmoid colon wraps around itself and its own mesentery, causing a closed-loop obstruction which, if left untreated, often results in life- threatening complications, such as bowel ischemia, gangrene, and perforation[2,3]. It is an important cause of colonic obstruction worldwide[1-3]. In developed countries, sigmoid volvulus ranks the third among large intestine obstructions following cancer and diverticular diseases [4] It represents 4% of all cases in developed countries and 50% in developing countries [5] .

The etiology of sigmoid volvulus is multifactorial and controversial [4,6-9] Those who possess a sigmoid colon with a long loop and narrow base of mesenteric attachment would be more prone to volvulus [8].Anatomical predispositions, advanced age, a high-fiber diet, medications altering intestinal motility, chronic constipation, previous abdominal surgery, neurological or psychiatric illness, pregnancy, high altitude and megacolon have all been reported in association with development of the condition[4,6-9].

Sigmoid Volvulus may present with acute sigmoid tor sion, recurrent previous torsion or ileosigmoid knotting sigmoid volvulus generally affects adults, with the highest incidence seen in the 4th-8th decades of life[5.] However, patients tend to be younger in developing countries as opposed to developed countries where the average age is 62 to 72 years[5,11]. The disease is more common in males and occurs in ratios ranging from 2:1 to 10:[1,5,11].Classically, patients present with a triad of abdominal pain, constipation and abdominal distention [12]. Abdominal X-ray radiograph always revealed findings typical of volvulus in only 65.0% of cases [12,13]. Many other authors have reported similar symp- toms and signs plus; vomiting, empty rectal ampulla, as- sociated mental and other medical illnesses in sigmoid volvulus presentation [11-13].

Despite significant progress in the treatment of this dis- ease, no consensus has been reached [2,14]. Generally, the aim of treatment of sigmoid volvulus is to relieve the obstruction and decompress the twisted sigmoid colon [14]. Many authorities now agree that, in uncomplicated sigmoid volvulus (without perforation or gangrene) sigmoid resection with immediate primary anastomosis is a first choice single-stage operation as it does not increase morbidity or mortality rates [14,15]. On the other hand, if the sigmoid colon is gangrenous then Hartmann's procedure is recommended [13-16]. Some authors advocate nonoperative such as sigmoidoscopic decompression and derotation as the primary emergency treatment of choice in uncomplicated acute sigmoid volvulus followed by interval semi-elective resection and primary anastomosis several days after successful decompression and emergency surgery is reserved for gangrene or failed decompression [1,17,18]. Emergency surgery is the appropriate

ISSN:0975-3583,0976-2833 VOL13,ISSUE05,2022

treatment for those who present with diffuse peritonitis, intestinal perforation or ischemic necrosis [18-19].

Sigmoid volvulus is often associated with a high mortality because it affects elderly patients who may have se- vere co morbid conditions. Patients older than 70 years represent a high-risk group if subjected to surgical intervention[19].However, when volvulus necessitates emergency surgery, it also carries a substantial mortality even in relatively young patients [20]. The highest mortality usually occurs in cases of resection and primary anastomosis of gangrenous sigmoid colon [21.]

There is a paucity of information regarding sigmoid volvulus in southern part of Odisha, India and particularly the study area. This is partly due to a lack of published local data regarding this condition in this region. This study was de- signed to describe our experience on the management of sigmoid volvulus outlining the clinical presentation, treatment outcome of sigmoid volvulus in our local setting and to identify factors predicting the outcome.

METHODS:

Study design and setting:

This was a descriptive prospective study of patients operated for sigmoid volvulus at M K C G Medical College and Hospital, Berhampur,Odisha,India from June 2018 to May 2020. M K C G Medical College and Hospital, Berhampur,Odisha,Indiais a tertiary care and teaching hospital for the Berhampur Universityand has 300 beds.

Study population:

The study included patients who were operated for sigmoid volvulus at M K C G Medical College and Hospital, Berhampur,during the period of study. However, patients aged 10 years and below are usually admitted in the pediatric surgical wards and therefore were excluded from the study. Preoperative diagnosis of sigmoid volvulus was made clinically, radiologically and confirmed at laparotomy. Preoperatively, all the patients recruited into the study were resuscitated with intravenous fluids to correct fluid and electrolyte imbalance; nasogastric suction; urethral catheterization and broad-spectrum antibiotic coverage. Relevant preoperative investigations included packed cell volume, serumelectrolytes, urea and creatinine, blood grouping and cross- matching. Radiological investigations including plan abdomen X-ray supine and erect views were done in all patients. Barium enema and Abdominal computed tomography (CT) was done in selected patients. No patients had sigmoidoscopy due to lack of these facility at our centre.

