

# The Outcome of Resection and Primary Anastomosis (With On-table Lavage) Management of Acute Sigmoid Volvulus, A Developing Country Experience

Mohamad Elhassan<sup>2</sup> | Mohamed Abdulkarim<sup>1,2</sup> | Farah Mohammed<sup>2,3\*</sup> | Hisham Hassan Ibrahim Mohammed<sup>2</sup> | Dafalla Shani<sup>1,2</sup> | Nadir Salih<sup>1,2</sup>

\*Correspondence: Farah Mohammed

Address: <sup>1</sup>Department of Surgery, Alzaiem Alazhari University, Sudan; <sup>2</sup>Department of surgery, Khartoum North Teaching Hospital, Sudan; <sup>3</sup>National Ribat University, Sudan

e-mail ✉: zezu2009@gmail.com

Received: 24 October 2022; Accepted: 07 November 2022

Copyright: © 2022 Elhassan M. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided that the original work is properly cited.

## ABSTRACT

**Background:** Acute sigmoid volvulus is the third most common cause of large bowel obstruction. It occurs when the sigmoid part of the colon twists around its blood supply.

**Methodology:** This is a retrospective cross-sectional study detailing the outcome of 15 patients with acute sigmoid volvulus who underwent resection of the affected part of the colon and primary resection with on-table lavage in Khartoum, Sudan in the period from January 2019 to January 2021. All 15 patients were recruited on the basis of their fitting status for surgery and their consent to the procedure. All patients have been followed-up for a period of 2 months post-operatively with no loss to follow-up.

**Results:** The outcome for all 15 patients was excellent with no complications. All patients have been followed up for a period of 2 months following their surgeries. There was no loss to follow-up among them and all of them have attended their post-operative follow up clinics. There were no reported wound problems of dehiscence and infection, anastomotic leakages or the need for revision surgery. Patients have a mean age of 46 years. One of the participants was a Jehovah's witness; therefore, a cautious approach was implemented during surgery. Another one of the participants were suffering from left hip fracture when he underwent surgery, requiring a high level of care during his pre, peri as well as post-operative care.

**Conclusion and Recommendation:** The outcome for resection and primary anastomosis with on-table lavage can be excellent with no complications. One limitation of this study, as this is not a comparative study, is that no comparison between the outcome of such procedure with the Hartmann's procedure approach to managing such a condition. We recommend large-scale comparison between the outcome for both approaches to managing acute sigmoid volvulus.

**Keywords:** Sigmoid Volvulus, Resection, Anastomosis, On-Table Lavage, Intestinal Obstruction

## Introduction

Acute sigmoid volvulus is the third most common cause of large bowel obstruction and it is the commonest type of volvulus. It occurs when the sigmoid part of the colon twists around its blood supply, usually at its mesenteric base (Perrot *et al.*, 2016).

Acute sigmoid volvulus is commonly seen in elderly patients who are institutionalized and less mobile. Patients usually suffer from long-standing constipation which makes the mesentery long and redundant allowing a room for twisting. Patients with acute sigmoid volvulus often presents with features suggestive of large bowel obstruction including abdominal distension and discomfort as well as early constipation and vomiting later in their presentation (Perrot *et al.*, 2016; Lieske and Antunes, 2022).

In terms of diagnostic modalities, a plain abdominal x-ray usually shows a coffee bean or Omega sign where the trapped segment will be dilated and usually filled with fluids and gas from the bacterial action in that segment. Basic lab investigations including full blood count and renal function tests should be done to assess the patient's condition. That is being mentioned, an abdominal CT scan remains the most accurate investigation modality to confirm the presence of the volvulus which can also help identifying the etiology if present (Atamanalp, 2010).

This article aims at describing our experience in terms of patients' demographics and outcome of managing 15 patients with acute sigmoid volvulus using on-table lavage with primary anastomosis, instead of using a two-step procedure of resection with end colostomy (Hartman's procedure) and then anastomosis in a second operation.

## Methodology

This is a cross-sectional, observational retrospective study detailing the outcome of 15 patients with acute sigmoid volvulus who underwent resection of the affected part of the colon and primary resection with on-table lavage in Khartoum, Sudan in the period from January 2019 to January 2021. The study was conducted in Khartoum state, the capital of Sudan in a multicentric institutions that were both academic (Khartoum North Teaching hospital) as well as private hospital (Al-gawda hospital). All 15 patients were recruited for the on-table lavage approach on the basis of their fitting status for surgery and their consent to the procedure. All patients have been followed-up for a period of 2 months post-operatively with no loss to follow-up. Ethical approval was obtained from Alzaiem Alazhari University based in Khartoum and informed consent was taken from patients, verbally. This study was conducted in lines with Declaration of Helsinki.

