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Management of Acute Sigmoid Volvulus: An Institution's Experience Over 9 Years

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Abstract
Introduction Management of sigmoid volvulus is often challenging because of its prevalence in high-risk patients and the associated perioperative morbidity and mortality rates. This study was designed to review the management and outcome of all patients admitted with sigmoid volvulus.
Methods A retrospective review of all patients who were admitted for sigmoid volvulus from October 2001 to June 2009 was performed. Diagnosis was confirmed on clinical evaluation, radiological studies, and/or intraoperative findings.
Results Seventy-one patients, median age 73 (range, 17–96) years, were admitted a total of 134 times for acute sigmoid volvulus during the study period. The majority ($n = 51$, 71.8%) were older than aged 60 years, and 41 (57.7%) had at least one premorbid condition. Seven (9.9%) patients underwent emergency surgery on presentation. The remaining 64 (90.1%) patients were initially managed conservatively using a flatus tube and/or sigmoidoscopic decompression. One patient had an endoscopic-related perforation and required emergency surgery. Another ten patients failed conservative management for which nine underwent operative intervention. The last patient refused surgery and died subsequently. Fifty-three (74.6%) patients had successful conservative management; seven of them underwent elective surgery subsequently. Of the remaining 46 patients, 28 (60.9%) were admitted for recurrent sigmoid volvulus. Of these 28 patients, 12 eventually had elective surgery after successful decompression, whereas the remaining 16 were not operated. In our series, three patients died after emergency surgery and there was no mortality after elective surgery. Another six patients died from medical conditions that were unrelated to sigmoid volvulus.
Conclusions Acute sigmoid volvulus is a surgical emergency, although the majority (75%) can be successfully decompressed nonoperatively. Emergency surgery in these patients is associated with a mortality of 17.6% in our series. Elective definitive surgery is suggested in view of the high recurrence rate (>60%) and the considerable risks of emergency surgery.

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Introduction

Sigmoid volvulus is the twisting of the sigmoid colon around its own mesentery, which if left unattended often leads to life-threatening complications, such as intestinal obstruction, bowel ischemia, gangrene, and perforation. In the absence of peritonism or bowel gangrene, an initial attempt with nonoperative reduction is reasonable. Some of these techniques described included tube decompression inserted per rectally, endoscopic decompression, or enema-guided decompression [1].

Unfortunately, nonoperative reduction is not always successful and surgery should then be performed with minimal delay. However, operative intervention in these patients often is fraught with prohibitive morbidity and mortality rates [2]. Apart from the high prevalence of sigmoid volvulus in frail, elderly patients with poor physiological reserves, the pathophysiological impact of intestinal obstruction and operating in an unprepared grossly distended bowel are also accountable for the abysmal outcome [1–3].

All the above-mentioned issues prompted us to review our institution's experience in the management of sigmoid volvulus; our primary goal was to illustrate the presentation, management, and outcome of all patients with sigmoid volvulus. The secondary goal was to derive an algorithm for the management of acute sigmoid volvulus based on our results and those in the literature.

Methods

Study population

Tan Tock Seng Hospital is a 1,300 bed hospital, the second largest in Singapore, and provides secondary and tertiary medical care for approximately 1.5 million people. A retrospective review of all patients who were admitted for sigmoid volvulus from October 2001 to June 2009 was performed. Patients were identified from the hospital's diagnostic index. Diagnosis was confirmed on clinical evaluation, radiological studies, and/or intraoperative findings. Some of the characteristic features on plain radiographs include the omega or coffee-bean signs [4, 5]. All of these findings were verified by the radiologist on duty. Colonic pseudo-obstruction cases were excluded.

Data collected from our patients included demographic data, comorbid conditions, previous admissions for sigmoid volvulus, clinical presentation, radiological investigations, nonoperative or operative findings and interventions, perioperative outcome, and long-term follow-up.

