

**JIMMA UNIVERSITY  
INSTITUTE OF HEALTH  
FACULTY OF MEDICINE  
DEPARTMENT OF SURGERY**

**RETROSPECTIVE STUDY ON PATTERN OF CLINICAL  
PRESENTATION AND MANAGEMENT OUTCOME OF PATIENTS  
OPERATED FOR SIGMOID VOLVULUS AT JIMMA MEDICAL  
CENTER, JIMMA, OROMIA REGION, ETHIOPIA.**

**FINAL THESIS REPORT TO BE SUBMITTED TO JIMMA UNIVERSITY,  
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SPECIALITY CERTIFICATE IN GENERAL SURGERY**

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## ABSTRACT

**Background:** Intestinal Volvulus is a twisting of the intestine on itself and its mesentery causing an intestinal obstruction [1]. Sigmoid volvulus (SV) is a rare cause of intestinal obstruction in the United States. [10]. In Africa, sigmoid volvulus accounts for a great proportion of large bowel obstruction and is often associated with a high mortality because it affects elderly patients who may have severe co morbid conditions [4]. Ethiopia is one of the countries where sigmoid volvulus is a major cause of large bowel obstruction (91.9%) [2].

**Objective:-** To assess Pattern of clinical presentation and management outcome of patients operated for sigmoid volvulus at JMC, Ethiopia from September 1, 2017 to August 30, 2022 G.C

**Methods:** Hospital based retrospective cross-sectional study was conducted among all adult patients with sigmoid volvulus operated at JMC during the study period. Data was collected by using check list from recorded documents/charts. Collected data was cleaned and entered to epidata then transported to SPSS version 26. Descriptive and analytic studies were performed. P value  $\leq 0.05$  with 95% confidence interval (CI) was used to interpret the findings.

**Results:** The data of 109 (83.8%) patients who were operated for sigmoid volvulus were retrieved and analyzed. The prevalence of acute sigmoid volvulus was 65.2%. Majority of them were men (91.7%) and most patients came from rural areas 89(81.7%). Abdominal pain, distention and failure to pass feces and flatus were their main presenting feature. Of 71 patients with viable sigmoid volvulus, 28(39.4%) was operated on emergency due to failure of non-operative management, 43(60.6%) had successful rectal tube deflation and subsequently managed with definitive surgery. All (34) patients with gangrenous sigmoid volvulus, eight (27.6%) patients with viable sigmoid volvulus, one (100%) patient with gangrenous ISK and one (50%) patient with viable ISK were managed by Hartman's procedure. While the remaining patients with viable sigmoid volvulus and ISK managed by operative derotation only. There were total of seven deaths (Mortality rate – 6.4%) and the average length of hospital stay was 7 days.

**Conclusion:** Hartman's procedure was the common procedure for management of acute sigmoid volvulus. Mortality rate was 6.4% and higher in gangrenous sigmoid volvulus (20.6%)

**Keywords:** Intestinal obstruction, Sigmoid volvulus, Clinical presentation, Management outcome, Resection and primary anastomosis, Hartman's procedure.

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## ABBREVIATIONS

AIDS: Acquired Immune Deficiency Syndrome	MMR: Morbidity and Mortality Report
AOR: Adjusted Odds Ratio	N: Number
BPH: Benign Prostatic Hyperplasia	OR: Odds Ratio
BUN: Blood Urea Nitrogen	PA: Primary Anastomosis
DBP: Diastolic Blood Pressure	PI: Principal Investigator
DCS: Damage Control Surgery	PTB: Pulmonary Tuberculosis
DM: Diabetes Mellitus	RFT: Renal Function Test
ERB: Ethical Review Board	RR: Relative Risk
F: Female	RVI: Retroviral Infections
H: Hour	SBP: Systolic Blood Pressure
HCT: Hematocrit	SD: Standard Deviation
HP: Hartmann's Procedure	SPSS: Statistical Package for Social Science
HTN: Hypertension	SV: Sigmoid volvulus
ICU: Intensive Care Unit	USA: United States Of America
IQR: InterQuartile Range	WBC: White Blood Count
JU: Jimma University	
JUMC: Jimma University Medical Center	
LOS: Length of stay	
M: Male	



## Operational definition

- ❖ **Treatment outcome:**- Improvement: A patient who is discharged without complication
- ❖ **Complication-** post-operative event in which patient develop sepsis, multi-organ failure, wound dehiscence, hospital-acquired pneumonia, wound infection, anastomotic leak, colostomy prolapsed, colostomy necrosis,...etc
- ❖ **Comorbidity:** A patient with SV who has DM, HTN, asthma, RVI, cardiac disease, PTB, BPH,....etc
- ❖ **Shock at presentation:** A patient with SV whose SBP<90mmHg and DBP <60mmHg at presentation
- ❖ **Volvulus:** is a twisting or axial rotation of a portion of bowel about itself and/or its mesentery
- ❖ **Colostomy:** is an artificial opening made in the colon to divert feces and flatus outside the abdomen.
- ❖ **Sigmoiopexy:** Surgical attachment or fixation of sigmoid colon to firm structures, like abdominal wall.
- ❖ **Mesosigmoidoplasty:** Is a nonresective procedure for viable sigmoid volvulus. It aims to correct the main pathogenic factor of this condition, the narrow but long mesosigmoid.
- ❖ **Mesosigmoid:** Is mesentery of sigmoid colon.
- ❖ **Adult:** An adult is a person older than 15 years of age.
- ❖ **Typical plain abdominal x-ray finding of sigmoid volvulus:** is characteristic *bent inner tube* or *coffee bean* appearance, with the convexity of the loop lying in the right upper quadrant (opposite the site of obstruction)

# CHAPTER ONE

## INTRODUCTION

### 1.1 Background

Intestinal volvulus is a twisting of the intestine on itself and its mesentery causing an intestinal obstruction and is usually involves sigmoid colon followed by caecum, transverse colon and splenic flexure [1]. It occurs most frequently in men and it represents 10–15% of all gastrointestinal obstructions in the United States [2].

Sigmoid volvulus is an obstructive bowel disease caused by abnormal twisting of the sigmoid colon and mesentery [1]. Sigmoid volvulus has been contributed to a low portion of large bowel obstruction in developed countries [2]. It is the third cause of large bowel obstruction in the USA (accounting only 4%) following colorectal cancer and diverticular disease [8]. The prevalence of sigmoid volvulus is higher in volvulus belt countries which are extending from South Asia, Africa, and South America [8]. It is accounting for 50-85% of large bowel obstruction in Volvulus Belt countries [8]. The highest incidence from Africa is reported from Ethiopia where it accounted for 91.9% of patients with large bowel obstruction [2].

It has multifactorial predisposing factors like anatomical factors includes long loop and narrow base attachment to pelvic mesocolon, overload colon, advanced age, higher fiber diet, neurologic or psychiatry disease, chronic constipation, and previous surgery [2].

In the acute stage, pain, constipation and abdominal distension are the commonest clinical features [1-3]. In gangrenous cases, blood may be seen in the rectum on digital examination [3]. Diagnosis is made on clinical and radiological findings [2,3]. Imaging findings from Plain x-rays and Gastrografin enema helps to differentiate sigmoid volvulus from cecal and transverse colon volvulus. Sigmoid volvulus produces a typical sign of bent inner tube or coffee appearance

in plain abdominal X-ray. Gastrografin enema shows a narrowing at the site of the volvulus and a pathognomonic bird's beak sign [1].

Sigmoid volvulus with viable bowel is commonly treated by endoscopic decompression using a long rectal tube via sigmoidoscopy and Later a delayed elective sigmoid resection is done through open or laparoscopic approaches [3]. In case of gangrenous sigmoid volvulus, the management involves adequate and prompt fluid resuscitation followed by laparotomy and decompression of proximal bowel with urgent resection of the gangrenous segment [3]. In many centers, resection is followed by Hartmann's procedure but primary resection with anastomosis can be considered in the absence of absolute contraindications. Contraindications include shock, local purulent infection, fecal contamination, and perforation of necrotic bowel [1,3,4]. Sigmoidopexy and mesosigmoidoplasty are additional options of operative management for uncomplicated sigmoid volvulus [3]. These have been shown to be reliable methods of treatment in both emergency and elective settings [3].

As mentioned earlier, even though sigmoid volvulus is the main cause of intestinal obstruction in Ethiopia [2], local studies on its management outcome are lacking. The aim of this study is to assess the pattern of presentation of patients who had sigmoid volvulus and outcome of their treatment at JMC, Jimma, Ethiopia.

## **1.2 Statement of the problem**

Although sigmoid volvulus (SV) is a rare cause of intestinal obstruction in the United States, it accounted for 79 percent of all intestinal obstructions in high altitude of the Andes [10]. The morbidity and mortality due to sigmoid volvulus is higher in volvulus belt countries which are extending from South Asia, Africa, and South America [8]. It is accounting for 50-85% of large bowel obstruction in Volvulus Belt countries [8].

In Africa, acute large bowel obstruction accounts for a great proportion of morbidity and mortality. Sigmoid volvulus is often associated with a high mortality because it affects elderly patients who may have severe co morbid conditions. Patients older than 70 years represent a high

risk group if subjected to surgical intervention [4]. However, when volvulus necessitates emergency surgery, it also carries a substantial mortality even in relatively young patients [4].