## Intervention

### Pre-intervention Considerations

Regarding the pre-operative preparations, all patients have been counselled and informed about the procedure risks and benefits and the possibility that the procedure might be converted into a 2-step procedure if necessary was discussed. We ensured the presence of our catheter (we used size 12 Foley catheter) and a draining system for the washed contents with a saline infusion for the irrigation.

### Intervention

The on-table lavage approach to sigmoid volvulus management allows for a one-setting primary anastomosis and is not commonly performed. In this approach, we first identified the dilated segment undergoing volvulus and detwisted that part. Next, the non-viable part was identified when present and appendectomy was done to allow inserting a small-sized Foley catheter (size 12 usually). The Foley catheter is inserted through the appendix opening after appendectomy and inflated using around 7 ml of saline and kept in place using purse-string suture. It is then advanced distally towards the proximal free end to allow irrigating and washing the segment distal up to the opening left proximally after removal of the dilated and/or redundant segments. A sterile draining tube (anesthesia corrugated tube) was ligated to the proximal end to allow the washed contents to be expelled out.

### Intra-Intervention Considerations

All of our cases have been done under general anesthesia. We used a midline laparotomy incision to access the dilated bowel segment undergoing volvulus dilation. The dilated and/or redundant segments were resected. The distal segment was then closed and the proximal segment was lavaged using a catheter introduced through the appendix opening after its removal. The irrigation time was about 40 minutes using around 2 liters of saline solution. Then, both segments are connected together after completion of the lavage.

### Operating Team Details

Operating team included a consultant-level surgeon with extensive training assisted by surgical trainee(s).

## Variations

To ensure quality variation despite the wide discrepancy in the population ages and their associated co-morbidities, we were keen to do the procedure in the same setting with the same consultant and same pre-operative and post-operative care. Post-Intervention Considerations: Post-operatively, patients have been put on appropriate analgesia and antibiotics (metronidazole and cefuroxime were used). They have been kept on nil per oral until they pass motions. They have been followed-up regularly for complications for the period of 2 months following procedure.

## Results

### Participants

Participants were recruited based on their fitting status for surgery and their consent to the procedure. 15 patients were involved in the period from January 2019 to January 2021. All patients involved were Sudanese and most of them belong to a low socioeconomic state. They have a mean age of 46 years with a standard deviation of 12.44. One of the participants was a Jehovah's witness; therefore, a cautious approach was implemented during surgery. Another one of the participants was suffering from left hip fracture when he underwent surgery, requiring a high level of care during his pre, peri as well as post-operative care. Patients have been managed in 2 hospital setting, 12 patients were managed in a teaching hospital (Khartoum North Teaching Hospital) and 3 patients were managed in a private hospital (Al-Gawda hospital).

### Participant Comparison

With regard to the patients' demographics, participants ages ranged between 22 – 65 years of age. Surprisingly, all the recruited participants were males and no female patient has been included even though there was no gender preference in the recruitment process (Table 1).

### Intervention

Sigmoid volvulus is generally managed surgically through de-twisting the affected segment and then resecting the non-viable part with opening it as a colonic stoma in one setting. Three months later, the anastomosis connecting both proximal and distal ends of the remaining segments connecting them together in a later surgery is done. On-table lavage is a procedure allowing the surgery to be done in one setting bypassing the 3-month period of waiting with the uncomfortable stoma and bag usage to patients.

## Outcomes and follow-up

With regard to the outcome, all of the 15 patients involved were discharged in good conditions leading a normal life. They have been followed up without loss to follow-up for a period of two months with no complications including recurrence (since one of them has initially presented with recurrent sigmoid volvulus) nor bowel or wound complications.