In our institution, upon diagnosis of sigmoid volvulus, an initial nonoperative approach would be adopted if there was no evidence of acute abdomen. One option would include tube decompression, using a Foley catheter (size 16 or 18 French), inserted per-rectally in the ward. If successful, there would be instantaneous response as evident by the resolution of the abdominal distension. A repeat abdominal radiograph would be performed subsequently.

The other option would be to decompress the volvulus using flexible sigmoidoscopy. This could be adopted as the primary procedure depending on surgeons' preferences or as a backup after failure of tube decompression. It could also be used to ascertain the viability of the mucosa after tube decompression. Upon successful decompression, a rectal tube would be inserted past the constriction point under endoscopic visualization and left in situ.

Emergency surgery would be performed in patients with acute abdomen, or in those who failed endoscopic decompression or with endoscopic evidence of ischemic colonic mucosa. The decision to offer elective surgery would be dependent on the primary surgeon's discretion.

Results

During the study period, 71 patients were admitted a total of 134 times for acute sigmoid volvulus. The median age of the study group was 73 (range, 17–96) years, and the majority ($n = 51$, 71.8%) of patients were older than aged 60 years. Hypertension was the most common premorbid condition ($n = 30$, 42.3%); while more than 41 (57.7%) patients had at least one premorbid condition. Table 1 illustrates the various characteristics of the study group.

Apart from the premorbid conditions highlighted in Table 1, several patients also had neuropsychiatric conditions. Parkinson's disease was present in 14 (19.7%) patients, and dementia was documented in another 9 (12.7%). Schizophrenia, depression, and epilepsy were seen in several of our patients. A total of 13 (18.3%) patients were institutionalized and another 6 (8.5%) were bed-bound.

Table 1 Characteristics of the 71 patients who were admitted for acute sigmoid volvulus

Characteristics	No. of patients (%)
Median age, yr (range)	73 (17–96)
≤60	20 (28.2)
>60	51 (71.8)
Gender	
Male	43 (60.6)
Female	28 (39.4)
Premorbid conditions	
Hypertension	30 (42.3)
Diabetes mellitus	13 (18.3)
History of cerebrovascular accident	16 (22.5)
Ischemic heart disease	13 (18.3)
Hyperlipidemia	9 (12.7)
No premorbid condition	30 (42.3)
Presence of premorbid condition(s)	41 (57.7)
One	16 (22.5)
Two	8 (11.3)
Three	12 (16.9)
Four	5 (7.0)
Other notable medical problems	
Parkinson's disease	14 (19.7)
Dementia	9 (12.7)
Schizophrenia	5 (7.0)
Depression	5 (7.0)
Epilepsy	3 (4.2)
Mobility status	
Institutionalized	13 (18.3)
Wheelchair bound	6 (8.5)
Bedbound	6 (8.5)

All of the patients had constipation, abdominal distension, and/or abdominal pain. Abdominal radiography was performed in all patients but was only diagnostic of acute sigmoid volvulus in 45 (63.4%) of them. Thirteen (18.3%) patients had computed tomographic (CT) scans performed. The rest of the patients were diagnosed during sigmoidoscopy or intraoperatively.

Seven (9.9%) patients underwent emergency surgery without any attempted decompression. Three had acute abdomen with refractory hypotension. Another three patients were operated on for suspected mechanical obstruction on abdominal radiographs and had the volvulus diagnosed intraoperatively. The last patient was operated after the CT scan reported ischemic bowel from sigmoid volvulus. One of these patients died eventually from the ensuing septicemia caused by bowel gangrene.

The remaining 64 (90.1%) patients had their conditions initially managed conservatively. In 35 patients, flatus tube decompression was attempted and was successful in 20 (57.1%). In the 15 patients who failed tube decompression, 2 underwent immediate surgery because there were emergent signs of acute abdomen; the other 13 underwent emergency sigmoidoscopy, which was successful in 10. The remaining three patients who failed sigmoidoscopic decompression required immediate surgery. Twenty-nine patients had sigmoidoscopic decompression as their primary procedure. It was unsuccessful in only five patients.

