Acute sigmoid volvulus: Results of surgical treatment in the teaching hospitals of Bamako

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Summary
Objective: The aim was to evaluate the results of surgical treatment of occlusion of the sigmoid colon due to volvulus.

Patients and Methods: This was a retrospective study from 1996 to 2010 of all patients undergoing surgery for sigmoid volvulus in surgical wards of the University Hospital of Bamako.

Results: A total of 417 patients were identified including 379 men and 38 women. The mean patient age was 45.7 ± 18.3 years. The general condition of the patients was good in 70.5% and altered in 29.5% of cases. Colonic necrosis was present in 80 patients (19.2%). Single-stage resection with immediate anastomosis was performed in 149 patients (35.7%). Two-stage surgery was performed in 268 cases (64.2%). The initial stage of the two-stage procedure was colostomy in 167 cases and simple detorsion in 101 cases. The surgical approach had an impact on mortality in patients who were in poor general condition. Single-stage surgery resulted in higher mortality (12/149; 8.05%) than two-stage surgery (5/268; 1.87%), and the difference was statistically significant (P = 0.0005).

Conclusion: Single-stage surgery for sigmoid volvulus carries a high risk of death when it is performed in patients with poor general condition. Indications for surgery must take into account the patient’s general condition and the viability of the torsed sigmoid colon.

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Introduction

Sigmoid volvulus is the torsion of the sigmoid colon loop on its mesenteric axis, producing a distal colonic obstruction, with intestinal ischemia [1]. It is the leading cause of intestinal obstruction in developing countries accounting for up to 50% of obstructions compared with 5% in developed countries [2]. In the USA, it is the third leading cause of colonic obstruction after colon cancer and diverticulosis [3]. The gravity of this condition is due to its progressive evolution. Segmental colectomy or sigmoidectomy followed by a restoration of intestinal continuity is currently accepted as the preferred treatment of volvulus of the sigmoid colon.

The purpose of this study was to evaluate the surgical treatment of colonic obstruction caused by sigmoid volvulus in the hospitals and University Centers of Bamako and to determine the factors affecting operative mortality.

Patients and methods

This was a retrospective descriptive study of management over a period of 15 years from January 1996 to December 2010 in surgical wards A and B of the CHU Point G and the general surgery department of the CHU Gabriel Touré, Bamako Mali. The study population consisted of patients who underwent surgery for sigmoid volvulus. Patients in whom the diagnosis of sigmoid volvulus was confirmed intraoperatively were included in the study, but patients whose chart could not be evaluated were excluded.

Principal endpoint

The principal endpoint was mortality defined as the frequency of post-surgical death occurring during the procedure or during postoperative hospitalization.

Explanatory variables

Explanatory variables, or factors that might explain the patient’s death, included the therapeutic approach, the general condition of the patient, the viability of the twisted sigmoid colon, and co-morbidities.

Variables that were extracted for analysis included:

- the general condition of the patient: as determined by age, ASA status, blood pressure, Karnofsky performance status, hemoglobin level, and fever. The appraisal values were «good», «altered» or «poor».
- the general condition was considered altered in any patient with a systolic blood pressure <90 mm Hg, and/or an ASA score >2, and/or a Karnofsky performance status <70%, and/or a fever ≥38°C, and/or older than 75 years, and/or a hemoglobin level <10 g/dl, and/or having a co-morbidity. Otherwise, general condition was considered good;
- co-morbidities: we considered that there was a co-morbidity when the patient had one or more of the following conditions: hypertension, diabetes, heart disease, pulmonary disease;
- therapeutic approach: two approaches to surgical treatment were considered. The first was a single-stage surgical procedure consisting of sigmoid colon resection followed by immediate colorectal anastomosis without intra-operative colonic lavage. The second approach was two-stage surgical treatment consisting of either simple detorsion followed by second-stage resection with anastomosis, or of resection with colostomy followed by second-stage colorectal anastomosis;
- the state of the torsed sigmoid loop: viable or non-viable.

An individual questionnaire was used to collect information from the medical record including operative report, anesthesia sheets, records of observation and progress notes. Data were entered using Excel software. They were then transposed to Epi Info, version 3.5.3 to determine the frequencies of different variables. SPSS was used to perform logistic regression in the multivariate analysis.