**Table 1:** Table detailing each patient's gender, main complaints, co-morbidities, and type of surgical intervention.

Patient Number	Main Complain	Treatment	Comorbidities	Sex
Patient 1	Constipation + lower abdominal pain	Resection + primary anastomosis	Nil	M
Patient 2	Constipation + lower abdominal pain	Resection + primary anastomosis	HTN	M
Patient 3	Constipation + lower abdominal pain	Resection + primary anastomosis	HTN	M
Patient 4	Constipation + lower abdominal pain	Resection + primary anastomosis	NIL	M
Patient 5	Constipation + distension	Resection + primary anastomosis	HTN + DM	M
Patient 6	Constipation + lower abdominal pain	Resection + primary anastomosis	NIL	M
Patient 7	Constipation + lower abdominal pain	Resection + primary anastomosis	NIL	M
Patient 8	Abdominal pain + distension	Resection + primary anastomosis	NIL	M
Patient 9	Abdominal pain + distension	Resection + primary anastomosis	NIL	M
Patient 10	Abdominal pain + constipation	Resection + primary anastomosis	HTN	M
Patient 11	Lower abdominal pain	Resection + primary anastomosis	HTN+CKD	M
Patient 12	Constipation + lower abdominal pain	Resection + primary anastomosis	NIL	M
Patient 13	Lower abdominal pain and constipation	Resection + primary anastomosis	NIL	M
Patient 14	Abdominal pain and distension	Resection + primary anastomosis	NIL	M
Patient 15	Lower abdominal pain + constipation	Resection + primary anastomosis	NIL	M

## Discussion

Acute sigmoid volvulus is one of the most common causes of intestinal obstruction worldwide. It occurs due to twisting of the bowel around its mesentery (Fig. 1). Different approaches to management have been discussed in the literature. Patients usually present with symptoms of intestinal obstruction including vomiting, abdominal pain and distension as well as constipation (Kapan *et al.*, 2012).

Regarding the management of acute sigmoid volvulus, resuscitating patients is often the first step using intravenous fluids. Electrolyte imbalance should be corrected if present and nasogastric suctioning can aid in partially decompressing the distended abdomen. Patients then undergo detorsion if stable or go for surgery (Safioleas *et al.*, 2007). Failure of conservative management will indicate the need for surgical intervention. The surgical intervention for acute sigmoid volvulus intractable to conservative treatment is usually a sigmoid colectomy which followed by either an end colostomy (Hartman's procedure) and subsequent anastomosis in a future surgery in 3 months or a primary anastomosis after bowel lavage while the patient is on the operating table (On-table lavage) (Akcan *et al.*, 2007).



**Figure 1:** Dilated segment of the colon that is twisting around its mesentery.

While, in theory, managing patients using on-table lavage with primary resection and anastomosis can offer patients a one-setting surgery rather than two which can potentially lower complications stemming from having another surgery with its anesthesia complications and patients' post-operative stay, a retrospective cohort study performed by Mohammad Shahmoradi and his colleagues (2021) has found the reverse. Their study included a total of 102 patients, among which 56 patients were managed using end colostomy (Hartmann's procedure) and 46 were managed with resection and primary anastomosis, has found that patients' hospital stay was less in the Hartmann's procedure group when compared to primary resection and anastomosis group (Kazem Shahmoradi *et al.*, 2021). Having the same results in terms of mortality and morbidity with less hospital stay in primary resection and anastomosis group when compared to Hartmann's operation group was found in case of non-complicated acute sigmoid volvulus (Akcan *et al.*, 2007). Although we have not compared it to a two-step procedure of resection with end colostomy (Hartmann's procedure) followed by anastomosis few months later. This study has concluded that the outcome for a one-setting procedure with primary resection and anastomosis (on-table lavage) management for acute sigmoid volvulus was good.

A retrospective study lasted over 5 years starting from September 2010 in India including a total of 122 patients (87 managed with on-table lavage approach) found out that the outcome for both approaches were the same except for a slightly longer hospital stay in patients with primary resection

and anastomosis post-operatively. It has concluded that for complicated cases Hartmann's procedure is the operation of choice (Kazem Shahmoradi *et al.*, 2021). Another study conducted in Veterans Affairs Medical Centers in Missouri, USA in the period from 1991 to 1995 found out that among 178 patients underwent celiotomy for acute sigmoid volvulus 14% (25 patients) died within 30 days from their operations. They reported no intraoperative deaths (Grossmann *et al.*, 2000).

One other study carried out in the University of Maiduguri Teaching Hospital, Maiduguri, Nigeria included 48 patients (September 2000 to January 2005) has found that one-step approach to management of acute sigmoid volvulus can be done successfully without on-table lavage in cases of viable bowel. In contrast, when a gangrenous part of the bowel was found, then Hartmann's procedure is the best surgical approach (Nuhu and Jah, 2010). In our 15 cases, our approach to both viable and non-viable bowel segments involved on-table lavage with primary resection and anastomosis.