Intraoperatively, manual untwisting relieved the obstruction, and the distended hypertrophied sigmoid colon was decompressed by a tube passed through its wall, surrounded by seromuscular purse string of 2/0 vicryl and attached to a suction machine. The contents of the sigmoid colon, primarily gas and liquid feces, were evacuated as much as possible. A nasogastric tube was routinely used in all the cases to decompress the small bowel. The redundant sigmoid colon became evident, and the line of resection was decided. The descending colon and proximal rectum were mobilized, their vascularity was ensured and a resection and two-layered anastomosis with vicryl 2/0 and outer layer of interrupted silk 2/0. If the sigmoid colon was gangrenous, it was resected without untwisting and a Hartmann’s procedure or double-barreled colostomy fashioned. The peritoneal cavity was

ISSN:0975-3583,0976-2833 VOL13,ISSUE05,2022

lavaged with warm normal saline and the abdomen closed by mass- closure technique. A digital rectal dilatation was carried out as soon as the patient began to recover from anesthesia, to enhance drainage of mucoid colonic contents. Perioperative intravenous antibiotics were given to all the patients in combination with ampicillin 500 mg, gentamicin 80 mg and metronidazole 500 mg. IntravenousAmpicillinwas given 6 hourly, while gentamicin and metronidazole were given twice or every 8 hours respectively for a period of 72 hours. These were given for a further 48 hours for those with gangrenous bowel. Skin sutures were removed between 7 and 10 days and patients advised on follow-up. Data on each patient were entered into a proforma prepared for the study. The study variables included socio-demographic (i.e., age and sex, education, area of residence and occupation), associated pre-morbid illness, duration of symptoms, clinical presentation, radiological findings, timing of surgical procedure, ASA classification, operative findings and surgical procedure performed. The variables studied in the postoperative period were postoperative complications, hospital stay and mortality. Patients were followed up till discharge or death and thereafter for a period of six months.

Statistical data analysis:

Statistical data analysis was done using SPSS software version 17.0 (SPSS, Inc, Chicago, IL). Data was summarized in form of proportions and frequent tables for categorical variables and mode and median for continuous variables. P-values were computed for categorical variables using Chi-square ($\chi 2$) test and Fisher's exact test depending on the size of the data set. Independent student t-test was used for continuous variables. Multivariate logistic regression analysis was used to determine predictor variables that are associated with outcome. A p-value of less than 0.05 was considered to constitute a statistically significant difference.

RESULTS:

Socio-demographic data:

During the period of study, a total of 1028 adult patients were admitted to the adult general surgical wards of M K C G Medical College and Hospital and underwent laparotomy for bowel obstruction. Out of these, the underlying cause of obstruction was sigmoid volvulus in 208 patients. Of these, 12 patients were excluded from the study due fail ure to meet the inclusion criteria. Thus, 196 patients representing 19% of all bowel obstruction cases (i.e., 196 out of 1028 patients) were enrolled into the study. The range of patients at presentation ranged from 18 to82 years with a median age of 48 years (interquartile range, 46 to 52 years). The median age for males (54 years) at presentation was higher than that of their female counterparts (42 years) and this was statistically significant (P = 0.012). The peak age incidence was in the age group 51-60 years. Out of 196 patients, 158 (80.6%) were males and 38(19.3%) were females with a male to female ratio of 4.1: 1. Most of patients, 172 (92%) had either primary or no formal education and more than 80% of them were unemployed. The majority of patients, 168(85.7%) came from the rural areas located a considerable distance from the study area and morethan three quarter of them had no identifiable health insurance.

Clinical presentation among patients with sigmoid volvulus:

Majority of patients, 175 (89.2%) presented with acute bowel obstruction and the remaining 21 (10.8%) patients presented with sub-acute/chronic bowel obstruction. The duration of symptoms ranged from 1 to 16 days with a median duration of 6 days. 20 (10%)

ISSN:0975-3583,0976-2833 VOL13,ISSUE05,2022

patients presented within twenty-four hours of onset of symptoms, 132 (67.3%) between 24 and 48 hours, 38(19.3%) between 48 and 72 hours and 6 (1%) over 72 hours afterwards. Gross abdominal distention in 164 (95.9%) patients, colicky abdominal pain in 134 (91.8%), constipation in 98 (67.1%), vomiting in 181 (92.3%) and fever in 46 (23.4%) patients were the main symptoms; while dehydration in 68 (34.6%) patients, abdominal tenderness in 60 (30.1%) and visible peristalsis in 62 (31.6%) patients were the main signs. The classic triad of abdominal pain, abdominal distention and constipation was reported in 166 (84.7%) patients. Forty-two (21.4%) of the patients were in shock (with a diastolic blood pressure of less than 90 mmHg) on admission. Concomitant medical illness such as respiratory diseases (12), cardiovascular diseases (10), diabetes mellitus (8) and renal diseases (5) was re- ported 35 (24%) patients.