The highest mortality usually occurs in cases of resection and primary anastomosis of gangrenous sigmoid colon [4]. Most authors have reported a high mortality of sigmoid volvulus varying between 6% to 64% but this depend on whether there was gangrene, perforation, emergency surgery, toxic, shock post operatively, co morbid conditions and other postoperative complications [3,4]. Ethiopia is one of the countries where sigmoid volvulus is a major cause of large bowel obstruction (91.9%) [2].

### **1.3 Significance of the study**

Although Ethiopia is one of the countries where sigmoid volvulus causing large bowel obstruction is a major cause of morbidity and mortality [2], there were no studies done about sigmoid volvulus in JMC, which helps to know incidence and disease burden in this institution. This study aims to assess the pattern of clinical presentation and management outcome of sigmoid volvulus at Jimma Medical Center.

As there were no studies done about sigmoid volvulus in JMC, this study was conducted to fill this information gap and generate base-line information for physicians to know the cause and specific determinant factors which affect the treatment outcome of patient with sigmoid volvulus. The finding or results obtained from this research could also be used as a baseline for researchers who are interested to do further researches in this area.

## CHAPTER TWO

### LITERATURE REVIEW

#### 2.1 Pattern of clinical presentation of sigmoid volvulus

Sigmoid volvulus continues to be one of the most common emergency surgical conditions in the developed and other developing countries. Disease burden and respective treatment remain as a problem worldwide.

A retrospective study in Kern Medical Center, Bakersfield, California, showed that of the 230 patients, 111 (48 percent) were 40 to 60 years of age; overall, the age range was 10 to 89 years. There was a male: female ratio of 4.5:1. Of the 230 patients, 124 (54 percent) came from rural areas. All patients were natives of the Andes and were of a low socioeconomic status. Sixteen patients presented with a recurrent episode of SV. Average hospital stay was 14.2 days (range, 6-62 days)[13].

A Retrospective series from Department of General Surgery, Ataturk University, Erzurum, Turkey, showed that, 271 (61.3%) of the 442 patients with SV had sigmoid gangrene. In 93 of 271 gangrenous volvuli (34.3%), sigmoid gangrene was diagnosed utilizing rectal digital examination by determining melanotic stool, while endoscopic examination demonstrated bowel gangrene in 37 patients (13.7%), and sigmoid gangrene was diagnosed at laparotomy in the remaining 141 patients (52.0%). The presence of pregnancy ( $P<.05$ ) was negatively correlated with sigmoid gangrene development, while major comorbid diseases (chronic obstructive pulmonary disease, hypertension, coronary disease, cardiac failure, diabetes mellitus, chronic renal insufficiency, hemiplegia, and Parkinson's disease) ( $P<.01$ ), the presence of toxic and/or hypovolemic shock ( $P<.01$ ), prolonged symptom duration ( $P<.05$ ), over rotation ( $P<.05$ ), and the presence of ileosigmoid knotting ( $P<.01$ ) were positively correlated with bowel gangrene. However, no correlation was found between sigmoid gangrene and the other criteria evaluated, including being 60 years of age or older, gender, history of previous volvulus, previous

abdominal surgery, and direction of rotation ( $P<.05$ ). In this series, 58 of 271 patients (21.4%) died [4].

Another study from the Department of Surgery, \*University of Ankara, and †Ankara Numune Teaching and Research Hospital, Ankara, Turkey, showed, One hundred six consecutive patients (81 males; mean age, 60.9 (range, 26–93) years) who had undergone primary resection for acute sigmoid volvulus were treated. All patients had abdominal complaints, the most frequent being abdominal distention (n \_95), followed by tenderness (n \_ 72), nausea and vomiting (n \_ 64), and peritonitis (n \_ 21). The duration of obstructive symptoms before diagnosis ranged from one to seven days and averaged two days [18].

A retrospective review of patients managed for SV at Tenwek Hospital in Bomet, Kenya, showed that of 46 included in the study, 42 males (87%), with a mean age of 47.3 years (range 15-81). Most of the patients (54.3%) were aged 30 to 60 years, while 21.7% were below 30 years and 23.9% were above 60 years.

The mean duration of symptoms prior to hospital presentation was 2.2 days (range 2 hours-7 days). Most patients had symptoms for 1 to 2 days (26 patients; 56.5%) and 3 to 4 days (15 patients; 32.6%) prior to presentation, while those with symptoms for < 1 day and > 5 days represented 4.3% and 6.5% of the cases, respectively. Abdominal pain (44 patients; 95.6%), abdominal distension (44 patients; 95.6%), abdominal tenderness (42 patients; 91.3%) and vomiting (29 patients; 63%) were the most common signs and symptoms [6].

A retrospective cross-sectional study on treatment for acute sigmoid volvulus at Metu Karl Referral Hospital (MKRH), Ethiopia, showed a total of 469 patients with bowel obstructions were admitted to surgical ward of MKRH in the 5 year study period. Two hundred eight of them had large bowel obstruction of which 152(73%) were due to acute sigmoid volvulus. One hundred thirty-one patients were included in the study (data retrieval rate of 86.2%). Majority of them were men (82.4%; male to female ratio of 4.7:1) and above 60 yrs. (42%). The mean age was 69 yrs. & ranged from 25 to 88 years. There were no patients in the age range of 10-19 yrs. Majority of the patients came from rural areas (71.8%). More than half of the patients (54.2%) came to hospital 24 h after their onset of illness (duration of illness ranged from 6 h to 5 days).

Women (72.3%) and those from rural areas (63.8%) tended to present to hospital later than 24 h in comparison to men (50.9%) and those that were from urban (29.7%) areas.

All patients had colicky abdominal pain, abdominal distention, and inability to pass feces & flatus as their main presenting complaint. Vomiting & constipation was noticed in 26(19.8%) & 44(33.5%) patients respectively. On physical examination abdominal distention was a finding in all the patients. Twenty one (16%) patients presented with vital sign derangement, 29 (22.1%) had abdominal tenderness, 91(69.4%) presented with empty rectum, while 13(9.9%) had blood on exam finger during digital rectal examination. Total WBC count was determined for 43 (32.8%) patients out of which a raised WBC count ( $> 10,000$  cells/mm<sup>3</sup>) was noted in 17(39.5%). Eighty-two patients (62.5%) had plain abdominal x-ray performed prior to management. The other patients were not investigated because of unavailability of lab or radiology resources [3].

A retrospective cross-sectional study employed in Debre Tabor general hospital North central Ethiopia, revealed that there were 124 patients with sigmoid volvulus admitted within four years of the study. During the study period, 408 patients with bowel obstructions were admitted, among mechanical large bowel obstruction (MLBO) 135 (33.1%), mechanical small bowel obstruction (MSBO) 251(61.5%) and Ileosigmoid knotting 22(5.4%). This study showed that sigmoid volvulus accounted for 91.9% of Mechanical Large bowel obstruction and 30.4% of total cases with Bowel obstruction (Mechanical SBO, LBO or Ileosigmoid knotting). Most of the patients were male 97.6 % (N=121) and rural residents 91.1 % (N=113). The peak age was 56-65 years accounted for 29 % and 65.3 % (N=81) of patients were above age 50years. The age ranged from 19-88 years. The mean and median ages were  $56.52 \pm (SD=14.4)$  and  $58.5 \pm (IQR=17.75)$  respectively. The mean of hospital stay for elective admission was  $10.98(SD \pm 4.33)$  days and the median was  $11(IQR \pm 5)$  days. The mean of hospital stay for emergency admission excluding death and leave against medical advice was  $8.4(SD \pm 4.1)$  days and median was  $8 (IQR \pm 2)$  days. The clinical presentations were abdominal pain 100%, constipation 97.6%, abdominal distention, and 85.5%. The most prominent clinical findings were abdominal tenderness 91.9% and visible peristalses 67.7%. This study revealed that 66.9% was simple sigmoid volvulus and 33.1% was gangrenous sigmoid volvulus [2].

## 2.2 Management of sigmoid volvulus

A retrospective review from the \*Department of Surgery, Kern Medical Center, Bakersfield, California, and ~ Department of Surgery, Juan XXIII Hospital, La Paz, Bolivia, showed that Non operative reduction was successful in 78 (34 percent) patients and was the only treatment received by 71 (31 percent) of them. One hundred fifty-nine (69 percent) patients underwent surgical intervention, 152 (66 percent) as an emergency and 7 (3 percent) electively. Surgical treatment consisted of sigmoidectomy and primary anastomosis in 80 (50 percent) patients, open detorsion and sigmoid plication in 60 (38 percent) patients, and Hartmann's procedure in 19 (12 percent) patients.

Among the group of patients who underwent successful nonoperative detorsion as the only treatment, mortality was 1.4 percent (one patient) and there were no other immediate complications. However, the majority of patients in this group did not return for follow-up. For the remaining 159 patients who underwent surgical treatment, mortality was 18.9 percent (30 patients). This makes for an overall mortality of 13.5 percent. Fifty seven (36 percent) of the surgically treated patients developed significant complications [13].

