

## Management of Sigmoid Volvulus in a High-Altitude Limited Resource Setting. A 2 Years' Experience Retrospective Study in the Ruhengeri Referral Hospital

E. Niyirera<sup>1\*</sup>, G. Mukunzenkase<sup>2</sup>, A. C. Chavarri<sup>3, 4</sup>

<sup>1</sup> Shyira District Hospital, Rwanda

<sup>2</sup> Nyamata District Hospital, Rwanda

<sup>3</sup> Rwanda Military hospital, Rwanda

<sup>4</sup> Instructor in Surgery, Harvard Medical school

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**\*Corresponding author:** E. Niyirera, Shyira District Hospital, Rwanda.

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### Abstract

Acute sigmoid volvulus is a most common surgical condition in peasant adult male farmers; it is geographically distributed but most common in low- and middle-income countries. The early management by a skilled surgeon, the best outcome. The aim of this study was to review the management characteristics and clinical outcomes of patients diagnosed with acute sigmoid volvulus in Ruhengeri referral hospital.

**Objective:** To identify diagnostic tool, management and outcome of acute sigmoid volvulus in the high altitude and limited resource setting.

**Methods:** This is a 2 year descriptive, retrospective review of all cases of sigmoid volvulus done in the Ruhengeri referral hospital located in the Northern Province in Rwanda from January 2019 to December 2020. The study population included 46 patients diagnosed with acute sigmoid volvulus either clinically or intraoperatively. Demography, diagnostic tool, intervention, clinical outcome and length of hospital stay (LOS) have been analyzed.

**Results and discussion:** In our study, 46 patients were diagnosed with acute sigmoid volvulus. Of these 39 (84.8%) were males and 7 (15.2%) were females, M: F ratio was 5.6:1. We found acute sigmoid volvulus was more common in older people above 50 years (76.1%) and the more advanced age, the higher the risk. 41 (89.1%) were peasant farmers. Aside from clinical findings, the only tool used for diagnosis was Plain abdominal X-ray (93.5%). Intraoperatively, the bowels were viable in 32 patients (69.6%) and in 14 (30.4%) were not viable. The most common procedure done was Sigmoidectomy with primary end to end anastomosis in 35 patients (76.1%) followed by sigmoidectomy and colostomy in 10 patients (21.7%). Among the patients who underwent sigmoidectomy and primary end to end anastomosis the mortality rate was 22% while among those who sustained Hartmann's procedure the mortality rate was 50%. We found that there was an association between age and outcome (P value = 0.045) and bowel viability was leading any type of procedure (P value= 0.004). The length of the hospital stay (LOS) ranged between 1 and 35 days with mean of 8 ±6 days. There was no association between patient age and length of hospital stay.

**Conclusion:** Acute sigmoid volvulus is the main cause of large bowel obstruction in peasant farmers in the Northern Province of Rwanda, with males above 50 years at high risk. Sigmoidectomy and primary end to end anastomosis is the preferred management option if bowel is viable or when the patient is clinically stable.

**Keywords:** sigmoid volvulus; high altitude; bowel resection; anastomosis

### Introduction

Sigmoid volvulus is a condition in which a long redundant sigmoid colon rotates along its mesentery with a narrow base which causing a large bowel obstruction. There is a strong association between redundant sigmoid and the consumption of cereals, fruits and fats, and irregular bowel habits. The condition is most frequent in adults<sup>1,2</sup>. The acute SV (sigmoid volvulus) is the most common cause of large bowel obstruction in developing countries, especially in elderly, male patients<sup>3,4</sup>. Institutionalized patients and people with neurogenic disorders are also at high risk but mostly in high income and western countries. The cause of sigmoid volvulus is unknown but predisposing



factors include a long congenital sigmoid, chronic constipation, use of laxatives, high fiber diet, acquired megacolon, anticholinergic drugs, sedatives, high altitude and anti Parkinson drugs<sup>5</sup>. The incidence of sigmoid volvulus varies geographically, with the frequency being higher in the so-called “volvulus belt” which encompasses Africa, India, Iran, and Russia<sup>6</sup>. In the Middle East, sigmoid volvulus is the 3<sup>rd</sup> cause of large bowel obstruction, while in Ethiopia, Nigeria and Kenya it is the 1<sup>st</sup> cause of large bowel obstruction followed by tumors<sup>7,8,9</sup>. The Ruhengeri referral hospital is located in Rwanda, Northern Province at high altitude where the minimum is 1638m and the highest is 3378m with the average of 2330m above sea level. The fertile volcanic soil is mainly exploited; the principal crops are maize, Irish potatoes, cereals and different types of vegetables. This leads to the population being at high risk of developing redundant sigmoid.