Of the 42 patients in whom sigmoidoscopy was attempted, 1 (2.4%) patient had an initially successful endoscopic decompression but was complicated by colonic perforation. He complained of severe abdominal pain after the procedure and an erect chest radiograph showed pneumoperitoneum. He underwent immediate surgery and was discharged well eventually.

Hence, after taking into account the patient with post-procedural perforation, sigmoidoscopic decompression was successful in 78.6% when used as a primary procedure or after failed rectal tube decompression.

Ten patients failed conservative management and operative intervention was advised: six underwent Hartmann's procedure; one had subtotal colectomy; and another two had sigmoid colectomy. The last patient and his family refused surgical management due to the significant operative risks from his recent myocardial infarction. He passed away eventually. Two of the patients who underwent surgical intervention died during the perioperative period: one from pneumonia, and the other from intra-abdominal septicemia.

In total 53 (74.6%) patients were successfully managed conservatively. Upon resolution of their acute symptoms, seven patients underwent elective surgery for their conditions. Of the remaining 46 patients, 4 died during the same hospitalization from various other medical causes (acute myocardial infarction, pneumonia, or septicemia), all unrelated to the volvulus. Fourteen patients did not have any further episode of acute volvulus; however, 28 (60.9%) were readmitted for similar attacks. The median duration from the initial admission to the first recurrence was 116 (range, 5–985) days, and median number of recurrences was 2 (range, 1–9) episodes. One patient who adamantly refused surgery had a total of nine subsequent admissions for recurrent sigmoid volvulus.

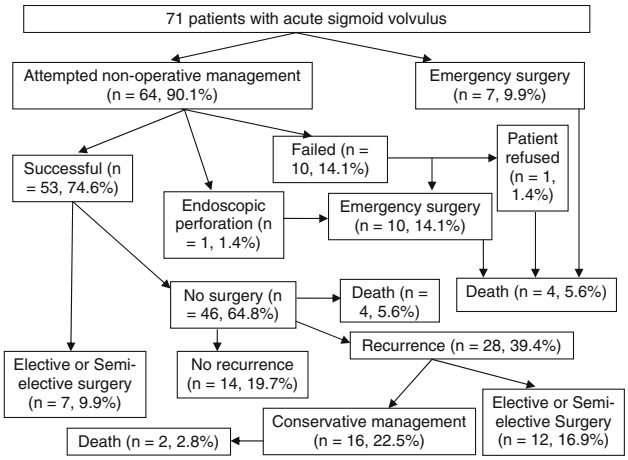

Fig. 1 Outcome of all 71 patients with acute sigmoid volvulus

Interestingly, all recurrent episodes of volvulus were successfully decompressed using rectal tube and/or flexible sigmoidoscopy. Twelve eventually underwent elective surgery after successful decompression, and the remaining 16 were not operated on: 2 died subsequently from medical complications, whereas 4 had prohibitive perioperative risks and hence surgery was not advised. The remaining ten patients refused surgery.

The overall perioperative mortality of the patients who underwent emergency surgeries was 17.6% (3/17). Five (29.4%) other patients required postoperative surgical intensive care unit (SICU) stay. There was no mortality seen in the group of patients who underwent elective surgery, although there was one patient who required relook laparotomy and Hartmann's procedure due to anastomotic dehiscence after sigmoid colectomy. He was discharged well eventually. Figure 1 illustrates the entire flowchart of all 71 patients who were admitted for acute sigmoid volvulus.

Discussion

With an aging population in most developed countries, the problem of acute sigmoid volvulus is expected to become more prevalent [3]. Apart from advanced age, other risk factors associated with sigmoid volvulus include

congenital redundancy of the sigmoid colon with an elongated yet narrow mesenteric base, male gender, high residue diet, postoperative abdominal adhesions, and certain long-term medications [1–3]. Some of these medications include anti-Parkinsonian, antipsychotics, and tranquilizers and were experienced in a sizeable proportion of our patients [5, 6]. These medications often resulted in constipation as an adverse effect, which is one of the well-known risk factors. Thus, those situations that predispose to constipation, such as prolonged bed rest, immobilization, and institutionalized patients, are significant contributory factors [5–8]. Although intussusception and colon carcinoma are rare causes, a complete colonoscopic evaluation should be performed for every patient at least once as part of the overall management.