A review from the Departments of Surgery, \*University of Ankara, and †Ankara Numune Teaching and Research Hospital, Ankara, Turkey, showed that Primary anastomosis was performed in 57 patients and Hartmann's procedure in 49 cases, depending on the patient's condition and the surgeon's preference. Three patients in the primary anastomosis group and seven in the Hartmann's procedure group had previously undergone abdominal surgery. Three patients in the primary anastomosis group and 4 in the Hartmann's procedure group died within 30 days of their operation. Two patients died of myocardial infarction, two of pulmonary complications, and three of multisystem organ failure. In the latter group, one death occurred in a patient with anastomotic dehiscence, which was converted to Hartmann's procedure. The other patient, who had undergone Hartmann's procedure for gangrenous sigmoid volvulus with associated peritonitis, died after a reoperation for wound dehiscence and stoma necrosis. The last patient who had undergone Hartmann's procedure was discharged at postoperative Day 7 and readmitted 5 days later because of intra-abdominal abscess. This abscess was drained percutaneously, but the patient died as a result of pulmonary complications [18]. Intra-abdominal abscess developed in seven patients after Hartmann's procedure and in one after



primary resection and anastomosis. Percutaneous drainage was performed in four patients, one of whom died of pulmonary complications. The other four patients required a subsequent additional laparotomy for abscess drainage and were discharged without further complications [18].

Reoperation was performed in five patients after Hartmann's procedure and in six after primary resection and anastomosis. In the former group, reoperation was performed in three patients because of drainage of intra-abdominal abscess and in two because the stoma required revision (1 for stoma necrosis, 1 for stoma retraction). In the primary anastomosis group, four patients underwent reoperation for the dehiscence of anastomosis, one for evisceration, and one for the drainage of intra-abdominal abscess [18].

Five patients in the primary anastomosis group and 13 in the Hartmann's procedure group had gangrenous bowel. Mortality and morbidity rates were higher in patients with gangrenous bowel than in those with viable bowel [18].

Resident surgeons performed 73.6 percent of the operations (n = 78), with an equal number of primary anastomoses (n = 39) and Hartmann's procedure cases (n = 39). However, 18 of the 28 operations performed by staff were primary anastomoses (64.2 percent). Six of the 7 deaths, 3 of the 4 anastomotic dehiscences, 10 of the 11 reoperations, and 5 of the 8 intra-abdominal abscesses were documented after operations performed by resident surgeons [18].

Forty-four of 57 patients in the primary anastomosis group and 37 of 49 patients in the Hartmann's procedure group underwent surgery during on-call hours. All major complications and all deaths developed after the operations that took place during on-call hours compared with those performed during daytime hours [18].

Study done at Ataturk University, Erzurum, Turkey, revealed that, of 721 endoscopically treated/evaluated patients with SV, seven patients had borderline bowel ischemia. Three of them (42.9%) were treated by emergency surgery, and sigmoid resection with primary anastomosis was applied. Four other patients (57.1%) were observed, and a second look endoscopic examination was performed after 6-8 hours. In one of them (25.0%), a delayed emergency surgical sigmoid resection with primary anastomosis was performed due to the development of

bowel gangrene, while the other three patients (75.0%) were advised to receive elective surgery. The two who accepted the surgery were treated by elective sigmoid resection with primary anastomosis after a few days. None of the seven patients were lost, and wound infection developed in one patient (33.3%) in the emergency surgery group [19].

A retrospective review of patients managed for gangrenous SV at Tenwek Hospital in Bomet, Kenya, showed that at laparotomy, all 46 cases were noted to have gangrenous bowel, with only 3 cases of concurrent bowel perforation. Four patients underwent damage control surgery (DCS), in response to persistent hypotension despite adequate resuscitation, involving resection of the gangrenous bowel, proximal and distal bowel decompression, separate closure of both bowel ends with suture or staples, peritoneal lavage, and temporary abdominal closure. The patients were then transferred to the ICU, where resuscitation was continued. After a second-look laparotomy (undertaken in 24 to 48 hours), 2 patients underwent a colostomy and 2 had a colo-colonic anastomosis done. A total of 42 patients underwent a definitive procedure during the initial laparotomy, with 23 having a PA and 19 undergoing a HP [6].

Antibiotics were started preoperatively in all cases, with the main combinations being ceftriaxone/metronidazole (60.9%) and ampicillin/gentamycin/metronidazole (26.1%). The median duration of antibiotic administration was 6.7 days (range 1-18 days), with the majority (54.3%) of patients receiving antibiotics for 7 to 8 days. The rest were distributed as 12 patients (26.1%) receiving antibiotics for < 5 days, 8 (17.4%) for > 9 days, and not indicated in 1 case (2.2%) [6].

Twenty-eight patients (61%) were admitted to the ICU, for a median duration of 2.4 days (range 1-18). Most of the patients were admitted for 1 to 2 days (10 patients; 21.7%) or 3 to 4 days (10 patients; 21.7%), with the rest divided as 5 to 6 days (2 patients; 4.3%), > 6 days (4 patients; 8.7%), and not indicated (2 patients; 4.3%) [6].

The mortality rate was 15.2% (7 of 46) overall, 8.3% (2 of 24) for those having a primary anastomosis, 22.7% (5 of 22) for those undergoing a colostomy, 50% (2 of 4) for those having DCS with either PA or HA as a definitive procedure, and 66.7% (2 of 3) in those having bowel perforation (who subsequently had a HP). The cause of death was severe sepsis or septic shock in 4 patients, multisystem organ failure in 2 patients, and there was 1 suspected large pulmonary embolism. The deaths occurred within 2 to 5 days of admission in 4 cases, and within 10 to 18

days in 3 patients. The mean duration of hospitalization was 9.6 days (range 2-61), with most (29 patients; 73.9%) being admitted for 6 to 10 days. Those admitted for  $\leq 5$  days and  $\geq 11$  days represented 17.4% and 19.6% of the cases, respectively. Postoperative complications and morbidity were noted in 12 patients (26.1%), including surgical site infection in 10, fascial dehiscence in 4, anastomotic leak in 1, and intra-abdominal abscess in 1. Assessment of the group of patients who underwent a PA (n = 24) or HP (n = 22) revealed that they were similar in terms of mean age, sex ratio, mean arterial pressure (MAP), antibiotics administered, antibiotic duration, and the proportion of patients undergoing DCS. None of the patients with a concurrent colonic perforation had a PA. Patients undergoing a HP had a longer duration of symptoms (2.7 vs. 1.8 days; P = 0.02) and a higher incidence of peritonitis (72% vs. 42%; P = 0.04) than those who had a PA [6].

Review of 31 consecutive cases of sigmoid volvulus operated at Zomba Central Hospital, Zomba, Malawi, East Africa, has revealed, 12 of these cases the colon was gangrenous or perforated, and in 5 others there was an ileosigmoid knot. The latter 17 cases required emergency colonic resection with or without a primary anastomosis. Of these cases, 14 patients with a nongangrenous volvulus affecting exclusively sigmoid colon were suitable for primary nonresective treatment. Endoscopic derotation was not possible owing to the lack of equipment and experience.

In addition to the 12 patients with nongangrenous simple volvulus treated by modified mesosigmoidoplasty, one patient underwent derotation and insertion of a deflator tube only because of the patient's poor general condition. The patient died the same day. In another case, resection and primary colonic anastomosis were preferred because of an extraordinarily large sigmoid colon. No patient who underwent mesosigmoidoplasty showed signs of bowel ischemia or septic complications perioperatively. All but 1 of the 12 patients with a modified mesosigmoidoplasty made uneventful recoveries until discharge from hospital. The only complication before discharge was the result of misdiagnosing Hirschsprung's disease as sigmoid volvulus and consequently treating it by modified mesosigmoidoplasty. During laparotomy for recurrent obstruction the correct diagnosis was suggested and later confirmed by histology. Among the rural African population that this public hospital serves, systematic follow-up was possible for only 8 patients who lived close-by. Follow-up was done at clinics for 4 to 6 months (mean 4 months). In none of these patients did we find weight loss or hear complaints

about abdominal discomfort or changes in stool habits. Of the four patients lost to follow-up, one returned with recurrent sigmoid volvulus 5 months after the modified mesosigmoidoplasty. At the emergency laparotomy we found a still rather long, narrow mesosigmoid, indicating insufficient dissection of the mesosigmoid during the first procedure. Sigmoid resection followed by primary anastomosis was done, and recovery went well [16].

A Retrospective case series review from Moi Teaching and Referral Hospital (MTRH), Eldoret, Kenya, showed, of 92 patients who underwent emergency resection of sigmoid volvulus, there were 88 males and three females (M/F ratio = 29.3/1). The median age was 50 years (mean age was 47.3 years). The range was 16-86 years. There was only one case of significant co-morbidity (renal failure) and one case reported predisposing or associated risk factors (one case of schizophrenia). Twenty three patients (25%) had adverse outcome (deaths and complications) while 69 patients (75%) had no adverse outcome. Mortality was three cases (3.3%). One patient died of multiple postoperative complications (burst abdomen, colostomy diarrhea and fecal fistula). Another case with co-existing BPH died of renal failure and the third case died of electrolyte imbalance (this patient had severely decompensated preoperative shock on admission with unrecordable BP). Morbidity was recorded in 20 (21.7%) of the patients. The main causes of morbidity (complications) are: - Post-operative infection, Burst abdomen, Wound dehiscence. Anastomosis leakage, Feecal fistula, Electrolyte imbalance, Wound infection, Urinary tract infection, Chest infection and Deep vein thrombosis. There were eight cases with ilio-sigmoid knotting. Four of these had gangrene but all the eight cases had no adverse outcome.