Early symptoms of sigmoid volvulus are abdominal distention, and stool and gas arrest. Later on patients can present with fecaloid vomiting, colicky abdominal pain and fever<sup>8,10</sup>.

In limited resource settings, a Plain abdominal X-ray is enough to confirm the diagnosis, which shows inner bent tube or inverted U shape or coffee bean sign. In well equipped settings, different imaging modalities can be used such as: abdominal CT scan (multidetector computed tomography (MDCT), enema and sigmoidoscopy<sup>11,3</sup>.

The aim of management is to release obstruction, and to restore and maintain bowel transit. Despite significant progress in the management of sigmoid volvulus consensus has not been reached. If the bowel is still viable some surgeons do decompression by barium enema, rigid or flexible sigmoidoscopy or rectal tube, others prefer operative management such as sigmoidectomy and primary end to end anastomosis while other prefer to do devolvulation and sigmoidopexy and mesosigmoidoplasty when the bowel is still viable to change from emergency to elective surgery. When the bowel loop is not viable some surgeons perform sigmoidectomy and end colostomy (Hartman’s procedure) or double barrel colostomy (Mikulicz technique) or sigmoidectomy plus primary end to end anastomosis if the patient is stable.

Complications after sigmoid volvulus are common and are related to the patient’s age, bowel viability, surgical procedure and the patient comorbidities. The most common complication is surgical site infection, pneumonia, wound dehiscence, fistula, septicaemia, incisional hernia, adhesive bowel obstruction, and prolonged ileus and death<sup>10,4,12</sup>. Patients with gangrenous bowel and who underwent Hartmann’s procedure or Mikulichz technique are higher risk of complications such as surgical site infection predominantly compared to intrabdominal abscess, pulmonary infection, and wound dehiscence all of which lead to the prolonged length of hospital stay. In the many studies, mortality is related to the bowel viability and surgical intervention done<sup>13,14,15</sup>.

The aim of this study was to review the management characteristics and clinical outcomes of patients diagnosed with acute sigmoid volvulus in Ruhengeri referral hospital.

## Methods:

This is a 2 year descriptive, retrospective review of all cases of sigmoid volvulus done in the Ruhengeri referral hospital located in the Northern Province in Rwanda from January 2019 to December 2020. The study population included 46 patients diagnosed with acute sigmoid volvulus either clinically or intraoperatively. The age, sex, occupation, procedure, post operative outcome and the length of hospital stay (LOS) were analyzed. The data were coded, cleaned and entered into SPSS version 22 for analysis. Association between dependent and independent variables was assessed by correlation with a P value < 0.05 considered as significant. To confirm statistical significance variables were then entered in multiple regression analysis and statistically significant variables were taken at 95% confidence interval.

## Results:

In our study, 46 patients were diagnosed with acute sigmoid volvulus. Of these 39 (84.8%) were males and 7 (15.2%) were females, M: F ratio was 5.6:1. We found acute sigmoid volvulus was more common in older people above 50 years (76.1%) and the more advanced age, the higher the risk. 41 (89.1%) were peasant farmers. Aside from clinical findings, the only tool used for diagnosis was Plain abdominal X-ray (93.5%). Intraoperatively, the bowels were viable in 32 patients (69.6%) and in 14 (30.4%) were not viable. The most common procedure done was Sigmoidectomy with primary end to end anastomosis in 35 patients (76.1%) followed by sigmoidectomy and colostomy in 10 patients (21.7%). Among the patients who underwent sigmoidectomy and primary end to end anastomosis the mortality rate was 22% while among those who sustained Hartmann’s procedure the mortality rate was 50%. We found that there was an association between age and outcome (P value = 0.045) and bowel viability was leading any type of procedure (P value= 0.004). The length of the hospital stay (LOS) ranged between 1 and 35 days with mean of 8 ±6 days. There was no association between patient age and length of hospital stay.

