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Original Research Article

Risk factors and surgical management of sigmoid volvulus among patients attending Al-Karama Teaching Hospital of Iraq

Mohammed Hillu Surriah[1]*, Amine Mohammed Bakkour[1], Nidaa Ali Abdul Hussain[2]

[1]Department of Surgery, Al-Karama Teaching Hospital, Baghdad, Iraq
[2]Department of Obstetrics and Gynaecology, Al-Yarmouk Teaching Hospital, Baghdad, Iraq

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***Correspondence:**
Dr. Mohammed Hillu Surriah,
E-mail: drmohammedhs@yahoo.com

ABSTRACT

Background: Sigmoid volvulus is defined as torsion of the sigmoid colon around its mesenteric axis, which leads to acute large intestine obstruction, which, if left untreated, often results in life-threatening complications, such as bowel ischemia, gangrene and perforation. The aim of this study was to analyse sigmoid colon volvulus when its presented as a surgical emergency.
Methods: This was a prospective study of 25 patients presented with the features of strangulated sigmoid colon volvulus to Al-Karama Teaching Hospital (surgical casualty) from March 2014 to March 2018. Eighteen patients (72%) were males and seven patients (28%) were females. The age of the patients ranged from 20-70 years. The main risk factor was chronic constipation, laxative dependency and high fiber diet. The main presenting symptoms and signs were absolute constipation, generalized abdominal distension, tenderness, tachycardia and fever. The patients were investigated by plain abdominal X-ray and haematological investigations.
Results: Among the 25 patients, 13 had distended gangrenous sigmoid colon volvulus, 9 out of the remaining 12 patients were discovered to have distended non-gangrenous sigmoid colon volvulus of the rest 3 patients, 2 were found to have Ileo-sigmoid knotting and the last patient had a perforated gangrenous sigmoid colon volvulus. Four patients developed postoperative complications and one patient died.
Conclusions: Volvulus of the sigmoid colon is more predominant in males. Middle age individuals seem to be the most affected group by sigmoid colon volvulus. Majority of patients with sigmoid colon volvulus have history of chronic constipation, laxative dependency and high fiber diet.

Keywords: Sigmoid colon, Strangulation, Volvulus

INTRODUCTION

Sigmoid volvulus is defined as torsion of the sigmoid colon around its mesenteric axis which leads to acute large intestine obstruction, which, if left untreated, often results in life-threatening complications, such as bowel ischemia, gangrene and perforation.[1,2] Early and correct diagnosis of this disease is essential for appropriate treatment aimed at correcting abnormal pathophysiological changes and restoring intestinal transit caused by the volvulus.

It usually occurs in elderly or institutionalized patients and in patients with variety of neurogenic disorders. The

sigmoid colon is part of the hindgut which is part of the primitive gut develops during the fourth week of gestation. The hindgut develops into the large bowel distal to the mid transverse colon, as well as the proximal anus and the lower urogenital tract.[3] Despite significant progress in the treatment of this disease, no consensus has been reached.[4] Emergency surgery is the appropriate treatment for those who present with diffuse peritonitis, intestinal perforation or ischemic necrosis.[5,6] Nonoperative treatment is adopted if there is no evidence of these conditions. Barium enema, rectal tubes, rigid and flexible sigmoidoscopy as therapeutic methods have been adopted by clinicians.[7,8] Colonoscopy, besides being a therapeutic measure, allows the evaluation of colonic mucosa and therefore the presence or absence of signs of ischemia and is effective in more than 70% of patients.[9,10]

The cause of sigmoid volvulus is not known. Primary predisposing factors include a long congenital sigmoid with a short mesenteric base, chronic constipation, high fiber regimen, acquisitive mega colon, anticholinergic drugs, sedatives and anti-Parkinson agents.[11]

Rotation nearly always occurs in an anticlockwise direction and the degree of rotation varies from 180 degree to complete rotation. The loop may rotate half a turn, in which event spontaneous rectification sometimes occurs. After the loop has rotated one and a half turn, the veins will be compressed and the loop become greatly congested. If it rotates more than one and a half turn, the blood supply is cut off entirely and the loop becomes gangrenous.[12]