From this review, we observed that there was a significant association between post operative intravenous fluid therapy (POSTI VF) and the outcome ( $p=0.0406$ ). The odds of someone who had less than two litres/day of post operative intravenous fluid having an adverse outcome is 3.8 times that of someone who received two litres/day or more. Other independent variable (Age, Duration of symptoms, vital signs, electrolyte, urea and creatinine, surgeon, type of operation and gangrenous bowel) had no statistically significant association with the outcome [22].

A retrospective and prospective study of patients who presented with sigmoid volvulus at St. Mary's Hospital Lacor Gulu, Northern Uganda, revealed that, of 44 cases studied. Males accounted for 84% of cases; the male to female sex ratio was 5.3:1. The mean age for males was

54.4 years compared with 40.4 years for females ( $P = 0.032$ ). The patients' ages ranged from 16 to 80 years, with a mean of 52.2 (SD  $\pm$  15.98) and a mode of 60 years. The peak age was 51-60 years for males and 41-50 for females. The frequency of sigmoid volvulus rose with increasing age and this was more so for the males. The majority (77%) of the cases presented as emergency and required immediate resuscitation and relief of the sigmoid obstruction. Of these, 61.3% had acute sigmoid volvulus and 16% had ileosigmoid knotting. Three main types of surgical interventions were offered to patients of sigmoid volvulus, These were primary resection and anastomosis (75%), colostomy (20.5%) and sigmoidoscopy derotation and deflation (4.5%). Among the cases who presented as emergency with acute obstruction, 23 (52%) were treated with primary resection and anastomosis, (acute volvulus 45.5% & ileo-sigmoid knotting 6.82%) while 9 (20.5%) were treated with colostomy ( $P > 0.05$ ). All the patients who presented with sub-acute obstruction were treated with primary resection and anastomosis. There was no significant difference in the type of surgical intervention offered to patients who presented with acute sigmoid volvulus. Of the patients studied, 37 (84.1%) were successfully treated, recovered and were discharged alive. There were 7 deaths giving an overall mortality rate of 15.9%. Amongst those who survived, 27 (73%) had primary resection and anastomosis. Only 8 (21.6%) were treated with colostomy [6].

Amongst the patients treated with primary resection and anastomosis, 18% died while 11% of those who had colostomy died, however this difference was not significant ( $P = 0.5$ ). Therefore primary resection and anastomosis in sigmoid volvulus did not adversely affect outcome of treatment. Furthermore, amongst the 7 patients who died, 4 had presented as emergency and of these 3 were treated with primary resection and anastomosis and 1 with colostomy but there was no statistical difference ( $P = 0.56$ ). Therefore the outcome was probably not affected by the type of surgical treatment offered. Of the 7 patients who died, 3 had chronic/sub acute sigmoid volvulus besides which, one had hypertension with respiratory distress and the others had diabetes and hypertension. Two of the dead had acute sigmoid volvulus and was later found to be diabetic and the other also had intraabdominal abscess (in liver and subphrenic area). Among the dead was a pregnant lady with cancer of sigmoid colon causing volvulus. One case of ileo-sigmoid knotting died. The age of those who died ranged from 60 to 73 years with a mean of 62.3 years and median 68 years ((95% confidence interval). Ages of those who survived ranged

from 16 to 80 years with mean of 52.3 years and median of 50 years (95% confidence interval). The only one female who died was a 27-year-old pregnant patient with cancer of the sigmoid colon. The majority of the dead were older male patients but the difference in mean ages between those who survived and those who died was not statistically significant ( $P= 0.06$ ) [6].

A retrospective study done in west African population, in Royal Victoria Teaching Hospital (RVTH) Banjul showed, Preoperative diagnosis of sigmoid volvulus was made clinically in all cases and confirmed at laparotomy though 39 (81.3%) had classical plain abdominal X-ray features. Two (4.2%) of the patients had sigmoidoscopic detortion of their sigmoid volvulus followed by elective sigmoid colectomy and primary anastomosis on the same admission, while 24 (50%) had emergency resection of the sigmoid colon and primary anastomosis in two layers without on-table lavage. There was no mortality in the former group, but one (4.2%) of those that had emergency sigmoid colectomy died. All those who had sigmoid colectomy and primary anastomosis had viable sigmoid colons at operation and presented to hospital within 48 hours of on-set of symptoms. Twenty-two (45.8%) patients had gangrenous sigmoid colon at operation and were offered Hartmann's procedure. Four (18.2%) of these patients died in the postoperative period. Wound infection was the commonest postoperative complication seen in 14 (29.1%) cases followed by prolonged ileus in five (10.4%) and chest infection in three (6.2%). There was no anastomotic leak (Table 2). There were five deaths giving a mortality rate of 10.4%. Three of the deaths were due to septicemia, one had co-morbidity in the form of congestive cardiac failure while the other had acute renal failure. The average duration of follow-up was 6 months, during which three (6.2%) of the patients were found to have developed intestinal obstruction secondary to adhesions; and one (2.1%) had incisional hernia. These complications were managed accordingly [26].

A retrospective cross-sectional study on treatment for acute sigmoid volvulus at Metu Karl Referral Hospital (MKRH), Ethiopia, showed Twenty-nine (22.1%) patients were managed non-operatively by non-endoscopic rectal tube deflation due to lack of sigmoidoscope while the remaining 102 (77.9%) patients were managed operatively, due to failure of rectal tube deflation, suspicion of ischemic bowel or due to surgeon preference. Among those managed operatively 34 patients (33.3%) had gangrenous bowel. From those patients managed operatively, 78 (76.5%)



patients underwent primary resection & end to end anastomosis. Eighteen (18.7%) patients underwent Hartman's procedure for gangrenous bowel obstruction. Six (5.9%) patients underwent operative derotation due to failed rectal tube deflation. Among those patients who had primary resection and anastomosis, 22 (28.2%) patients had unfavorable outcome, i.e. developed post operative complications. These complications occurred in 43.8% of those with gangrenous bowel while only 24.1% of patients with viable bowel developed postoperative complications. Five patients (6.4%) died after primary resection and anastomosis of which 3 were having gangrenous bowel.

A third (1/3) of the Hartman's procedure patients developed postoperative complications but all improved. One patient died after operative sigmoid derotation secondary to congestive heart failure due to previous cardiac problem. About 1/5 (18.8%) of patients, who came with gangrenous bowel and were managed by primary resection and anastomosis, died during the same admission while none died after Hartman's procedure. Only 2 (3.2%) patients died after primary resection and anastomosis for acute viable sigmoid volvulus. All patients managed non operatively by non-endoscopic rectal tube deflation had favorable outcome. The length of hospital stay ranged from 3 to 38 days having an average length of stay of 13.5 days. Overall 29 (22.1%) patients had unfavorable outcome.

The commonest post operative complication was wound infection 13 (12.7%) followed by wound dehiscence 6 (5.9%), anastomosis leakage 4 (3.7%), and post operative intra abdominal abscess 2 (1.9%). Re-laparotomy was performed for 12 patients and the commonest reason was wound dehiscence. There were a total of six deaths (Mortality Rate – 4.5%). After removing confounding factors with multivariate regression analysis, female sex (AOR = 3.97(1.19,12.2), CI 95%, p = .025), duration of illness more than 24 h (AOR = 3.47(1.2,10.4), CI 95%, p = 0.027), and primary resection and anastomosis (AOR = 3.92 (. 242,12.4.), CI 95%, p = .020) were identified to be significantly associated with unfavorable outcome. The other variables were not significantly associated with the outcome of patients [3].

A retrospective study in Gondar University Hospital, Gondar, Ethiopia, revealed that of 200 study patients, the ratio of deflation to surgery was almost 2:1. Almost all study patients were male (92.5%). The mean LOS was 4.30 days (SD=5.59 days). The majority of patients (66.5%) had a LOS of less than 5 days, 33.5% had a LOS equal to or greater than 5 days, 25.5%

developed SV-associated gangrene and only 16% experienced post-surgical complications: 2.0% had stroke, 2.5% experienced deflation failure, 2.0% developed intra-abdominal abscess, 7.0% developed sepsis, and 2.5% had septic shock. The majority (66%) of patients did not report a previous SV attack. Of those who reported an attack (68 patients), 57.4% had a single attack, 32.4% had two, 8.8% had three, and only 1.5% (one patient) reported five attacks. Logistic regressions indicate that female patients have an excess risk of 62% for surgery (the point estimate of relative risk [RR]=1.62). However, difference in RR by gender was not significant ( $p=0.11$ ). Of the five study patients who died, all except one died within 10-25 days. One patient died in the first post-surgery day. There were no other deaths among the patients after a year. The distribution of a total 856 LOS days. Patients with LOS in excess of 5 days accounted for 79% of the total days in this sample. Patients with a maximum LOS of 30 days accounted for 10.5% of the days in the sample.