Operating on these patients is always deemed undesirable because many of them have numerous medical problems that markedly increase the risks of surgery [6–9]. This often results in the high morbidity and mortality reported by other series and also seen in the current one [6–9]. On the other hand, although sigmoid volvulus is rare in fit, younger patients, the diagnosis is consequently delayed or missed and could result in dismal outcome [3].

Prompt diagnosis and early decompression are vital for the optimal management of acute sigmoid volvulus. In the majority of patients, a thorough clinical evaluation and abdominal radiographs can be adequate to achieve the diagnosis. Some typical symptoms include abdominal pain and distension followed by complete constipation. Physical findings of tenderness or guarding and/or bleeding per rectum must alert the possibility of bowel ischemia, gangrene, or perforation [5–9].

Plain abdominal radiographs typically demonstrate a dilated sigmoid colon and/or multiple small or large intestinal air-fluid levels with one of the well-known radiological diagnostic features, such as the omega, coffee bean, or horseshoe sign [4–10]. In our series, the accuracy of abdominal radiographs in diagnosing acute sigmoid volvulus was 63.4%, comparable to other series in the literature [4–10].

Apart from abdominal radiographs, the other noninvasive diagnostic modality that has been adopted in increasing frequency includes computed tomography [11]. It is able to achieve the underlying diagnosis with high sensitivity and specificity and could illustrate associated complications, such as bowel perforation and ischemia. Furthermore, it is able to exclude other etiologies of bowel obstruction. However, the time to perform the scans must be taken into consideration, especially in the acute setting.

The role of endoscopy in acute sigmoid volvulus is invaluable. Apart from being able to convert a potentially high-risk emergency operation to an elective procedure, it is also extremely useful to exclude the various other causes of colonic obstruction, such as an underlying malignancy [12–14]. In addition, the detection of any ischemic or gangrenous mucosa would require urgent surgery [12–14]. However, before the endoscopic procedure, the presence of an acute abdomen must be excluded. In our series, we were able to achieve a successful sigmoidoscopic decompression rate of approximately 78%.

Compared with rigid sigmoidoscopy, flexible sigmoidoscopy is readily used in our institution for endoscopic decompression due to several reasons. In addition to a superior success rate and safety profile, it is of adequate length to reach past the constricting point [7]. It also allows better visualization of the colonic mucosa and could guide the decompression process more ideally. Furthermore, the authors postulated that the senior registrars on duty are more familiar with the flexible sigmoidoscopy during their surgical training, which could help to minimize the risk of perforation.

Unfortunately, there are several criticisms of performing sigmoidoscopy in the acute setting. The risk of traumatic perforation is genuine and was seen in one (2.4%) of our patients. Other disadvantages cited include the possible delay in surgical intervention of patients with bowel gangrene and the high rate of recurrence after successful decompression [12–14].

Another method that our institution had been practicing to reduce the volvulus is the usage of a rectal tube. We use a Foley catheter (16 or 18 French) because it is semirigid, of adequate length, and readily available in any surgical ward. Although we could only achieve a success rate of 57.1%, this procedure is still advocated because it can be performed easily in the ward with minimal time delay. If successful, it can prevent the need for an urgent endoscopy, which may be difficult considering the manpower and logistics constraints, especially during the night. Although the risk of perforation using the rectal tube alone is extremely low, it is still possible. In addition, because it does not allow visualization of the bowel mucosa, it may give a false sense of reassurance and delay any subsequent operative intervention, especially in bowel gangrene. Hence, endoscopy is still indicated if the viability of the colonic mucosa is questioned or if the rectal tube fails to decompress the volvulus.

Perhaps more importantly, before considering any nonoperative interventions, the diagnosis of an acute abdomen from gangrenous or perforated bowel must be excluded [1, 2, 6, 7]. Any suspicion of an acute abdomen warrants an emergency surgery. Other situations that necessitate immediate laparotomy include failure of endoscopic decompression or related postprocedural colonic perforation and the presence of ischemic or gangrenous mucosa on endoscopy [1, 2, 6, 7].

