

Original Article

Sigmoid Volvulus in the Elderly: Outcomes of a 43-Year, 453-Patient Experience

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Abstract

Purpose. The present study reviewed the clinical outcomes of 453 elderly patients with sigmoid volvulus (SV).

Methods. The clinical records were reviewed retrospectively.

Results. The mean patient age was 71.1 years of age, and 371 patients (81.9%) were male. Of the patients, 30.7% had recurrent volvulus, 34.6% had associated disease, and 16.5% suffered from shock. The correct diagnosis rate based on the clinical features was 66.4%. Radiography revealed SV findings in 64.9% of the patients. Computed tomography (CT) or magnetic resonance imaging (MRI) were diagnostic in all cases. Nonoperative detorsion was performed in 323 patients (71.3%) with 77.4% success, 1.2% mortality, 4.0% morbidity, and 4.4% early recurrence rates. Emergency surgery was required in 215 patients (47.5%) and resulted in 24.2% mortality, 41.4% morbidity, 0.9% early recurrence, and 8.1% late recurrence rates.

Conclusions. Elderly SV patients generally present with high percentages of recurrent volvulus, serious comorbidity, late admission, and shock. The clinical features may be less diagnostic. Radiological studies, particularly CT or MRI, may assist in an SV diagnosis. Nonoperative detorsion is advocated as the primary treatment. In emergency surgery, nonresectional or nonanastomotic procedures are preferred. The overall patient prognosis is grave, and the disease tends to recur.

Key words Sigmoid colon · Volvulus · Elderly patient

Introduction

Sigmoid volvulus (SV), a condition in which the sigmoid colon wraps around itself and its mesentery, is uncommon

in Western countries, but represents one of the most common causes of large bowel obstruction in Eastern countries.^{1–3} The disease most commonly occurs in adults, with the highest incidence in patients between 40 and 80 years of age, and its diagnosis, treatment, and prognosis differ somewhat for elderly patients.^{4–7} In this article we report the results of our 43-year experience with 453 cases of elderly patients in Eastern Anatolia, Turkey, a region in which SV is endemic; this is the largest series of SV in an elderly population ever reported worldwide.

Patients and Methods

We performed a retrospective review of the clinical records of 453 elderly patients 60 years of age and older with SV, who were treated under emergency conditions at the Department of General Surgery in the Faculty of Medicine at Atatürk University, Turkey, over the 43-year period between June 1966 and July 2009. The age, gender, comorbidities, previous SV attacks, symptom duration, clinical signs and symptoms, radiological and endoscopic findings, diagnosis, nonoperative and operative treatments, mortality, morbidity, hospitalization period, and recurrence rates were noted.

After resuscitation and clinical examination, abdominal X-ray films, and computed tomography (CT) or magnetic resonance imaging (MRI) for some patients, were obtained. In stable patients, nonoperative procedures (barium enema, rigid sigmoidoscopy, or flexible sigmoidoscopy) were performed. In patients with muscular guarding or rebound tenderness on clinical examination, melanic stool on rectal examination, or uncertain diagnoses, emergency surgical procedures (detorsion, mesopexy, mesoplasty, or resection with primary anastomosis or stoma) were used as the initial treatment, while in patients with bowel gangrene on endoscopy, unsuccessful nonoperative detorsion, or

early recurrence, emergency surgical procedures were used after a nonoperative reduction failure. Elective surgical treatment was suggested in stable, successfully detorsioned cases, and open or laparoscopic-assisted resection and anastomosis were performed in patients who agreed to undergo this treatment.

The chi-square test, Student *t*-test, and Fisher exact tests were used for the statistical analyses. Differences were considered to be statistically significant for *P* values of less than 0.05.

Results

Four hundred and fifty-three elderly patients comprised 50.3% of the 901 total SV patients who were treated during the study period. The mean age of the elderly patients was 71.1 years (range: 60–98 years), while the mean age was 45.6 years (range: 10 weeks to 59 years) in the nonelderly group. Patients' characteristics are given in Table 1.

Of the 381 elderly patients who provided a medical history, 117 (30.7%) had recurrent volvulus, and 132 (34.6%) had an associated disease (chronic obstructive pulmonary disease in 89 patients, hypertension in 58, cardiac or coronary disease in 32, diabetes mellitus in 15, neurological diseases in 10, and renal insufficiency in 6). Both recurrent volvulus and the rate of significant comorbidities were significantly higher in the elderly group than in the nonelderly group (20.5% and 17.4%, respectively, $P < 0.01$).