The effects of age, gender, other complications (gangrene), and previous attacks were not significant and were, therefore, not reported. Estimated coefficients indicate that shock; stroke, abscess, sepsis and surgery significantly prolonged LOS beyond the 1.36 days (intercept), which patients spent in hospital if they underwent sigmoidoscopic decompression only and had no complications. Net contributions of each complication to LOS ranged from 3 days (sepsis =  $1.36 + 2.42$ ) to 10 days (abscess =  $1.36 + 8.85$ ). Surgery added 6.79 days to any treatment. The shortest LOS (1.36 days) was experienced by patients who only underwent sigmoidoscopic decompression and had no treatment complications. Complications associated with surgery accounted for 10.6 to 17.0 LOS days. The majority of the patients (66%) did not experience SV attacks prior to presentation at clinic. Only 68 patients had one or more previous attacks. Of these, more than half (57.4%) reported a single previous attack. Overall, estimates indicate a significant negative correlation ( $r=-0.2787$ ,  $p<.0001$ ) between previous attacks and gangrene. That is, the more previous attacks the less likely the patient was to have gangrene. But, when the gangrene correlation was restricted only to the 68 patients with one or more previous attacks, the direction of the association changed. It became positive but was statistically not significant ( $r=0.1790$ ,  $p=0.2944$ ). Only five of the 68 patients with previous attacks in the sample had gangrene. Four of these subjects had gangrene reported during the first previous attack. One subject had gangrene, but not during the first previous attack. Fifty-one patients had gangrene with one or more previous attacks while 46 patients had gangrene with no previous attacks. In



contrast, 63 patients had previous attacks but no gangrene (OR=0.1484, Chi square=17.86,  $p<0.0001$ ). That is, a previous attack may have been a “protective factor” reducing the risk of having gangrene in this cohort [9].

In a retrospective study of 79 patients with sigmoid volvulus admitted to Attat Hospital, central Ethiopia, There were 70 males and nine females (M:F =7.8:1). The youngest patient was aged 25 and the oldest was 75 years old, with a mean age of 53 years. Twenty five (32%) of the patients presented with gangrenous bowel while the rest (68%) had viable gut. The operative procedures performed included derotation alone, resection and primary anastomosis or resection and colostomy. Of the 54 with viable bowel, four (7%) were managed with derotation alone. Of these four, one was lost to follow up, while the other three presented with recurrence and were readmitted after 3 months, 8 months and after 8 years. They were managed with resection and primary anastomosis. Of the 54 patients with viable gut, 50 (93%) were managed by resection and primary anastomosis. Of the 25 with gangrenous bowel, 23 (92 %) were managed with resection and primary anastomosis. Two (8 %) had resection and a colostomy which was closed later. The average hospital stay was 8 days for patients managed with derotation alone, 10 days for those having resection and a primary anastomosis and 28 for those who had a colostomy. There were four deaths among the patients who had resection and primary anastomosis, a mortality rate of 5.5%. The mortality among those who had viable gut was 4 % (two deaths out of 50) in comparison with the 9% (two deaths out of 23) among those with gangrenous sigmoid colon. Two deaths occurred on the day of operation, one occurred on the 14<sup>th</sup> postoperative day and the fourth was after 30 days. Two deaths were attributed to septic shock . One death occurred in a patient with suspected Acquired Immune Deficiency Syndrome (AIDS). No cause of death was apparent in one case. There were no deaths among patients who had derotation alone or resection and a colostomy [24].

A retrospective cross-sectional study employed in Debre Tabor general hospital North central Ethiopia, revealed that Primary resection and anastomosis was the most common procedure for sigmoid volvulus for 77.4 % ( N=96) and stomas 13.4% (N= 17). The mortality rate was 6.45% and it had statistical significance with bowel viability and hospital stay. [2].

## A. Conceptual Framework

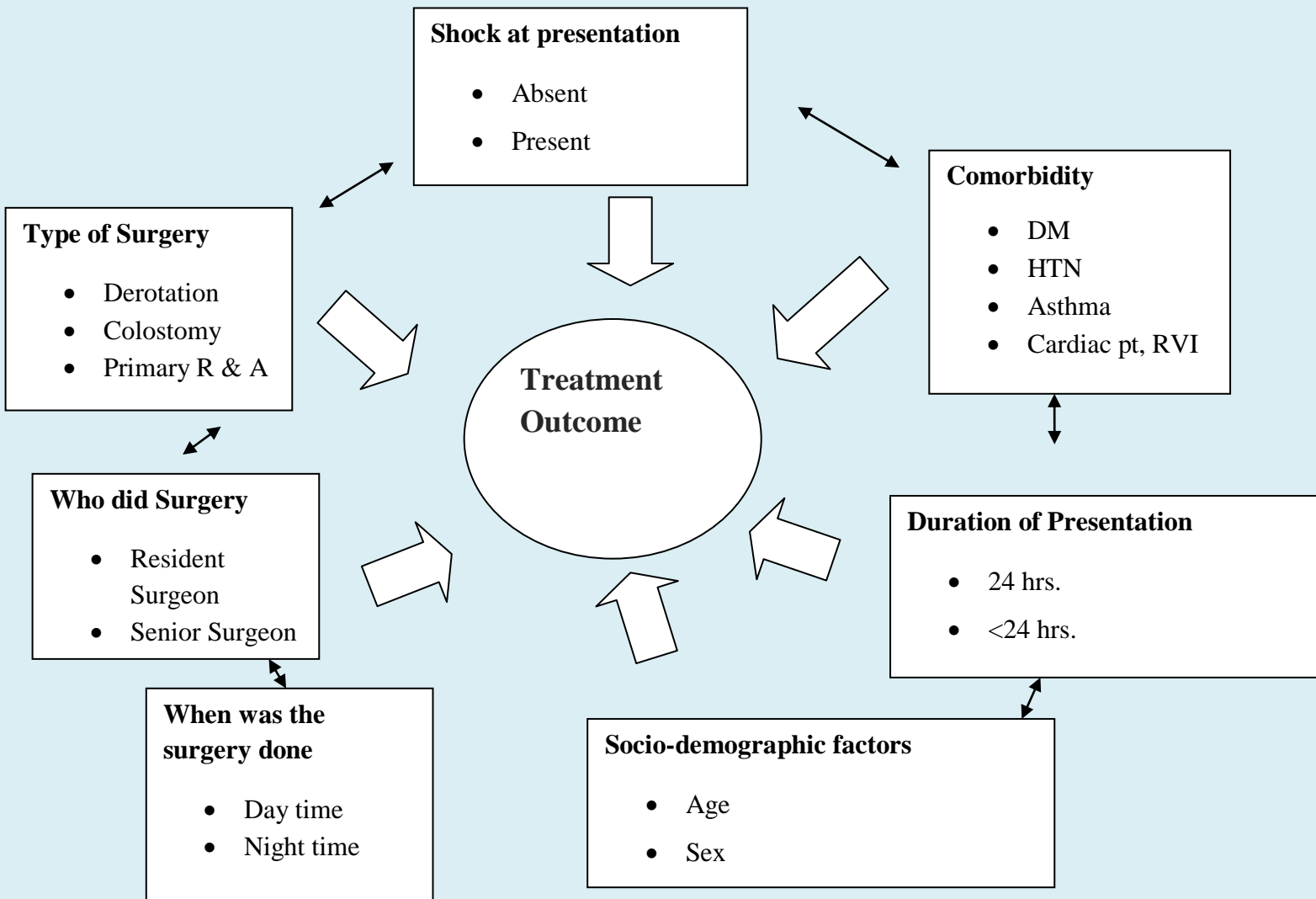


Figure 1. Conceptual frameworks for factor affecting treatment outcome of sigmoid volvulus (developed from different literature review)

## **CHAPTER: - THREE**

### **OBJECTIVES**

#### **A. General objective:**

- To assess Pattern of clinical presentation and management outcome of patients operated for sigmoid volvulus at JMC from September 1,2017 to August 30, 2022  
G.C

#### **B. Specific objectives:**

- To describe the sociodemographic characteristics of adult patients with sigmoid volvulus.
- To identify common clinical presentation of sigmoid volvulus
- To assess the treatment outcome of sigmoid volvulus
- To assess predictors of management outcome of sigmoid volvulus

## **CHAPTER FOUR**

### **METHODS AND MATERIALS**

#### **4.1 Study area and period**

The study was carried out in JMC, which is found in Jimma town, located 350km southwest from Addis Ababa. It becomes the only teaching and referral hospital in the south western part of the country with catchment population of over 15 million peoples. JMC is owned by Jimma University, which is one of the universities in Ethiopia known for its pioneer in Community Based Education. There are 12 specialty units (surgery, Anesthesia, Radiology, Internal medicine, GYN/OBS, Ophthalmology, Dermatology, Psychiatry, pediatrics, Maxillofacial, Emergency medicine and Oncology). Surgery department is one of major specialty unit it has 189 beds, accounting for 28.3% of all beds available in the hospital & has 8 major operating tables for both elective and emergency cases.

The study was carried out retrospectively from September 1, 2017 to August 30, 2022 G.C, at JMC Jimma zone, Oromia region, Ethiopia.

#### **4.2 Study design**

Hospital based retrospective cross-sectional study was conducted among all adult patients with the diagnosis of sigmoid volvulus operated at JMC during the study period from September 1, 2017 to August 30, 2022 G.C, Jimma zone, Oromia region, Ethiopia.