The perioperative mortality rate after emergency surgery of 17.6% in our series is not unexpected. The outcome after emergency surgery in these patients is often dismal and some of the notable associated risk factors include advanced age, higher ASA score, comorbid conditions, and gangrenous or perforated bowel [1, 2, 6, 7, 10]. In addition, the associated physiological derangement from the intestinal obstruction and operating in the feces-filled dilated colon only worsens the situation.

Similar to other series, the high rate of recurrence after successful nonoperative reduction in our series (60.9%) remains a significant problem. To make matters worse, the reported dismal outcome after emergency surgery only serves to reinforce the necessity of definitive surgery on successful decompression. In addition, the superior outcome after elective surgery is well documented and also seen in our series with no mortality or recurrence. Unfortunately, as seen in our series and others, a significant proportion of patients and/or their families often declined elective surgery after successful conservative management.

To compound this issue further, the ideal surgical technique is still controversial. Although most advocate sigmoid colectomy with primary anastomosis for the management of sigmoid volvulus in a semielective setting, some prefer Hartmann's procedure due to fear of anastomotic dehiscence in these unfavourable conditions as highlighted previously [1, 2, 6, 7, 10]. However, the associated morbidity of a stoma and the risks of a second surgery to reverse the stoma are significant drawbacks [15, 16]. However, if the viability of the colon is questionable and/or the patient is hemodynamically unstable, Hartmann's procedure seems to be a sound and safe option [15, 16]. In the presence of concomitant megacolon or megarectum, subtotal or total colectomy is advised [1, 2, 6, 7].

As with most studies, there were several limitations in the present study. This series of patients was enrolled from a single institution and any retrospective study has inherent flaws. Our sample size is rather small. All of these may mask several other important factors that could be accountable for the outcomes measured.

In addition, there was no previous fixed protocol adopted at our institution for the management of these patients. This has being changed currently. Our institution has adopted the algorithm as shown in Fig. 2. Rectal tube would be inserted initially on diagnosis of an acute sigmoid volvulus. Should this fail, emergency sigmoidoscopic decompression would be performed. Emergency surgery would be performed if acute abdomen is suspected or when the volvulus failed endoscopic decompression or when ischemic or gangrenous mucosa was seen on endoscopy. An elective colonoscopic evaluation after successful decompression also is advised. Definitive procedure would be advocated in the same admission if the patient is deemed surgically fit. Surgical options would include sigmoid colectomy, Hartmann's procedure, or subtotal or total colectomy depending on the general condition of the patient, the status of the bowel, and intraoperative assessment.

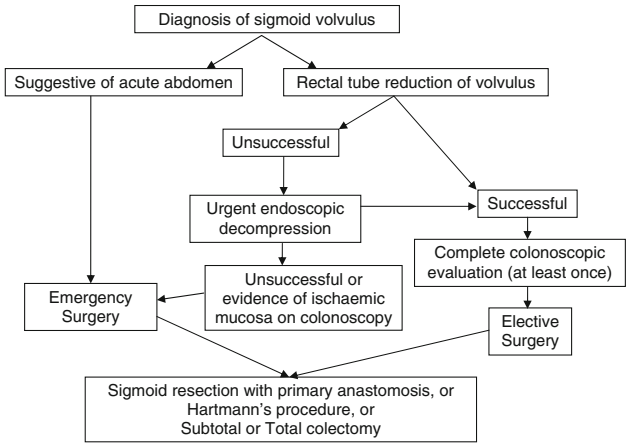

Fig. 2 Suggested algorithm for the management of acute sigmoid volvulus

Conclusions

Acute sigmoid volvulus is a surgical emergency, although the majority (75%) can be successfully decompressed nonoperatively. Emergency surgery in these patients is associated with a mortality of 17.6% in our series. Elective definitive surgery is suggested in view of the high recurrence rate (>60%) and the considerable risks of emergency surgery.

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