### Strengths and Limitations

The study was conducted in an areas of limited data availability and limited resources. It can be one of the first studies to give an insight into the outcome of such approach to managing acute sigmoid volvulus from this part of the world (Middle east and North Africa) which can be seen as a strength for this study. What can be considered as a limitation for it is that this study has not used a more evidence-based type of studies of having a control group for patients who underwent other types of management including detwisting using a tube or endoscopy as well as Hartmann's procedure.

### Implications and Relevance

This study can serve as a start to more investigations regarding the use of one-step approach to acute sigmoid volvulus management. Future research is strongly needed and encouraged.

### Conclusions and Recommendations

This study shows that the on-table lavage approach with primary resection and anastomosis for managing acute sigmoid volvulus can be safely done with good outcome regardless of bowel viability. Nonetheless, data in this study will need to be strengthened in future studies investigating both approaches using randomized-controlled trials with larger patients' involvement.

**Conflict of Interest:** Authors report no conflict of interest of any sort.

**Funding:** Authors received no funding from any institution or facility.

## Authors Contributions

**Conception or Design of Work:** Mohamed Hussein, Mohamed Abdulkarim, Dafalla Shani, Nadir Salih.

**Data Acquisition, Data Analysis and Interpretation:** Mohamed Hussein, Mohamed Abdulkarim, Farah Mohammed, Hisham Hassan Ibrahim Mohammed, Dafalla Shani, Nadir Salih.

**Drafting The Paper:** Mohamed Hussein, Mohamed Abdulkarim, Farah Mohammed.

**Analyze The Paper Critically:** Mohamed Hussein, Mohamed Abdulkarim, Hisham Hassan Ibrahim Mohammed, Dafalla Shani, Nadir Salih.

**Final Approval:** Mohamed Hussein, Mohamed Abdulkarim, Farah Mohammed, Hisham Hassan Ibrahim Mohammed, Dafalla Shani, Nadir Salih.

**Agreement To Be Accountable for All Aspects of The Work:** Mohamed Hussein, Mohamed Abdulkarim, Farah Mohammed, Hisham Hassan Ibrahim Mohammed, Dafalla Shani, Nadir Salih.

## References

Akcan A, Akyildiz H, Artis T, Yilmaz N, Sozuer E. Feasibility of single-stage resection and primary anastomosis in patients with acute noncomplicated sigmoid volvulus. *Am J Surg* 2007; 193: 421-426.

Atamanalp SS. Sigmoid volvulus. *Eurasian J Med* 2010; 42: 142-147.

Grossmann EM, Longo WE, Stratton MD, Virgo KS, Johnson FE. Sigmoid volvulus in Department of Veterans Affairs Medical Centers. *Dis Colon Rectum* 2000; 43: 414-418.

Kapan M, Onder A, Arikanoglu Z, Büyük A, Taskesen F, Gul M, Keles C. Sigmoid volvulus treated by resection and primary anastomosis: urgent and elective conditions as risk factors for postoperative morbidity and mortality. *Eur J Trauma Emerg Surg* 2012; 38: 463-466.

Kazem Shahmoradi M, Khoshdani Farahani P, Sharifian M. Evaluating outcomes of primary anastomosis versus Hartmann's procedure in sigmoid volvulus: A retrospective- cohort study. *Ann Med Surg (Lond)* 2021; 62: 160-163.

Kazem Shahmoradi M, Khoshdani Farahani P, Sharifian M. Evaluating outcomes of primary anastomosis versus Hartmann's procedure in sigmoid volvulus: A retrospective- cohort study. *Ann Med Surg (Lond)* 2021; 62: 160-163.



Lieske B, Antunes C. Sigmoid Volvulus. 2021 Aug 11. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2022 Jan-. PMID: 28722954.

Nuhu A, Jah A. Acute sigmoid volvulus in a West African population. *Ann Afr Med* 2010; 9: 86-90.

Perrot L, Fohlen A, Alves A, Lubrano J. Management of the colonic volvulus in 2016. *J Visc Surg* 2016; 153: 183-192.

Safioleas M, Chatziconstantinou C, Felekouras E, Stamatakos M, Papaconstantinou I, Smirnis A, Safioleas P, Kostakis A. Clinical considerations and therapeutic strategy for sigmoid volvulus in the elderly: a study of 33 cases. *World J Gastroenterol* 2007; 13: 921-924.