Diagnosis of sigmoid volvulus:

Preoperative diagnosis of sigmoid volvulus was made clinically, radiologically and confirmed at laparotomy. All patients in this study had plain abdominal x-ray films available for review and demonstrated the classical plain abdominal x-ray features of sigmoid volvulus (grossly distended and twisted sigmoid loop filling the abdomen, with multiple air fluid levels and the 'omega' or 'coffee bean' sign) in 183 (93%) patients. Abdominal computedtomography (CT) was performed in only 4 (1%) patients and demonstrated a twisted and dilated sigmoid colon with whirled sigmoid mesentery, in addition to twisted and dilated small intestinalsegments.None of our patients had sigmoidoscopy done due to lack of this facility at our centre.

Table 1 : Distribution of patients according surgical procedure performed

Diagnosis	Surgical procedure offered		Total
	Resection andprimary anastomosis	Colostomy	
Acute sigmoid volvulus	92 (63.0)	20 (13.7)	112 (76.7)
Ileo-sigmoid knotting	0	24 (16.4)	24(16.4)
Sub-acute/chronic sigmoid volvulus	10 (6.9)	0	10 (6.9)
Total	102(69.9)	44 (30.1)	146 (100)

Treatment modalities:

All the 196 patients underwent laparotomy. The majority of them, 183 (93.3%) were operated on emergency basis and required immediate resuscitation and relief of the sigmoid obstruction, while 13 (6.6%) patients had an elective surgery. Out of the 196 patients studied, 24 (12.2%) had ileo-sigmoid volvulus. Amongst the patients who had emergency operations, 159 (86.8%) had acute sigmoid volvulus and 24 (12.2%) had ileo-sigmoid volvulus, whereas 13 (6.6%) patients who presented with sub- acute or chronic sigmoid volvulus were operated on elective basis. The majority of patients, 152(77.5%) were treated with resection and primary anastomosis, of which 63.0% were emergency cases. Colostomy was offered to 27.1% of cases who had gangrenous and perforated bowel. All the patients who presented with sub-acute obstruction/chronic were treated with primary resection and anastomosis. None of our patients in this study had sigmoidoscopic derotation due to lack of this facility at

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our centre. Delayed presentation (≥24 hours) (P = 0.011) and a high ASA score (P = 0.000) were found to be independent predictors of gangrenous bowel.

Table 2 : Postoperative complications (N = 30)

Postoperative complications	Frequency	Percentage
Surgical site infection	13	43.3
Chest infection	4	13.3
Wound dehiscence	2	6.6
Prolonged paralytic ileus	2	6.6
Urinary tract infection	2	6.6
Enterocutaneous fistulae	1	3.3
Intraabdominal abscess	1	3.3

Treatment outcome:

A total of 30 (15.3%) patients developed postoperative complications, of which surgical site infection was the most common type accounting for 20.5%. Complication rate was significantly higher in emergency operations than in elective operations (32.5% versus 11.9%) (P = 0.014) and in patients with gangrenous bowel undergoing bowel resection (42.3% v/s 13.2%) (P = 0.002). All complications resolved on conservative treatment alone except in three patients who required re-operation for wound dehiscence (2) and intraabdominal abscess (1) respectively.

Table 2:Distribution of patients according to operative findings

Operative findings	Frequency	Percentages
Sigmoid colon (sigmoid volvulus)	122	83.6
• Viable	102	69.9
• Gangrenous/perforation	20	13.7
Ileo –sigmoid portion(ileo-sigmoid knotting)	24	16.4
• Viable ileum	1	0.7
• Gangrenous ileum	5	3.4
• Gangrenous both ileum and sigmoid	18	12.3
Peritonitis*	2	1.4
Adhesions*	6	4.1

*Occurred as operative findings in patients with either gangrenous or perforated bowel.

