A COMPARATIVE STUDY OF OUTCOMES BETWEEN EARLY AND LATE ORAL FEEDING POST ONE STAGE SIGMOIDECTOMY FOR UNCOMPLICATED SIGMOID VOLVULUS AT UNIVERSITY TEACHING ADULT HOSPITAL, LUSAKA, ZAMBIA.

BY

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A dissertation submitted to the University of Zambia in partial fulfilment of the award of Master of Medicine of General Surgery

The University of Zambia

School of Medicine

LUSAKA

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DECLARATION

I hereby declare that this dissertation entitled "A comparative study of outcomes between early and late oral feeding post one stage sigmoidectomy for uncomplicated sigmoid volvulus at University Teaching Adult Hospital, Lusaka, Zambia" being presented for Master of Medicine in General Surgery, represents my work and that it has not been previously submitted either wholly or in part for a degree, diploma or other qualification at the University of Zambia or any other institution elsewhere.

Signed: ……..

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This dissertation is being submitted for examination with my approval.

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ABSTRACT

Background: Sigmoid volvulus accounts for more than 50% of colon obstruction here in Africa are usually associated with significant morbidity, and prolonged hospital stay post-operative. Traditionally, nil by mouth 4-5 days has been the practice post one stage sigmoidectomy and primary anastomosis for most surgical units at UTH for fear of anastomotic leakage, while others advocates for early oral feeding. Therefore, this study was conducted to compare outcomes between early oral feeding and late oral feeding (conventional) method post one stage sigmoidectomy and primary anastomosis for uncomplicated sigmoid volvulus.

Methods: A prospective block randomized comparative study was done at UTH for ten months (May 2019-February 2020). All patients who presented with intestinal obstruction secondary to uncomplicated sigmoid volvulus post one stage sigmoidectomy, and primary anastomosis were recruited in the study. Allocations of 48 patients were block randomized to either early oral feeding group 24-48 hours or under late oral feeding group 4-5 days post-operative respectively. Reinsertion of NGT was done for patients who could not tolerate oral feeds. The discharge criteria from the hospital were the same for both groups until the patient was able to tolerate a normal diet. The research was approved by ERES CONVERGE IRB Ethics Committee.

Results: Forty-eight patients were recruited in this study with the age range 22 to 72 years with the mean being 44.9±14.4 years, the majority of participants were male 47 (97.9%) except one female (2.1%), and all were black Africans. The length of hospital stay for early oral feeding was 5.833 days and 8.583 days for late oral feeding with an overall mean of 7.2±1.78 days, difference 2.75 days p-value 0.005, which was statistically significant. Majority of patients passed flatus on day one 22 (45%) day two 21 (43.6%) respectively, and it was noted that resolution of ileus was shorter in early oral feeding group, most patients opened bowels on day three 22(45.8%), about 39 (81.25%) had no abdominal distension while 9 (18.75%) had 22 (91.67%) patients under early oral feeding tolerated feeds well while 18 (75%) under late with the overall tolerability of 40 (83.33%) for both groups, 4 (8.3%) participants had surgical site infection, and all were from the late oral feeding group, there were two cases (4.2%) of anastomotic leakage all from the conventional group.

Conclusion: This study demonstrated that early oral feeding post one stage sigmoidectomy and primary anastomosis for uncomplicated sigmoid volvulus is safe, tolerated by majority patients, reduced length of hospital stay significantly and no anastomotic leakage, reduced morbidity or mortality. Therefore, early oral feeding is feasible, tolerable and beneficial to patients as compared to conventional approach nil by mouth 4-5 days.

Keywords: sigmoid volvulus, early oral feeding, late oral feeding, length of hospital stay, Anastomotic Leakage, Tolerability, primary anastomosis, sigmoidectomy

DEDICATION

This dissertation is dedicated to my wife Iresha Lakshani Changwe, my twin boys Jason Frank and Jaden Frank, my late father David Changwe M.H.S.R.I.P and my mother Esnelle Kalekanya Changwe for the constant support through this process.