Age	Frequency(n=46)	Percent (/100)	Valid Percent
<30	5	10.9	10.9
30-40	3	6.5	6.5
41-50	3	6.5	6.5
51-60	6	13.0	13.0
61-70	8	17.4	17.4
>71	21	45.7	45.7
<b>Gender</b>			
Male	39	84.8	84.8
Female	7	15.2	15.2
<b>Occupation</b>			
Farmer	41	89.1	89.1
Other	5	10.9	10.9
<b>X ray done</b>			
No	3	6.5	6.5
Yes	43	93.5	93.5
<b>Bowel viability</b>			
Yes	32	69.6	69.6
No	14	30.4	30.4
<b>Procedure</b>			
Hatmann’s procedure	10	21.7	21.7



Sigmoidectomy and anastomosis	35	76.1	76.1
Not operated	1	2.2	2.2
<b>Outcome</b>			
Improved	33	71.7	71.7
Death	13	28.3	28.3

**Table 1:** Statistical description of age, sex, Xray usage, bowel status, procedure, and outcome

Procedure	Outcome			/100
	Death	Improved	Total	
Hartmann's procedure	5	5	10	50
Sigmoidectomy + primary ETEA	8	27	35	22.8
Not operated	0	1	1	100
<b>Total</b>	<b>13</b>	<b>33</b>	<b>46</b>	<b>100</b>

**Table 2:** Procedure done and outcome

## Discussion

Our study has shown that acute sigmoid volvulus in the northern province in the Ruhengeri referral hospital is more common in males than in females with a ratio of M:F: 5.6:1. Different studies done in Africa have revealed similar results. In a study done by G. Tumusime et al in Mulago hospital Uganda and Muluguta GA al in Ethiopia the M:F ratio was 5:1 and 4.7: 1 respectively. While in the western Africa countries, in a study by A.NUHU al in Nigeria and Gambia the M: F was 14.3:1.

In our study, sigmoid volvulus is most common in the adult people their mean was 62±21 years. In a study done by A. Onder et al he found the same results, the patients mean was 62.5 years. Different studies done in Uganda and Ethiopia, revealed almost the same results where sigmoid volvulus was frequent in the adult people. A study done by Ooko PB et al and A.Nuhu et al the patients mean ages were 40.6 and 45.6 years respectively. In the northern province of Rwanda people live longer due to the precious climate and high availability of natural food.

In our study, diagnosis was determined by high clinical suspicion of acute sigmoid volvulus, and the only paraclinical investigation done was a plain abdominal X-ray. It was done in 93.5% of all patients who were diagnosed acute sigmoid volvulus. In a study done by Iracy J. et al, they revealed that abdominal plain xray has a specificity of 84% and sensitivity of 72% in the detection of large bowel obstruction<sup>3</sup>. In other settings with high resources different modalities are used for more accurate diagnosis and sometimes with therapeutic purpose<sup>3,11</sup>. In developing countries the plain abdominal X ray is the only paraclinical exam done in the high suspicion of sigmoid volvulus<sup>9,12, 17</sup>.

Intraoperatively bowel viability was evaluated and we found bowel loops were still viable in 69.6% while not viable (gangrenous) in 30.4%. This finding is similar to those found by Mulugeta GA et al in the district hospital, Ethiopia where gangrenous bowel was found in 33% of patients. In another study done by Raru YY et al the bowel was found gangrenous in 25.5%. In patients with gangrenous bowel the mortality rate was high compared to those with viable bowel, 43% and 22% respectively.

In different studies done elsewhere, the mortality rate is high in the patients with gangrenous bowel<sup>9,10,13</sup>

For the management of sigmoid volvulus, we found that sigmoidectomy and primary end to end anastomosis or Hartmann's procedures were performed, in 76.1% and 22.7% of cases, respectively. Among the patients who underwent sigmoidectomy, the mortality rate was 23% while in those who underwent Hartmann's procedure the mortality rate was 50%. Our study showed that there is no significant correlation between the type of procedure and outcome but it there was significant correlation between age and outcome (P value=0.045). Our study has shown also that our overall mortality rate was 28.3%. In the different, high income settings the mortality rate in of patients with acute sigmoid volvulus is low<sup>10,12,14</sup>. The outcome may be related to the initial clinical status of the patients and access to critical care facilities.