In the 381 elderly patients for whom information on clinical features was available, the mean symptom duration was 42.5 h, which was significantly longer than in the nonelderly group (36.8 h, $P < 0.01$). A significantly higher number of elderly patients ($n = 63$, 16.5%, $P < 0.05$) suffered from toxic and/or hypovolemic shock. The most common symptoms were abdominal pain, distention, and obstipation, while the most common signs were abdominal tenderness and distention. Although vomiting, muscular guarding, rebound tenderness, and hyperkinetic bowel sounds were less common, and an empty rectal vault and hypokinetic/akinetic bowel sounds were more common in the elderly group, there were no statistically significant differences in the clinical features between the two groups. Moreover, when SV was endoscopically and/or surgically confirmed, the diagnostic value of the clinical features was significantly lower in the elderly group (66.4% vs 75.4%, $P < 0.01$). Non-SV misdiagnoses included mechanical intestinal obstruction (postoperative ileus, malignancy, intussusception, etc.) or nonobstructive emergency (intestinal ischemia, perforated appendicitis, etc.).

Plain upright or lateral decubitus abdominal X-ray films were evaluated in 376 elderly patients. Of these,

244 (64.9%) demonstrated findings indicative of SV, including a dilated sigmoid colon and small intestinal air-fluid levels. There was no statistically significant difference in the diagnostic value of X-ray films between the two groups. Abdominal CT imaging was performed for 13 patients (2.9%), while MRI was used in 8 patients (1.8%); all of these patients had positive SV findings, such as a dilated sigmoid colon and a whirl pattern in the mesentery.

Nonoperative procedures were performed in 323 elderly patients (71.3%) for both diagnostic and therapeutic purposes. Rigid sigmoidoscopy was performed in 180 elderly patients, and flexible sigmoidoscopy was used in 143 patients. The differences in the rates of performance and therapeutic values of the nonoperative procedures were not significantly different in the elderly versus nonelderly groups. Four elderly patients died, and although the mortality rate was higher in this group (1.2% vs 0.3%), the difference was not statistically significant. Major morbidity (myocardial infarction, renal insufficiency, and bowel perforation) occurred in 13 patients, and the total morbidity rate was statistically higher in the elderly group (4.0% vs 1.3%, $P < 0.05$). By contrast, the rate of SV recurrence during the same hospitalization period, which occurred in 11 elderly patients in this group, was not statistically different between the two groups (4.4% vs 4.1%).

Emergency surgical procedures were performed in 215 elderly patients (47.5%), which was not statistically different in the elderly versus nonelderly group. Bowel gangrene was identified in 139 elderly patients (64.7%), and bowel perforation was seen in 9 patients (4.2%); differences between the groups did not reach statistical significance. Nondefinitive surgical procedures (detorsion, mesopexy) were performed in 56 elderly patients (26.0%); for definitive surgical repair, we performed resection with stoma (Hartmann or Mikulicz) in 98 patients (45.6%) and resection with primary anastomosis (with or without tube cecostomy) in 60 (27.9%). A resection with anastomosis was performed statistically less often in elderly patients compared with the nonelderly group (37.9%, $P < 0.05$).

In the elderly group 52 patients died, and the surgical mortality rate was statistically higher in this group than in the nonelderly group (24.2% vs 7.9%, $P < 0.01$). Postoperative morbidity (myocardial infarction, pulmonary embolism or atelectasis, renal insufficiency, paralytic or adhesive ileus, anastomotic leakage, stoma complications, and wound infection or dehiscence) was observed in 89 patients, and the total morbidity rate was statistically higher in the elderly group (41.4% vs 31.3%, $P < 0.05$). Similarly, the mean hospitalization period was longer in the elderly group (14.9 ± 8.5 vs 11.3 ± 7.6 days, $P < 0.01$). By contrast, the early (0.9% vs 0.5%) and late postoperative recurrence (8.1% vs 6.1%) rates were not