Sigmoid volvulus is a good example of closed loop obstruction, allowing entry of some intestinal from more proximal bowel but preventing their egress and if the ileo-caecal valve is competent, a double closed loop obstruction result with huge distention.[13,14]

Clinical presentations include abdominal pain, constipation and abdominal distention. In older patients receiving psychotropic medications, pain is not usually common, although it would be associated with significant abdominal distention.[3] The diagnosis is usually confirmed with abdominal X-ray examination, enema, sigmoidoscopy, Computerized Tomographic (CT) and blood test.[15-19] To the best of the knowledge, this could be the first attempt to gather information about risk factors and management of sigmoid volvulus among sample of Iraqi patients.

METHODS

A prospective cross-sectional study design of 25 cases of sigmoid colon volvulus presented to the surgical casualty in Al-Karama Teaching Hospital as acute large bowel obstruction with the clinical suspicion of strangulation, all of them were submitted to an emergency surgery. The study was conducted between July 2017 to April 2018. All suspected cases presented to emergency department or outpatient were invited to participate in this study. Those who fulfilled inclusion and exclusion criteria were included.

The adults above 18 years of old, provide consent to participate in this study and Iraqi national were included. Patients with presence of other surgical emergencies and presence of perforation were excluded.

Data including age, sex, clinical presentation, diagnostic and therapeutic measures and post-operative complications were recorded.

Special risk factors were sought for including, chronic constipation, laxative dependency, high fiber diet, institutionalization with neuropsychiatric disorders and previous abdominal surgery.

All data were described with frequency and percentage and presented in frequency tables.

RESULTS

In this study, author had 25 patients presented with the clinical features of strangulated sigmoid colon volvulus. There were 18 (72%) male and 7 (28%) female patients, with the male to female ratio was 2.5:1. The study showed that the age distribution of this patients ranged from 20-70 years and the mean age was 45 years. The highest incidence was in the 40-49 years age group, in which author had (12) patients (48%). On the other hand, the 70-79 years age group showed the least incidence, (1) patient (4%) (Table 1).

Table 1: Sex and age distribution of patients with sigmoid colon volvulus.

Variable		No. of the patients	Percentage
Sex	Male	18	72%
	Female	7	28%
Age	20-29	2	8%
	30-39	5	20%
	40-49	12	48%
	50-59	3	12%
	60-69	2	8%
	70+	1	4%

In respect to the risk factors that predispose to sigmoid colon volvulus, twenty patients (80%) gave history of chronic constipation, laxative dependency and high fiber diet, while 3 patients (12%) were institutionalized with neuropsychiatric disorders and 2 patients (8%) had undergone previous abdominal surgery as shown in Table 2.

In this sample of patients, the main presenting symptoms and signs were absolute constipation (23(92%) patients), generalized abdominal distension (23(92%) patients), abdominal pain and tenderness (22(88%) patients), fever

and tachycardia (18(72%) patients). The least encountered symptoms and signs were nausea and vomiting (9 patients) 36%.

Table 2: Risk factors for the development of sigmoid colon volvulus.

Risk factors	No. of patients	%
Chronic constipation, laxative dependency and high fiber diet	20	80
Institutionalization and neuropsychiatric disorders	3	12
Previous abdominal surgery	2	8
Total	25	100

All the patients were investigated by plain abdominal X-ray and haematological investigations. The X-ray showed characteristic features in 20 patients (80%) having the appearance of omega sign of the dilated colon with the apex of the loop under the left hemidiaphragm and the convexity of the loop points towards the right upper quadrant. Of the remaining 5 patients, 2 (8%) showed distended ileal loops in a distended sigmoid colon and one patient (4%) showed free air under diaphragm, while the last 2 patients had inconclusive findings. Regarding the hematological investigations, 21 patients (84%) had leukocytosis. Sixteen of them demonstrate a WBC count >15000\cc, while in the remaining 5 patients (20%), the WBC count was <15000\cc. The first group discovered later to have an underlying strangulation, gangrene and\or perforation (Table 3).

Table 3: Presenting symptoms and signs.