Length of hospital stay ranged from 1 to 35 days with an average of 8±6 days. In one study done by Riogi et al in Kenya the average hospital stay was 12.9 days after sigmoidectomy and primary end to end anastomosis<sup>18</sup>. The length of hospital stay is also high independent of the settings, in a study done by Kim EM et al in Korea the length of hospital stay was 13.9 days average, another study done by Chalya PL et al in Tanzania the average length of hospital stay was 14 days<sup>19,20</sup>.

## Conclusion

Acute sigmoid volvulus is the main cause of large bowel obstruction in peasant farmers in the Northern Province of Rwanda, with males above 50 years at high risk. Sigmoidectomy and primary end to end anastomosis is the preferred management option if bowel is viable or when the patient is clinically stable.

## References

1. REED CAL. THE REDUNDANT SIGMOID. J Am Med Assoc. 1914;LXIII(6):449-458.
2. Tumusiime G, Kakande I, Masiira NM. Factors Associated with Redundant Sigmoid Colon at Mulago Hospital, Kampala. 2009;14(2):65-69.
3. Findings CT, Jaffe T, Thompson WM. Large-Bowel Obstruction in the Adult: Classic Radiographic and. 2015;275(3):651-663.
4. Leeuwen JS Van. Sigmoid volvulus in a West African population. 2014;(November 1985).
5. Surriah M, Bakkour A, Hussain N. Risk factors and surgical management of sigmoid volvulus among patients attending Al-Karama Teaching Hospital of Iraq. Int Surg J. 2019;6.
6. Lal SK, Morgenstern R, Vinjirayer EP, Matin A. Sigmoid Volvulus an Update. 2006;16:175-187.
7. Soressa U, Gebretsadik A, Hiko D, Fentahun N. Prevalence, causes and management outcome of intestinal obstruction in Adama Hospital, Ethiopia. BMC Surg. 2016;16.
8. Sule AZ, Ajibade A. Adult large bowel obstruction: A review of clinical experience. 2011;10(1):45-50.
9. Ooko PB, Sirera B, Saruni S, Topazian HM, White R. Pattern of adult intestinal obstruction at Tenwek hospital, in south-western Kenya. Pan Afr Med J. 2015;20:31.
10. Article O. Acute Sigmoid Volvulus in a West African Population. 2010;29(2):2-4.



11. Haffajee MR. Radiological anatomy of the sigmoid colon. 2008;(June 2016).
12. Onder A, Kapan M, Arikanoglu Z, et al. Sigmoid colon torsion : mortality and relevant risk factors. 2013;17(Suppl 1):127-132.
13. Maddah G, Kazemzadeh GH, Abdollahi A, Bahar MM. Management of Sigmoid Volvulus : Options and Prognosis. 2014;24(1):13-17.
14. Cirocchi R, Farinella E, Mura F La, et al. The sigmoid volvulus : surgical timing and mortality for different clinical types. 2010:2-6.
15. Turner JS, Boutros MDM, Chun MDJ, Steele SR. Clinical Practice Guidelines for Colon Volvulus. :589-600.
16. Lyons D. Sigmoid Volvulus: A Case Series, Review of the Literature and Current Treatment. Am J Biomed Sci Res. 2019;6.
17. Raru YY, Messmer PR, Williams AR, et al. Surgery : Current Research Treatment of Sigmoid Volvulus by Deflation Versus Surgery : A Single Site Report. 2015;5(4).
18. MBChB RB, MBChB OK, Level K. Safe Resection and Primary Anastomosis of Gangrenous Sigmoid Volvulus. Vol 10.; 2013. www.sskkenya.org.
19. Kim EM, Kang BM, Kim BC, et al. Clinical outcomes of sigmoid volvulus and risk factors for its recurrence: a multicenter study in Korea. Int J Colorectal Dis. 2020;35(10):1841-1847.
20. Chalya PL, Mabula JB. Sigmoid volvulus and ileo-sigmoid knotting: a five-year experience at a tertiary care hospital in Tanzania. World J Emerg Surg. 2015;10(1):10.