Table 1. Findings of the patients with sigmoid volvulus

| Characteristic | 60 years of age and older | Under 60 years of age | Statistical analysis |
|--|-------------------------------|------------------------------|--|
| Number | 453/901 (50.3%) | 448/901 (49.7%) | |
| Sex (M/F) | 371/82 (81.9%/18.1%) | 375/73 (83.7%/16.3%) | Chi-square test, χ^2 : 0.5, $P > 0.05$ |
| History of torsion | 117/381 (30.7%) | 86/419 (20.5%) | Chi-square test, χ^2 : 10.9, $P < 0.01$ |
| Associated disease | 132/381 (34.6%) | 73/419 (17.4%) | Chi-square test, χ^2 : 31.1, $P < 0.01$ |
| Symptom duration (h) | 12-168 (mean 42.5 \pm 12.6) | 10-168 (mean 36.8 \pm 8.4) | Student <i>t</i> -test, <i>t</i> : 8.6, $P < 0.01$ |
| Shock | 63/381 (16.5%) | 45/419 (10.7%) | Chi-square test, χ^2 : 5.7, $P < 0.05$ |
| Abdominal pain/tenderness | 377/381 (99.0%) | 413/419 (98.8%) | Fisher exact test, $P > 0.05$ |
| Distention | 367/381 (96.3%) | 402/419 (95.9%) | Chi-square test, χ^2 : 0.1, $P > 0.05$ |
| Obstipation | 355/381 (93.2%) | 382/419 (91.2%) | Chi-square test, χ^2 : 1.1, $P > 0.05$ |
| Vomiting | 259/381 (68.0%) | 308/419 (73.5%) | Chi-square test, χ^2 : 3.0, $P > 0.05$ |
| Empty rectal vault | 256/381 (67.2%) | 268/419 (64.0%) | Chi-square test, χ^2 : 0.9, $P > 0.05$ |
| Hypokinetic/akinetic bowel sound | 179/381 (47.0%) | 186/419 (44.4%) | Chi-square test, χ^2 : 0.5, $P > 0.05$ |
| Hyperkinetic bowel sound | 104/381 (27.3%) | 140/419 (33.4%) | Chi-square test, χ^2 : 3.5, $P > 0.05$ |
| Melanotic stool | 45/381 (11.8%) | 48/419 (11.5%) | Chi-square test, χ^2 : 0.02, $P > 0.05$ |
| Muscular defense/rebound tenderness | 26/381 (6.8%) | 40/419 (9.5%) | Chi-square test, χ^2 : 2.0, $P > 0.05$ |
| Diagnostic value of the clinical features | 253/381 (66.4%) | 316/419 (75.4%) | Chi-square test, χ^2 : 7.9, $P < 0.01$ |
| Diagnostic value of X-ray films | 244/376 (64.9%) | 240/374 (64.2%) | Chi-square test, χ^2 : 0.04, $P > 0.05$ |
| Nonoperative detorsion | 323/453 (71.3%) | 316/448 (70.5%) | Chi-square test, χ^2 : 0.1, $P > 0.05$ |
| Therapeutic value of nonoperative procedures | 250/323 (77.4%) | 243/316 (76.9%) | Chi-square test, χ^2 : 0.02, $P > 0.05$ |
| Mortality of nonoperative procedures | 4/323 (1.2%) | 1/316 (0.3%) | Fisher exact test, $P > 0.05$ |
| Morbidity of nonoperative procedures | 13/323 (4.0%) | 4/316 (1.3%) | Chi-square test, χ^2 : 4.7, $P < 0.05$ |
| Early recurrence of nonoperative procedures | 11/250 (4.4%) | 10/243 (4.1%) | Chi-square test, χ^2 : 0.02, $P > 0.05$ |
| Emergency surgery | 215/453 (47.5%) | 214/448 (47.8%) | Chi-square test, χ^2 : 0.01, $P > 0.05$ |
| Bowel gangrene | 139/215 (64.7%) | 128/214 (59.8%) | Chi-square test, χ^2 : 1.1, $P > 0.05$ |
| Bowel perforation | 9/215 (4.2%) | 7/214 (3.3%) | Chi-square test, χ^2 : 0.3, $P > 0.05$ |
| Nondefinitive procedures | 56/215 (26.0%) | 47/214 (22.0%) | Chi-square test, χ^2 : 1.0, $P > 0.05$ |
| Resection with stoma | 98/215 (45.6%) | 86/214 (40.2%) | Chi-square test, χ^2 : 1.3, $P > 0.05$ |
| Resection with primary anastomosis | 60/215 (27.9%) | 81/214 (37.9%) | Chi-square test, χ^2 : 4.8, $P < 0.05$ |
| Mortality of emergency surgery | 52/215 (24.2%) | 17/214 (7.9%) | Chi-square test, χ^2 : 20.1, $P < 0.01$ |
| Morbidity of emergency surgery | 89/215 (41.4%) | 67/214 (31.3%) | Chi-square test, χ^2 : 4.7, $P < 0.05$ |
| Hospitalization period of emergency surgery (days) | 5-65 (mean 14.9 \pm 8.5) | 5-55 (mean 11.3 \pm 7.6) | Student <i>t</i> -test, <i>t</i> : 6.7, $P < 0.01$ |
| Early recurrence of emergency surgery | 2/215 (0.9%) | 1/214 (0.5%) | Fisher exact test, $P > 0.05$ |
| Late recurrence of emergency surgery | 8/99 (8.1%) | 7/115 (6.1%) | Chi-square test, χ^2 : 0.3, $P > 0.05$ |