#### **4.3 Source population**

The source population was all adult patients admitted to JMC general surgical ward during the study period.

#### **4.4 Study population**

The study population includes all adult patients admitted and operated at JMC for the diagnosis of sigmoid volvulus during the study period.

## **4.5 Eligibility criteria**

### **❖ Inclusion criteria's**

All adult patients admitted with the diagnosis of sigmoid volvulus & operated at JMC during the study period.

### **❖ Exclusion criteria's**

All adult patients with diagnosis of sigmoid volvulus and managed with only rectal tube deflation, those whose record document/charts are incomplete and those who defaulted from treatment after being admitted and transferred to another center or hospital due to various reason.

## **4.6 Sample size and sampling technique**

All adult patients operated at JMC for the diagnosis of sigmoid volvulus during the study period was included in the study.

## **4.7 Study variables**

### **★ Dependent variables**

- Treatment Outcome

### **★ Independent variables**

- Age
- Sex
- Durations of illness
- Shock at presentation
- Comorbidity
- Type of surgical interventions
- Surgery done by: resident/ senior
- Time of surgery done : daytime/night

## **4.7 Data collection instrument**

Data was collected using a record document analysis or checklist on age, sex, address of the patient; presenting sign and symptoms of large bowel obstructions, duration of presenting symptoms, diagnostic tests and imaging, treatment given and outcome of the treatments. Complications developed after procedures were also recorded.

## **4.10 Data collection procedures**

After having ethical clearance from IRB, Charts/record document of patients admitted to general surgical ward with the diagnosis of sigmoid volvulus and operated was retrieved from card room, surgical wards nurses' logbook, MMR, out-patient department (OPD) and major operation registry books. Then patient charts were given a unique ID number that was used to identify him/her throughout the study time. Data collection was conducted by reviewing medical records/charts of patients admitted to general surgical ward with the diagnosis of sigmoid volvulus and operated during the study period. Before starting data collection, pre-testing was performed on few patients chart by filling the checklist. Data was collected by trained data collectors by filling the record document analysis or checklist by reviewing the patient's charts or medical records, who were supervised by principal investigator during data collection. Each record document analysis or checklist was given to the principal investigator when completed and finally it was compiled based on the ID number of the patient's chart.

## **4.11 Data quality control measures**

Data quality was controlled through continuous supervision during data collection. All completed data collection forms were examined for completeness and consistency during data management and storage. The data was entered and cleaned before analysis.

#### **4.12 Data processing and analysis**

The data was coded, cleaned and entered to epidata then transported to and analyzed using SPSS version 26. Descriptive statistics was conducted using frequencies and proportions. The outcome and explanatory variables found in patients with SV case was entered into a bivariate logistic regression analysis, one at a time, in order to estimate the strength of association. All variables associated with the outcome in the bivariate logistic regression with a p-value less than 0.05 was searched to be entered together into a multivariate logistic regression in order to control for potential confounders. Adjusted and unadjusted odds ratios (OR) and their 95% confidence intervals (CI) was set to be used as indicators of strength of association. A p-value of 0.05 or less was also set to be used as the cut-off level for statistical significance.

#### **4.13 Ethical consideration**

Ethical approval was obtained from the Research and Ethics Committee of JU, after the purpose and objectives of the study was explained to them. Privacy and confidentiality of patients was maintained during data collection.

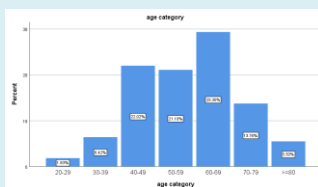
#### **4.14 Dissemination of results**

The research finding will be submitted to JMC department of surgery, research & publication office of Jimma University, library and other concerned bodies. It will be also published on national and international journals.

## CHAPTER FIVE: RESULTS

### 5.1. Socio-demographic characteristics of the study participants

A total of 1,072 patients with bowel obstructions were admitted to surgical ward of JMC in the 5 years study period. 256 of them had large bowel obstruction. Sigmoid volvulus accounted for 167(65.2%) of Mechanical Large bowel obstruction and 167(15.6%) of total cases with Bowel obstructions. One hundred thirty patients with sigmoid volvulus were operated during study period. Of these charts of one hundred nine patients were retrieved and included in this study (data retrieval rate of 83.8%). Majority of them were men (91.7%; male to female ratio of 11.1:1) and most of the patients age is in the range of 60–69 years (29.36%) Fig 2. The mean age was 56 (SD  $\pm$ 13.8) years and ranged from 25 to 90 years. Majority of the patients came from rural areas 89(81.7%).



**Figure 2: Showing age distribution of patients with sigmoid volvulus managed with operative management at JMC during study period.**



## 5.2. Common clinical presentation of patients with sigmoid volvulus

The average duration of presenting illness is 2.73 (SD  $\pm$ 1.3) days after the onset of illness (duration of illness ranged from 5 hours to 7 days). Most patients 81(74.3%) came to hospital after 24 hours of onset of their illness and all mortality in this study were from these group.

All patients had crampy abdominal pain, abdominal distention, and failure to pass feces & flatus as their main presenting complaint. Vomiting was noticed in 42(38.5%) patients and 33(30.3%) patients have reported one or more previous history of the same attack. On physical examination abdominal distention was a finding in all the patients. Thirty six (33%) patients presented with Tachycardia, Two (1.8%) patients had hypotension, 33(30.3%) had abdominal tenderness, 30 (27.5%) patients had hypoactive bowel sounds, 106(97.2%) patients presented with empty rectum, while three(2.8%) patients had blood on exam finger during digital rectal examination. CBC was determined for all patients and 30(27.5%) patients had raised total WBC count above laboratory reference range. RFT was done for 84(77%) patients, seven (6.4%) of them had raised creatinine. One hundred five (96.3%) patients had plain abdominal x-ray performed prior to management, out of these 93(88.6%) patients had typical coffee bean shaped dilated large bowel. The plain abdominal x ray was not done for four (3.7%) patients because of full blown peritonitis with or without hypotension and emergency laparotomy was decided.

Preoperative diagnosis of sigmoid volvulus was made clinically in all cases and confirmed at laparotomy though 93 (88.6%) had typical plain abdominal Xray features. Seventy one (65.1%) patients had preoperative diagnosis of viable sigmoid volvulus, 18(16.5%) patients had additional diagnosis or co morbidity (Table 1).

**Table1: Showing patients who had additional diagnosis or co morbidities among patients with sigmoid volvulus managed with operative management at JMC during study period.**

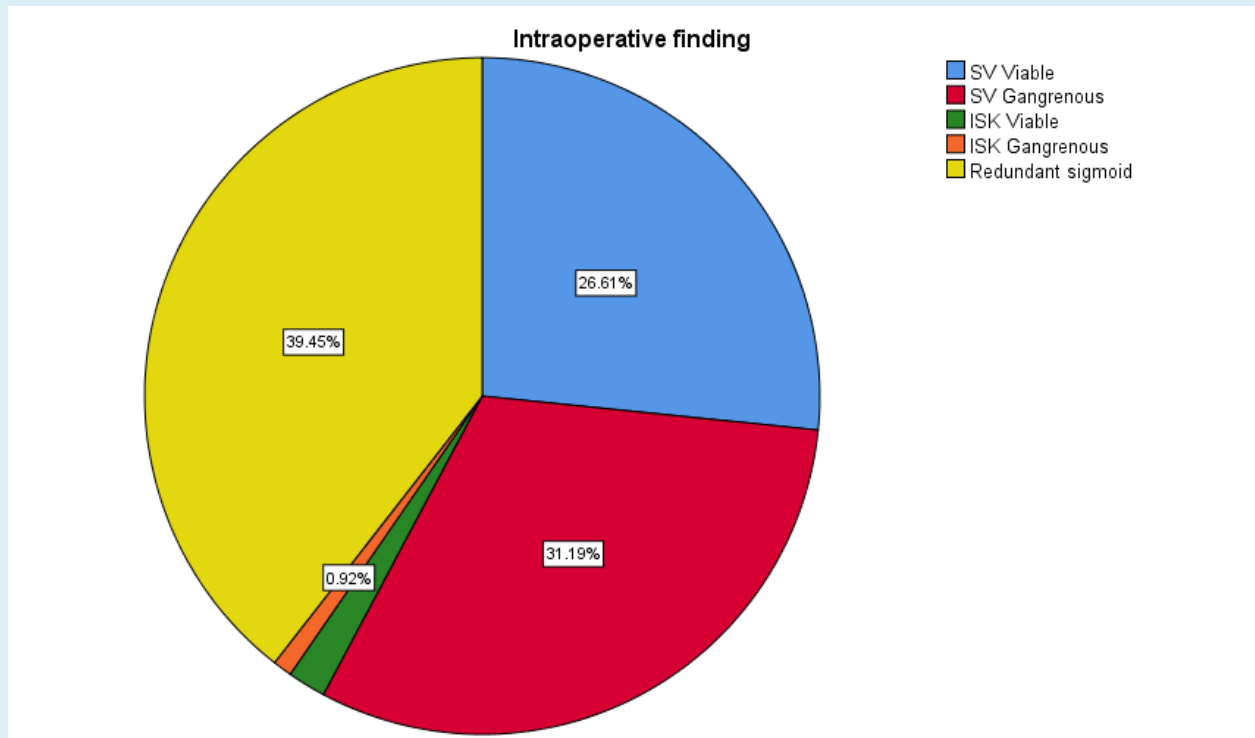
S.No	Co morbidities	Frequency	Percent
1.	Cardiac disease	1	5.6
2.	BPH	4	22.2
3.	Hypertension	13	72.2
<b>Total</b>		18	100

### **5.3 Management and outcome of sigmoid volvulus**

Of patients with preoperative clinical diagnosis of viable sigmoid volvulus, twenty eight (39.4%) was operated on emergency due to failure of initial non-operative management by rectal tube deflation, the remaining 43(60.6%) had successful non operative management by rectal tube deflation and subsequently elective sigmoid resection and anastomosis was done on the same admission and at different admission for 38(88.4%) and 5(11.6%) patients, respectively. Of five patients who came back for definitive surgery one patient had history of simple operative derotation previously. Elective sigmoid resection and anastomosis was done after 16.24(SD±4.32) days on average (ranged from 10 to 30 days) for those who were operated on the same admission after acute volvulus resolved by non-operative management.