The length of hospital stay (LOS) ranged from 1 to 34 days with a median of 14 days ((interquartile range, 12 to 16 days). The LOS for non-survivors ranged from 1 day to 11 days (median 4 days). The length of hospital stay was significantly longer in patients with advanced age, concomitant medical illness and presence of com- plications (P < 0.001).

In this study, 33 (17.1%) patients died in the hospital. Amongst the patients treated with primary resection and anastomosis, 25(16.7% i.e.25/152) died while 8(18.2% i.e., 8/44) of those who had colostomy died. This difference was not significant in multivariate logistic regression analysis (P = 0.289). According to multivariate logistic regression analysis, advanced age (>60 years) (OR = 2.5, 95% CI (1.2- 4.8), P = 0.012), concomitant medical

ISSN:0975-3583,0976-2833 VOL13,ISSUE05,2022

illness (OR = 3.2, 95%CI (2.3-5.3), P = 0.003), late presentation (≥24 hours) (OR = 5.4, 95% CI (2.8- 6.9), P = 0.015), presence of shock on admission (OR = 3.2, 95%CI (2.2-8.5), P = 0.001) and presence of gangrenous bowel (OR = 3.2, 95%CI (1.1- 6.8), P = 0.000) were significantly associated with mortality.

Follow up of patients:

Out of the 163 survivors, 130 patients (80.2%) were discharged well,24 patients (14.8%) were discharged home with colostomies and the remaining nine (5.0%) patients were discharged against medical advice. No patient among survivors in this study had permanent disabilities. A total of 17 patients had their colostomies closed at the end of study period and the remaining 7 colostomies were not yet closed. The time interval from colostomy creation to colostomy closure ranged from 1 month to 5 months with a median of 4 months (+IQR of 3 to 6 months). Of the 163 survivors, seventy-eight (47.9%) patients were available for follow up at six to twelve months after discharge and the remaining 85 (52.1%) patients were lost to follow up.

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DISCUSSION:

Since it was first described by von Rokitansky in 1836 [1], sigmoid volvulus remains a major cause of colonic intestinal obstruction, which results from twisting of the sigmoid colon on its own mesentery [2]. Globally, sigmoid volvulus shows geographic variation being higher in developing countries than in developed world [2,4,7]. It accounts for 2% to 5% of colonic obstructions in Western countries and 20% to 50% of obstructions in Eastern Countries including Africa [4,7]. In this study, sigmoid volvulus accounted for 14.2% of all diagnosed intestinal obstruction seen during the study period in our setting. This concurs with figures of 14.1% that was reported by Jumbi and Kuremu[23]in Kenya. There is no satisfactory explanation for the geographical distribution. It has been suggested that high fiber diet may contribute to the high incidence in Africa where the high fiber results in heavy loading of the sigmoid colon [24,25]. In East Af- rica, sigmoid volvulus is the second most common cause of intestinal obstruction after adhesions [23].

Sigmoid volvulus has been reported to occur in all age groups, from neonates to elderly[25]. Most often this condition is observed in adults, but the age at which it is most common also varies geographically. In developing countries, a man aged between 40 and 60 years is usually reported, whereas in developed countries, the mean age is between 60 and 70 year[5,11]. As reported in other African studies [11,13,14,23], the median age of 48 years in this study was younger than the age described in most developed countries; about 10 years difference has been reported in these studies [14,23]. We could not establish the reason for this age differences. The male predominance demonstratedinthisstudy was in keeping with previous observations reported in studies performed elsewhere[11,13,14,19,23] There is a marked over-all preponderance of male patients with sigmoid volvulus, with a reported ratio of 2.5-9.1 [21,26]. It is suggested that the more spacious female pelvic area allowed a greater possibility of spontaneous reduction of a beginning volvulus [27]. Another predisposing factor is the mesocolon, which is longer in men but wider in women [8]. Heavy loading is more likely to cause sigmoid volvulus in the presence of a longer mesentery.

ISSN:0975-3583,0976-2833 VOL13,ISSUE05,2022

CONCLUSION:

Sigmoid volvulus remains the commonest cause of colonic bowel obstruction at M K C G Medical college and Hospital berhampur and contributes significantly to high morbidity and mortality. Most of the patients presented acutely, requiring immediate resuscitation and surgical approach. It is suggested that in viable bowel, sigmoid resection and primary anastomosis is feasible as it may not adversely affect out- come. Temporary colostomy should be considered if the bowel is gangrenous or perforated. Early diagnosis and timely definitive treatment are essential in order to decrease the morbidity and mortalityassociatedwith this disease.

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