Table 2. Findings of the elderly patients with sigmoid volvulus according to age decade

| Characteristic | 60–69 years | 70–79 years | 80–89 years | 90 years and over | Statistical analysis (chi-square test) |
|--------------------------------------|-------------|-------------|-------------|-------------------|--|
| Number | 246 | 125 | 73 | 9 | — |
| Nonoperative detorsion | 175 | 88 | 54 | 6 | — |
| Mortality of nonoperative procedures | 1 (0.6%) | 1 (1.1%) | 1 (1.9%) | 1 (16.7%) | $P > 0.05$, compared with all groups |
| Morbidity of nonoperative procedures | 4 (2.3%) | 3 (3.4%) | 3 (5.6%) | 3 (50.0%) | $P < 0.05$, compared with age 90 and over |
| Emergency surgery | 115 | 63 | 32 | 5 | — |
| Mortality of emergency surgery | 22 (19.1%) | 17 (27.0%) | 11 (34.4%) | 2 (40.0%) | $P > 0.05$, compared with all groups |
| Morbidity of emergency surgery | 39 (33.9%) | 30 (47.6%) | 17 (53.1%) | 3 (60.0%) | $P < 0.05$, compared with all groups |

statistically different in the mean 17.8-year follow-up period.

As shown in Table 2, the morbidity rate of the patients who underwent nonoperative procedures was found to be significantly higher in patients aged 90 years and over ($P < 0.05$). Similarly, postoperative morbidity trended higher as the patient age at the time of presentation increased ($P < 0.05$).

Elective treatment, including open or laparoscopic-assisted sigmoid resection with primary anastomosis, was performed in 41 SV patients who had already undergone successful nonoperative detorsion and had chosen to undergo further definitive repair; cases ranged from ASA Classes 1 to 3. This group suffered no mortality, but postoperative complications (wound infection, evisceration, paralytic or adhesive ileus, anastomotic leakage, and pulmonary embolism) occurred in 8 patients (19.5%).

Discussion

Acute volvulus of the gastrointestinal tract organs is a rare but important cause of abdominal emergencies.^{8,9} Acute colonic volvulus accounts for 10%–30% of all large bowel obstructions² and is most common in the sigmoid colon.⁴ Sigmoid volvulus is the second² or third³ most common cause of large bowel obstructions in Eastern countries, and generally occurs in adult men. The mean age was found to be between 56 and 77 years of age in different patient series,^{2–4,6,7} and nearly one-third of all colonic emergencies in elderly patients are due to SV.⁵

One of the most important characteristics of SV in elderly patients is the presence of serious cardiovascular, respiratory, renal, gastrointestinal, neurological, and psychiatric comorbidities in 25%–63% of the popula-

tion,^{1,4,6,7} this was observed in 34.6% of our patients. Conversely, a high recurrent volvulus rate ranging from 13% to 85% is seen in patients of advanced age;^{2,3,6,7} this was true for 30.7% of our study patients.

Among elderly patients with SV, 7%–13.5% suffer from toxic and/or hypovolemic shock.^{3–5} Reasons for this increased incidence of shock may be a lower tolerance for fluid-electrolyte imbalance, the presence of other diseases, and delay in coming to the hospital (as seen in the present study).

The most common symptoms of acute SV are abdominal pain, distention, and obstipation, while additional complaints include vomiting, nausea, diarrhea, anorexia, rectal bleeding, and hematemesis. The most common signs are abdominal tenderness and asymmetrical abdominal distention; other findings include abnormal bowel sounds, abdominal tympany, a palpable abdominal mass, empty rectum, dehydration, and feculent breath.^{1–3,5–7,10} Although a limited number of clinical studies comparing elderly with nonelderly patients have been reported, the clinical presentation of SV in elderly patients is generally similar to SV in nonelderly patients.^{1,5,7} Nevertheless, because many elderly patients have different nutrition and defecation habits and are generally less healthy, some differences in the clinical presentation of SV in the elderly may be apparent, such as pain that cannot be elicited on examination.¹ Therefore, the clinical features may be of less diagnostic value in nonelderly patients, as was found in the present study.

Several radiological signs have been described as diagnostic for SV; for instance, plain or lateral decubitus abdominal X-ray films usually demonstrate a dilated sigmoid colon and/or multiple small bowel air-fluid levels.^{11,12} Although the diagnostic value of X-ray films in elderly patients was found to be similar for nonelderly patients in the present study, we were unfortunately unable to find an appropriate study in the

radiology literature against which our results could be compared. However, if a patient's condition allows for additional imaging,¹¹ then CT or MRI may show a dilated sigmoid colon with whirled sigmoid mesentery and dilated small bowel, which may be of greater diagnostic value.