All patients received either prophylactic or therapeutic intravenous antibiotics, 74(67.9%) cases were provided with prophylactic antibiotics. The antibiotics combination was ceftriaxone and metronidazole in all cases. For all patients undergone elective sigmoid resection and anastomosis bowel preparation was performed and there was no death from this group.

From the patients operated on emergency the intraoperative finding for patients with gangrenous sigmoid volvulus was 34(31.2%), followed by viable sigmoid volvulus 29(26.6%) and there were two (1.8%) cases of viable ISK and one (0.9%) patient with gangrenous ISK, Fig 3.



**Figure3: Showing intra operative findings of patients with sigmoid volvulus managed with operative management at JMC during study period.**

All patients with gangrenous sigmoid volvulus, eight (27.6%) patients with viable sigmoid volvulus, patient with gangrenous ISK and one (50%) patient with viable ISK was managed by Hartman’s procedure. While the remaining patients with viable sigmoid volvulus and ISK managed by operative derotation only. There were no patients for whom resection and anastomosis done on emergency, while all patients operated on elective were managed by resection and anastomosis, (Table 2).

**Table 2: Showing emergency surgical procedure done for patients with sigmoid volvulus managed with operative management at JMC during study period.**

Type of surgical procedure	Frequency	Percent
Laparotomy and derotation only	22	33.3
Hartman's procedure	44	66.7
<b>Total</b>	<b>66</b>	<b>100</b>

Three (2.8%) patients had intraoperative hypotension and vasopressor was started because they were not responding for fluid resuscitation, all of these patients died. Sixty nine (63.3%) patients operated on day time and there were only two (2.9%) patients died. 61(56%) patients were operated by resident surgeon alone and six (9.8%) patients died.

About fifty six (51.4%) patients received two and less liters of intravenous fluid intraoperatively and only one (1.8%) patient died. The average intraoperative intravenous fluid administration was 2.5 (SD±0.632) liters (ranged from 1 to 4 liters).

Among those patients who had Hartman's procedure for gangrenous SV, 10(29.4%) patients had unfavorable outcome, i.e. developed post operative complications, but those patients who had Hartman's procedure for viable SV didn't developed postoperative complications. These complications occurred in four(18.2%) patients for whom operative derotation only done while only one (2.3%) patient developed postoperative complications after resection and end to end anastomosis. Overall 15(13.8%) patients has developed postoperative complications, chest infection eight (53.3%) being a commonly reported post operative complication (Table 3).

**Table 3: Showing post operative complications developed in patients with sigmoid volvulus managed with operative management at JMC during study period.**

Complications	Frequency	Percent
Complete wound dehiscence	2	1.8
Superficial surgical site infection	2	1.8
Chest infections	8	53.3
Colostomy retraction	2	1.8
Post operative myocardial infarction	1	0.7
<b>Total</b>	<b>15</b>	<b>100</b>

Relaparotomy performed for four (3.7%) patients due to complete wound dehiscence with intra abdominal collection 2(50%) patients, both discharged with improvement and the remaining were for stoma retraction with intra abdominal spillage of fecal matter, both of them died and, of which one patient had two relaparotomy, first for stoma retraction and second for intra abdominal collection, then he died after 30 days of hospital stay. There were a total of seven deaths (Mortality rate – 6.4%), sepsis from index diagnosis for 4(57.1%) patients and post operative complications for 3(42.9%) patients are reported causes of the death. The length of hospital stay ranged from 2 to 30 days, having an average length of stay of 7 (SD±3.5) days.

This study showed that morbidity and mortality rate is more common in males (P=0.609), Rural residence (P=0.774), age greater than 60 years (P= 0.609), Duration of illness greater than 24 hours at presentation (P=0.485), presence of Co morbidity (P=0.384), Gangrenous SV (P=0.154), Hartman’s procedure (P=0.97) and procedures done by resident surgeon alone (P=0.137), which was found numerically impressive but not statistically significant. (Table 4).

**Table 4: Showing results of Binary logistic regression analysis of factors affecting the outcome of sigmoid volvulus managed with operative management at JMC during study period.**

<b>Factor affecting outcome</b>	<b>P-value</b>
Male sex	0.609
Rural residence	0.774
Age >60 years	0.609
Duration of illness >24 hours before presentation	0.485
Presence of co morbidity	0.384
Gangrenous SV	0.154
Hartman’s procedure	0.97
Procedure done by resident surgeon alone	0.137

## CHAPTER SIX: - DISCUSSION

Sigmoid volvulus has been contributed to a low portion of large bowel obstruction in developed countries [2]. The prevalence of sigmoid volvulus is higher in volvulus belt countries which are extending from South Asia, Africa, and South America [8]. Ethiopia has sigmoid volvulus as its most common cause of large bowel obstruction, which is seen in this study (65.2 %) and previous studies (Metu Karl Referral Hospital 73%) [3] and Debre Tabor 91.9% [2]. The prevalence of sigmoid volvulus in this study is much lower than prevalence of sigmoid volvulus in study done in Debre Tabor. The exact reason for this discrepancy is not well known but possible reasons are difference in dietary habits; cultural stool withholding behavior and chronic constipation are possibilities [3].

It has multifactorial predisposing factors like anatomical factors includes long loop and narrow base attachment to pelvic mesocolon, overload colon, advanced age, higher fiber diet, neurologic or psychiatry disease and chronic constipation [2].

Sigmoid volvulus occurred less commonly in females (this study showed male to female ratio of 11.1:1) similar to studies done in California 4.5:1, Kenya 29.3:1, Uganda 5.3:1, and Ethiopia ((Metu Karl Referral Hospital 4.7:1 and Atat 7.8:1) [13,22,6,3,24]. The exact cause of sex discrepancy is not well-known but possible reasons suggested that capacious female pelvic cavity and soft abdomen allowed a greater possibility of spontaneous reduction of volvulus and wider mesocolon in females [2]. This study showed older age patients were more commonly affected with mean age 56 years (age ranged 25 to 90 years). The finding is similar to other studies done in Turkey mean age was 60.9 years and Ethiopia (Debre Tabor mean age 56.5 years, Atat mean age 53 years and Metu karl referral hospital mean age 69 years)[18,2,3,24]. This indicates that redundancy of the sigmoid develops after long period of time due to continuous exposure to predisposing factors.

In this study most patients (81.7%), similar to other studies done in california (54%) and Ethipoia (Metu karl referral hospital 71.8%) were from Rural area [3, 13]. The exact cause of this difference is not well-illustrated but possible reason is people living in rural area usually don't go to toilet on time or postpone defecation due to their work habit and as most of them use field toilet, which impose inconvenience to go for defecation on time. Most patients in this study (74.3%), like other studies done in Kenya [6] and Ethiopia( Metu karl Referral Hospital

[6]), came to hospital after 24 hours of the onset of their illness (ranged from 5 hours – 7 days) with average duration of illness 2.73 days. This may be because patients coming from rural areas 89(81.7%) may have to travel long distance and may prefer traditional remedies before coming to hospital which may delay their presentation to hospital. Overall, all patients reported abdominal pain, abdominal distension and failure to pass feces and flatus. About 33% of patients had tachycardia and 30.3% had abdominal tenderness, which is consistent with the findings of other studies done in Kenya and Ethiopia (Metu karl referral hospital and Debre Tabor) [6, 3, 2].

In this study raised total WBC was seen in 27.5% of patients, which is similar finding with study done in Ethiopia (Metu karl referral hospital, 39.5%) [3] and typical radiologic finding was seen in 88.6% of those who had plain abdominal x ray prior to surgical intervention. This finding is similar with the study done in West African population, 81.3% [26].

This study showed that all patients started on either prophylactic or therapeutic antibiotics, which is similar finding on the study done in Kenya [6]. The antibiotics combination in this study was ceftriaxone and metronidazole in all cases, while in study done in Kenya, it was ceftriaxone and metronidazole (60.9%) and ampicillin, gentamycin and metronidazole (26.1%) [6].