Univariable analysis

Univariable analysis was performed by comparing the primary endpoint (mortality) with each of the explanatory variables (therapeutic approach, general condition of the patient, time interval to management, co-morbidities and viability of the torsed intestine).

Pearson's Chi-squared test and the corrected Yates test were used to search for association between explanatory variables and the primary endpoint. The association was considered significant for P-value <0.05.

Multivariable analysis

We modeled the probability of operative mortality due to sigmoid volvulus with factors assumed to influence outcome: condition, co-morbidity, therapeutic approach. All variables with P-value ≤0.05 in the univariable analysis were entered into a global logistic regression model. Step-by-step removal allowed us to eliminate by order of magnitude (the variable with the largest P-values) those variables that were not significantly associated with the primary endpoint (P>0.05), resulting in a final model that contained only variables with a P-value that remained <0.05.

Results

The clinical records of 417 patients operated for sigmoid colon volvulus were collected; these constituted 2.4% (417/17,375) of all surgical emergencies. The mean age was 45.7±18.3 years with a range of 16–96 years.

The average interval from onset of symptoms to consultation was 44.3 hours with a range of 22–180 hours. The occurrence of intestinal necrosis was not related to the duration of disease progression. However, the degree of intestinal constriction was directly related to the early onset of necrosis although the difference was not significant (P = 0.25).

Patient characteristics

Table 1 shows the distribution of patients with regard to general condition, co-morbidity, and the viability of the torsed intestine.

The therapeutic approach was: immediate resection with anastomosis in 35.73% (149/417), resection plus stoma in 40.05% (167/417), simple detorsion in 19.90% (83/417) and detorsion with colopexy in 4.32% (18/417).

One hundred and twenty patients in good general condition underwent immediate resection-anastomosis (40.82%). Sixty-nine patients in poor general condition had a Hartmann-type sigmoid colectomy with colostomy (56.10%). Twenty-nine of the 120 patients (23.6%) who underwent
immediate resection-anastomosis were in poor general condition.

When necrosis of the sigmoid loop was present, colostomy was performed in 74 out of 80 patients (92.5%). When the sigmoid loop was viable, resection with immediate anastomosis was performed in 143 out of 243 patients (42.4%).

Table 2 shows postoperative events in relation to the surgical procedure.

Two-stage surgical treatment was performed in 268 patients, i.e., 101 cases of first-stage detorsion and 167 cases of colostomy. Twenty-three of 268 patients (8.58%) did not undergo the second-stage procedure. The reasons were refusal to undergo surgery for 19 cases (7.08%), death for three cases (1.11%), and an association of diabetes and nodular liver one case (0.37%). For patients who underwent simple detorsion, the rate of patient refusal of second-stage surgery was 18.8% (19 patients). Recurrent sigmoid volvulus after detorsion occurred in eleven patients (10.8%).

Mortality

Table 3 shows mortality in relation to the therapeutic approach depending on the patient’s general condition.

Univariable analysis of the results

Univariable analysis identified four factors that were associated with mortality after sigmoid colon volvulus surgery. These included the general condition of the patient, co-morbidity, viability of the torsed intestinal segment, and the therapeutic approach.

Multivariable analysis of the results

Logistic regression models, with step-by-step subtraction of variables, showed only general condition and the therapeutic approach to be factors affecting mortality (P < 0.05).

Discussion

The different approaches to surgical treatment and the postoperative results have been described. Factors influencing mortality of surgery for sigmoid colon volvulus have been identified. However, some biases due to the retrospective nature of the studies and the diverse individual surgical approaches may have influenced these results.

Our 417 patients were predominantly male (90.8%). This predominance of sigmoid volvulus in males has been reported by several authors [3–6]. The existence of anatomical differences in the male (longer sigmoid colon) has been
described in the literature, and could explain this male pre-dominance [7].

Therapeutic approaches to sigmoid colon volvulus vary among different surgical teams. When the torsed loop is in good condition, the ideal treatment is decompression and detorsion followed by a delayed resection-anastomosis. This approach is the most widely practiced in developed countries [3,8–10] at higher rates than in our center (P < 0.000001). In our clinical setting as well as that reported by other African authors [6,11], sigmoid volvulus often results in necrosis (Fig. 1).