Presenting symptoms and signs	N	%
Absolute constipation	23	92
Generalized abdominal distension	23	92
Abdominal tenderness	22	88
Tachycardia and fever	18	72
Nausea and vomiting	9	36
Plain abdominal X-ray		
Omega sign	20	80
Distended ileal loops in a distended sigmoid loop	2	8
Free air under diaphragm	1	4
Haematological investigations		
Leukocytosis >15000\cc	16	64
Leukocytosis <15000\cc	5	20

Regarding surgical modalities of treatment among the 25 patients, 13 patients (52%) had distended gangrenous sigmoid volvulus, all of them were treated by sigmoidectomy, combined with double barrel colostomy in 7 patients (28%), Hartmann's procedure in 4 patients (16%) and colostomy and mucus fistula in 2 patients (8%). Nine of the remaining 12 patients had distended non-gangrenous sigmoid volvulus, all of them underwent sigmoidectomy associated with double barrel colostomy in 4 patients (16%), Hartmann's procedure in 2 patients (8%), colorectal end-end anastomosis in 2 patients in whom the colon was not loaded with feces (8%) and colostomy and mucus fistula in 1 patient (4%).

Of the rest 3 patients, 2 (8%) were found to have ileo-sigmoid knot, the first one with gangrenous sigmoid colon and small bowel managed by sigmoidectomy and double barrel colostomy with resection and end-end anastomosis of the small bowel (4%), the second one had gangrenous small bowel only treated by sigmoidopexy with resection and end-end anastomosis of the small bowel (4%). The last patient had perforated sigmoid colon volvulus, sigmoidectomy and Hartmann's procedure was done for him (4%).

Thus, of the whole 25 patients included in the sample and who were submitted to an emergency surgery, 16 patients (64%) were found, intraoperatively, to have gangrenous bowel. Of the remaining 9 patients, 7 cases (28%) demonstrated a questionably viable, dusky bowel intraoperatively. All of the patients who were left with colostomies were followed 6-8 weeks later by closure of the colostomy. Regarding the post-operative complications, 2 of the patients (8%) had atelectasis, while 1 patient (4%) developed wound infection and 1 patient (4%) was complicated by anastomotic leak. The other 2 patients had undergone sigmoidectomy and end to end anastomosis. All of them where treated conservatively and improved later on, so morbidity was (16%) as shown in Table 4.

Table 4: Distribution of type of surgery and complications.

Characteristic	No.	%
Type of surgery		
Sigmoidectomy/double barrel	13	52
Sigmoidectomy/Hartmann's procedure	6	24
Sigmoidectomy/colostomy and mucus fistula	2	8
Colorectal end-end anastomosis	2	8
Colostomy and mucus fistula	1	4
Sigmoidopexy end to end anastomosis	1	4
Complications		
Atelectasis	2	8
Wound infection	1	4
Anastomotic leak	1	4
Total	4	16

Mortality rate was (4%), where 1 male patient died in the 3rd post-operative day because of sepsis, as he had an emergency surgery for gangrenous sigmoid volvulus, with sigmoidectomy and Hartmann's procedure.

DISCUSSION

During the period of this study, author had 500 patients presented with acute mechanical intestinal obstruction and underwent emergency surgery, of whom, there were

58 cases of large bowel obstruction, among these, 25 patients had sigmoid colon volvulus with an incidence of (43.1%) of large bowel obstruction and (5%) of all mechanical intestinal obstruction, which is nearly similar as reported by others: Mellor et al, reported that 5.6% of their cases of intestinal obstruction were caused by sigmoid volvulus.[20] The sex incidence was, 18 males (72%) and 7 females (28%) with a ratio of 2.5:1. This indicate the male predominance in sigmoid volvulus that has been reported by Rennie JA, attributed the low incidence in females to their capacious pelvis and lax abdominal wall.[21]

Bhatnagar BN et al, in a study of 84 patients with sigmoid colon volvulus showed an incidence of 2.2:1 male predominance.[22] In this study, the age of the patients ranged from 20-70 years and the mean age was 45 years, this coincide with other studies done in the Eastern society, in which the mean age was 40 years but it does not agree with Western studies, in which the mean age was 72 years.[23,24] Thus, in this country it is a disease of middle age group, while in Western countries it is a disease of elderly.[17] This may be attributed to the fact that not very many people in this country reach this age group. In the majority of patients in this study, the main risk factor was chronic constipation, laxative dependency and high fiber diet (80%), while history of institutionalization and neuropsychiatric disorders and previous abdominal surgery were encountered with less frequencies (12% and 8% respectively).