Overall, Seventy one patients (65.1%) had viable sigmoid volvulus, of which 43(60.6%) patients had successful rectal tube deflation and subsequently sigmoid resection and primary anastomosis was done on semi elective on the same admission for 38 (88.4%) patients and for five (11.6%) patients on elective at different admission. This study showed that resection and primary anastomosis was done for most patients after successful rectal tube deflation on semi elective base on the same admission, which is similar finding on study done in West African Population [26]. This is because most patients will not come for definitive surgery if they are sent home after successful rectal tube deflation. The possible reason why they didn't come for definitive surgery is lack of awareness or poor advice about disease condition and as some of them might be deferred for definitive surgery due to medical co morbidity or advanced age. On this study 31.2% of patients had gangrenous sigmoid volvulus, which is similar finding with the studies done in Ethiopia (Metu karl referral hospital, Atat hospital, Debre tabor hospital) and West African Population [3, 24, 2, 26].

In our study the main stay of treatment for gangrenous sigmoid volvulus was Hartman's procedure, with all death being from this group and mortality rate of 20.6%. This finding is similar with study done in West African Population, where Hartman's procedure was the only surgical procedure done for gangrenous sigmoid volvulus with mortality rate of 18.2% associated with this procedure [26]. This is in contrary to findings of studies done in Kenya, other parts of Ethiopia (Metu Karl Referral Hospital and Atat), where primary resection and anastomosis was the mode of treatment for most cases of gangrenous sigmoid volvulus with mortality rates of 8.3%, 18.3%, 8.7% for this treatment group respectively [6, 3, 24]. Study done in Debre Tabor also showed primary resection and anastomosis is main stay of treatment modality for most cases of gangrenous sigmoid volvulus with over all mortality rates of 6.45% [2]. The possible reason for institutional variation in option of surgery is because of institutional guideline difference, difference in practice among surgeon of different institution or preference of operating surgeon and patient clinical condition at the time of surgery.

In this study laparotomy and Derotation only (72.4%) was main stay of surgical procedure for viable acute sigmoid volvulus and the other mode of procedure for viable acute sigmoid volvulus was Hartman's procedure (27.6%), there was no death from patients operated for acute viable sigmoid volvulus. Most commonly done surgical procedure for acute viable sigmoid volvulus in study done in other part of Ethiopia ( Metu karl referral Hospital) was resection and primary anastomosis for 91.2%, with associated mortality rate of 3.2% and Laparotomy and Derotation only for 8.8%, with moratlity rate of 16.7% (one patient with co morbidity) [3]. Study done in West African Population and Ethiopia (Atat) also showed resection and primary anastomosis is most commonly performed surgical procedure for acute viable sigmoid volvulus, with moratlity rates of 4.2% and 4% respectively [26, 24]. Current literatures advocate primary resection and anastomosis as safe and effective way of treatment especially for the viable sigmoid volvulus [3]. Operative management outcome for sigmoid volvulus with primary resection and anastomosis depends on the viability of the bowel [3]. From our literature review there was no study which revealed Hartman's procedure as procedure of option for acute viable sigmoid volvulus. The possible reason for this difference is preference of operating surgeon and the patients' clinical and over all condition at the time of surgery.



In our study most common post operative complication was chest infection (53.3%) followed by wound infection (1.8%), wound dehiscence (1.8%) and colostomy retraction with intra abdominal spillage (1.8%). A study in Kenya showed low rate of chest infection compared to this study [6]. Higher rate of chest infection in our study is may be due to relatively older age of study population and inadequate chest physiotherapy. Study done in other part of Ethiopia (Metu Karl Referral Hospital) revealed high rate of wound infection (18.2%) [3]. The low rate of wound infection in our study may be due to under reported or documented cases with wound infection.

The duration of hospital stay in our study ranged from 2 to 30 days (mean 7 days) similar to study done in Ethiopia (Metu Karl referral hospital) (3-38 days with mean stays of 13.5 days) [3].

We investigated the effects (associations) of the following factors on the outcome: age, sex, residence, duration of presenting illness, comorbidity, type of surgical procedure, intraoperative finding and resident alone/ consultant did the procedure. In this study we found numerically impressive but not statistically significant association between all the above variables with the outcome. In other study female sex, duration of illness more than 24 hours and primary resection and anastomosis were identified to be significantly associated with poor outcome [3].

### **Limitations of study**

This was a retrospective study with a small number of patients who underwent Hartman's procedure or operative derotation only with few observed differences in outcome that could have been occurred by chance. There were also small number of patients who underwent Hartman's procedure for acute viable sigmoid volvulus in this study but there were no patients for whom similar procedure done for the same case in our literature review to compare the outcome related with this procedure. Moreover there were no patients for whom resection and primary anastomosis done for acute sigmoid volvulus in our study to compare the outcome related with this procedure with the outcome of the same procedure in other studies.

The cases were managed by various surgeons over the duration of the review; these surgeons had various reasons for their management choices, some of which were not recorded in the files evaluated.

## **CHAPTER SEVEN: -CONCLUSION AND RECOMMENDATION**

### **7.1 Conclusion**

The prevalence of sigmoid volvulus was sixty five percent in this study. Majority of patients were above sixth decades of life and male. Most patients came from rural areas and duration of presentation was more than twenty four hours. Abdominal pain, distension and failure to pass feces or flatus were common presenting features. Gangrenous sigmoid volvulus is most common finding of patients operated on emergency base. The most common surgical procedure for acute sigmoid volvulus was Hartman's procedure. Chest infection was most common post operative complication and the overall mortality rate was six and half percent and the mortality rate related to Hartman's procedure was about twenty percent. All mortality was from those patients who had gangrenous bowel.

### **7.2 Recommendations**

1. Creating awareness for the community about features of intestinal obstruction, as delay in presentation carried significant morbidity and mortality.
2. Involvement of consultant surgeon during surgical procedure, especially in gangrenous sigmoid volvulus is good as most mortality in our study occurred in patients who were operated by resident surgeon only.
3. Semi elective sigmoid resection on the same admission after successful rectal tube deflation is highly recommended. As almost all patients after successful rectal tube deflation will not come back for surgery if they sent home with appointment may be due to fear of surgery or they assume that their problem has resolved.
4. Enhance provision of post operative care, specifically chest physiotherapy for our older age patients, as chest infection is commonest post operative complication in our study. As this may be due to inadequate chest physiotherapy.
5. Different institution follow different guideline for the management of sigmoid volvulus, we recommend management protocol has to be institutionalized.
6. As this study is retrospective review, future prospective study in this area is highly recommended.

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**ASSURANCE OF PRINCIPAL INVESTIGATOR**

The undersigned agrees to accept responsibility for the scientific ethical and technical conduct of the research project and for provision of required progress reports as per terms and conditions of the Faculty of Public Health in effect at the time of grant is forwarded as the result of this application.

Name of the student: \_\_\_\_\_

Date. \_\_\_\_\_ Signature \_\_\_\_\_

**APPROVAL OF THE FIRST ADVISOR**

Name of the first advisor: \_\_\_\_\_

Date. \_\_\_\_\_ Signature \_\_\_\_\_

**APPROVAL OF THE SECOND ADVISOR**

Name of the second advisor: \_\_\_\_\_

Date. \_\_\_\_\_ Signature \_\_\_\_\_

**Jimma University Faculty of Medicine**

**Post graduate thesis defense grading format**

Name of the department: **Surgery Department**

Student's name: \_\_\_\_\_

Title of the thesis: \_\_\_\_\_

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Evaluation points (criteria )	Weight (%)	SCORES (%)		Total
		Advisor/ examiner (55 %)	Internal examiner (45 %)	
<b>Mother document</b>				
Abstract	<b>5</b>			
Introduction and literature review	<b>10</b>			
Methods	<b>15</b>			
Result and discussion	<b>40</b>			
Conclusion, recommendation & references	<b>10</b>			
<b>Presentation/defense examination</b>				
Manner of presentation/appearance, legibility of slides and spoken English	<b>5</b>			
Confidence in the subject matter	<b>5</b>			
Response to questions & comments	<b>10</b>			
<b>Total</b>	<b>100</b>			

**The grading scales of each rank are as follows**

<b>Rank</b>	<b>(%)</b>
Excellent	$\geq 85$
Very Good	$75 \leq X < 85$
Good	$60 \leq X < 75$
Satisfactory	$50 \leq X < 60$
Fail	$< 50$

**Evaluation weight (%) = 0.55 \* Advisor/examiner's + 0.45 \* internal examiners**

**Final grade (out of 100 %) \_\_\_\_\_ grade in words \_\_\_\_\_**

Decision ("√" in the space, in front of your decision)

Accepted with no revision \_\_\_\_\_

Accepted with minor revision \_\_\_\_\_

Accepted with major revision (time needed to complete the revision needs to be putted.) \_\_\_\_\_

Not accepted (Failed) \_\_\_\_\_

**Advisor/ examiner: Name \_\_\_\_\_ Sign \_\_\_\_\_ date \_\_\_\_\_**

**Internal examiner: Name \_\_\_\_\_ Sign \_\_\_\_\_ date \_\_\_\_\_**

**Department head: Name \_\_\_\_\_ Sign \_\_\_\_\_ date \_\_\_\_\_**

**Jimma University Faculty of Medicine**

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Name of department: **Surgery Department**

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