Detorsion forms only a small part of our experience, and was performed by laparotomy in our series (101 cases, 24.22%). The rates of detorsion differ between studies, ranging from 5.56% for Akan et al. in Turkey [12] to 42.65% in Nigeria [11]. A major drawback of this palliative procedure is recurrent volvulus and the refusal of second-stage resection (18.8%, 19 patients in our series). This has led authors like Kuzu et al. [13] to favor resection with or without anastomosis.

Currently, single-stage sigmoid resection with immediate colorectal anastomosis appears to be the preferred therapeutic approach. Several authors [5,6] have performed single-stage resection and anastomosis at a rate ranging from 26 to 50%, which was not statistically significantly different from our study (P > 0.05). However Turkish and Spanish teams [12,14] have reported more frequent use of this approach (54.7 to 66.9%), while other authors [3,8–10] have reported much lower rates from 2.19 to 9.85%, (P < 0.05).

In some African and Asian series, this procedure was performed in 100% of cases [11,12,15].

Resection with immediate anastomosis time is generally indicated for patients in good general condition with no colonic necrosis. In our series where necrosis was present in 19.18% of cases versus 41.2% for Sané et al. [4] and 32% for Touré et al. [6], this technique was performed in six cases (7.5%) with two deaths. It was also performed in 29 cases (23.58%) of patients in poor general condition with nine deaths.

Our analysis showed the mortality rate associated with the one-stage surgical approach was higher than that associated with the two-stage approach (8.05% vs. 1.87%, P = 0.0021), which is similar to most series [3–6]. However, in our study the increase in mortality for single-stage surgery compared to two-stage surgery was statistically significant only in patients with poor general condition.

When the patient’s general condition was considered good, the type of surgery did not influence mortality.

Other authors who have reported this finding [12] found no statistically significant differences in morbidity and mortality between one-stage surgery and two-stage surgery as long as the colon was viable. Oren et al. [9] recommend one-stage sigmoidectomy as the treatment of choice in patients whose general condition was stable. Kanite et al. [16], in a series of 31 patients who underwent one-stage sigmoidectomy regardless of the degree of colon necrosis, reported a mortality rate of 12.90% (n = 4).

Some authors [8] reported mortality ranging from 1–9% with healthy colon versus 25% in patients with necrotic bowel; they concluded that the indication for single-stage surgery depended on the patient’s general condition, and the viability of the colon.

Although progress has been made in the treatment of obstruction due to sigmoid colon volvulus, mortality remains high. The overall mortality of 4.08% recorded in our series was not statistically different from those found in other African series [5,17] (P = 0.1540 and P = 0.1095 respectively). It is statistically significantly higher than that obtained by Uptal [18] in India in 2003 (1.01%), P = 0.0408, and significantly lower than that of other authors [3,4,6,19].

A total of four factors associated with operative mortality were identified: the therapeutic approach practiced, the general condition of the patient, duration of surgery, and comorbidity. Among these factors, the therapeutic approach and general condition were the main factors influencing the operative mortality of sigmoid colon volvulus.

The patient’s general condition rather than the surgical approach was the primary factor in mortality. Bhatnagar et al. [20] identified age >60 years, the presence of shock, and the general condition of the patient as predictive factors of mortality. Grossmann et al. in the U.S. [3] reported a high risk of mortality for emergency surgery (24% mortality for emergency surgery versus 6% for elective surgery).

**Conclusion**

The mortality associated with surgery for sigmoid colon volvulus remains high. The technique of first-stage detorsion followed by elective surgery helps minimize mortality. The one-stage surgical approach with immediate resection and anastomosis carries a high risk of death when it is applied to patients in poor general condition. The indications for surgery must therefore take into account the patient’s general condition and the viability of the torsed intestine. A thorough assessment of the patient’s general condition is essential requirement for an appropriate choice of the therapeutic approach.

**Disclosure of interest**

The authors declare that they have no conflicts of interest concerning this article.

**References**


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