These results were compatible with the Eastern studies in which colonic hypertrophy associated with high fiber diet is a major risk factor for developing sigmoid colon volvulus but they differ from most Western studies in which sigmoid volvulus occur oftenly in institutionalized and debilitated elderly individuals with neurologic and psychiatric conditions such as Parkinson's disease and schizophrenia, in one report, 40% live in nursing homes and institutes.[24-26]

This difference could be attributed to the lower percentage of institutionalized individuals and the more frequent ingestion of the high fiber diet in the Eastern society as compared to the western one.

Regarding the clinical presentation, the main presenting symptoms and signs were absolute constipation (23 patients, 92%), abdominal distension (23 patients, 92%), pain and tenderness (22 patients, 88%) and fever and tachycardia (18 patients, 72%). Nausea and vomiting were less observed (2 patients, 8%). These results are compatible with other studies done in the Eastern countries but are somewhat different from the Western studies, in which there is less incidence of abdominal tenderness (70%) and fever and tachycardia (11%).[7,24] The higher incidence in this study may be due to the late presentation of the patients with the outcome of ischemic strangulation of the twisted colon.

With respect to the investigations, plain abdominal X-ray will confirm the diagnosis in up to (80%) of the patients, this coincide with this study in which 20 patients (80%) showed the characteristic Omega sign, 2 out of the remaining 5 had distended ileal loops in a distended sigmoid loop, this is characteristic of ileo-sigmoid knot.[27,28]

Among the remaining 3 patients, one had free air under diaphragm (indicative of perforation) and two patients had inconclusive X-ray signs. In respect to haematological investigations, leukocytosis is suggestive of the presence of gangrenous bowel and this agrees with the finding of leukocytosis (>15000\cc) in 16 of the patients, who were discovered later to have an underlying strangulation and gangrene.[16,19]

Regarding the treatment of the patients, all of them were suspected clinically to have an underlying strangulation, and therefore underwent emergency surgery rather than non-operative treatment. 23 cases (92%) were proved intraoperatively to have gangrenous bowel. The majority were managed by sigmoidectomy combined with various types of colostomies in patients who had established gangrenous sigmoid colon or a sigmoid colon with questionable viability after operative detorsion (22patients, 88%).

In this study sample, Paul-Mikulicz procedure was the preferred one, as it does not necessitate a second laparotomy to be closed. Sigmoidectomy and colorectal anastomosis was done in only two patients (8%) who had viable sigmoid colon at laparotomy which was not loaded with feces. These results coincide with:

- Friedman et al, who stated that, as sigmoid volvulus is associated with high morbidity and mortality and high recurrence following non-operative decompression, therefore definitive surgery is required for its management.[29]
- Mokoena TR et al, in a study of 90 cases of sigmoid volvulus, advocate resection in all patients.[30]
- Baker DM et al, said that, if emergency surgery is necessary, a colostomy rather than primary anastomosis is indicated.[24]
- Bagarani M et al, concluded that, the treatment of choice in sigmoid colon volvulus seems to be resection with primary anastomosis in patients with viable colon and colostomy in patients with strangulated colon.[31] Concerning the morbidity and mortality rates in this study, they were highest when intraoperative strangulation was encountered, the former was (16%) and the latter was (4%). These results are nearly similar to other studies:
- Mokoena et al, in their study of 90 cases, reported a (20%) morbidity rate and (12%) mortality rate, (80%) of which was in the emergency operating group.[30]
- Osime U, reported a (7.9%) mortality rate after resection of strangulated sigmoid colon volvulus.[32]

CONCLUSION

Volvulus of the sigmoid colon is more predominant in males. Middle age individuals seem to be the most affected group by sigmoid colon volvulus. Majority of patients with sigmoid colon volvulus have history of chronic constipation, laxative dependency and high fiber diet. The main presenting symptoms and signs of patients having strangulated sigmoid colon volvulus are abdominal tenderness, tachycardia and fever in addition to huge abdominal distension and absolute constipation.

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