Nonoperative detorsion is advocated as the primary choice in the treatment of SV, particularly in elderly patients.^{1,4,5,7} While barium enemas or rigid endoscopy have been widely used in past years, in recent years flexible endoscopy is now the preferred nonoperative procedure.⁴ Nonoperative treatment is successful in 70%–91% of cases, with reported complication rates of 2%–4.7% in geriatric patients.^{5,7} Although the morbidity and mortality rates of nonoperative procedures are much higher in geriatric patients, as was the patient morbidity in the present series, endoscopic detorsion failure increases mortality,¹³ and successfully avoiding surgery in cases that qualify for nonoperative treatment reduces the mortality to 5%.^{1,7} Although our study found no differences in the early recurrence rates in elderly versus nonelderly patients, we were unable to find any comparable studies in the literature. The late recurrence rate following nonoperative treatment in elderly patients is high, and has been reported to be 41.7%–55%.^{1,7}

In SV patients, emergency surgery is essential for those in whom nonoperative treatment is unsuccessful, or in whom peritonitis, bowel gangrene, or perforation is present.^{4,6,7,14,15} In gangrenous SV cases, resection with stoma, which was used widely in the past, may be a life-saving procedure in unstable patients.⁴ A resection with primary anastomosis, which has been advocated in recent years, is preferred if the patient is stable and if tension-free anastomosis is possible.^{4,16–18} Bowel gangrene is present in a higher percentage of elderly patients than nonelderly patients.¹ In addition, the presence of shock, associated diseases, and overall poor health of many geriatric patients^{1,3–7} may force a surgeon to perform a nonanastomotic procedure. On the other hand, in nongangrenous SV cases, detorsion may be used as the sole procedure in high-risk patients, but because recurrence rates are high after nondefinitive procedures, resection with primary anastomosis or a volvulus-reduction procedure such as colopexy, mesopexy, or mesoplasty may be included in stable patients.^{4,16–18} Although a high recurrence risk in elderly patients^{2,3,6,7} may support the addition of a volvulus-reducing procedure, detorsion alone or another nonresectional or nonanastomotic procedure may be more suitable in elderly and severely ill patients.²

The prognosis of patients with SV is poor, and the overall surgical mortality rate has been reported to be 11%–80% in gangrenous cases and 6%–24% in nongangrenous cases.^{1,4,18} Advanced age has been cited as a

causative factor in increasing mortality, and the mortality rate has been reported to be higher in patients older than 60^{4,15} (as observed in the present cohort), 70,¹³ and 80 years.² The presence of serious associated diseases, shock, and bowel gangrene, as well as the use of resectional or anastomotic procedures, increases the mortality in elderly patients.^{1,4,5,7,18} The mortality rate of geriatric patients is high and has been reported to range from 14.3% to 72.6% in different series,^{1,16,18} as in the present series. Moreover, the postoperative morbidity of SV patients has been reported to be 6%–24%,^{2,4} and advancing age increases complication rates and prolongs the hospitalization period.

Although the late recurrence rate of surgically treated elderly SV patients is high (6.7%–55%), and although nondefinitive surgery is associated with increased recurrence rates,^{1,4,5} elective surgical treatment of detorsioned SV is controversial for elderly patients.^{2,7,13,19} While Arnold and Nance¹³ recommend the elective surgery only for good-risk/young patients, Bak and Boley⁷ and Pahlman et al.² have advocated the performance of elective surgery for all but poor-risk patients; similarly, Atamanalp et al.¹⁹ have recommended elective surgical treatment in all patients except those with ASA Class 4 and 5.

In conclusion, elderly patients with SV generally have serious comorbidities in addition to high rates of toxic and/or hypovolemic shock caused by late admission. Because many elderly patients have different nutrition and defecation habits and are generally in poor health, the clinical features may be less diagnostic, while radiological studies, particularly CT or MRI, may assist in making an accurate patient diagnosis. If possible, nonoperative detorsion is the treatment of choice, and avoidance of surgery improves the patient prognosis. Emergency surgery has high risks for mortality and morbidity, and nonresectional procedures are preferred despite being associated with high recurrence rates in nongangrenous cases; nonanastomotic procedures may be used in gangrenous cases, particularly in unstable patients. The prognosis of SV in the elderly is poor, and the disease tends to recur in patients treated with either nonoperative detorsion or nondefinitive surgery.

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