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This research work would not have been accomplished without my patients who voluntarily participated and contributed to the findings presented in this document.

Glory be to the Almighty God who has continued blessing me abundantly through my academic journey.

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ABBREVIATIONS AND ACRONYMS

C.I= Confidential Interval

Cons.= Constance

Diff.= Difference

DOB= Day of opening bowels

DOF= Day of flatus

EOF= Early Oral Feeding

LOF= Late Oral Feeding

LOS= Length of hospital stay

NGT=Nasogastric Tube

OR= Odds Ratio

Ref.= Reference

POD= Post Operative Day

SD= Standard Deviation

SSI= Surgical Site Infection

UTAH= University Teaching Adult Hospital

DEFINITION OF TERMS

Early Oral Feeding- defined as clear liquid diet on postoperative day (POD) 1 followed by gradual introduction of solid diet on POD 2 up to 3

Late Oral Feeding- define as initiation of liquid diet from POD 4 to 6 and gradually advancing to solid diets.

Anastomotic Leakage- as a defect of the intestinal wall at the anastomotic site leading to a communication between the intraluminal and extra luminal compartments.

Surgical Site Infection- defined as infection occurring up to 30 days after surgery and affecting either the incision or deep tissue at the operation site (Owens CD et al., 2008).

Uncomplicated sigmoid volvulus- as torsion of the sigmoid colon around its mesenteric axis, which leads to acute intestine obstruction with viable bowels

Prospective block randomized comparative study-is a method in research design used to select and divide participants into different groups or conditions in order to avoid selection bias. It ensures that participants are assigned to conditions or groups with equal probability.

CHAPTER 1: INTRODUCTION

1.1 Background

Sigmoid volvulus accounts for 20% to 50% of colonic obstruction here in Africa with significant morbidity of about six to twenty-four per cent and is associated with prolonged stay in the hospital post-operatively (Gingold D. et al., 2012). Sigmoid volvulus ranks high as a cause of colon obstruction in Africa (Mugala D et al., 2014).

Early oral feeding is an essential part of fast track surgery which has evolved as a result of coordinated effort to combine recent evidence-based advances in the modern care of surgical patients (Kehlet H et al., 2005). Fast track rehabilitation or enhanced recovery after surgery is a multimodal program aiming at enhancing postoperative recovery and outcome (Wilmore DW et al., 2002) and (Kehlet H et al., 2005).

Traditionally, nutritional management of patients undergoing major abdominal surgery has involved a period of nil by mouth with nasogastric decompression followed by a clear liquid diet that gradually progresses to regular food on the 4 to 5 day postoperatively (Meltvedt R et al., 1985) and (Reissmann P et al., 1995).

Proper and adequate nutrition has been one of the major concerns in postoperative care, however, there are still two feared related common perceptions about post-operative ileus and anastomotic leakage hence the routine adoption of nasogastric tube and prevention of oral feeding (Levine M.A 1981). More recent research emphasizes that the routine adoption of a nasogastric tube is unnecessary (Nematihonar B. et al., 2018).

The first comparison concerning the early oral onset of feeding with an elemental diet in surgery of gastrointestinal digestive tract dates back to 1979. In their study, Sagar et al., (1979) carefully initiated the elemental diet on the first day after surgery.

A period of starvation (nil by mouth) of up to 4-5 days after colorectal surgery has been a common practice after an anastomosis has been performed. The stomach is decompressed by nasogastric tube, and intravenous fluids are given, with oral feeding being introduced as gastric dysmotility resolves. The rationale of nil by mouth is to prevent postoperative nausea, vomiting and to protect the gastrointestinal anastomotic site allowing time to heal before being stressed by food. However, it is unclear whether keeping patients nil by mouth beneficial.

Postoperative dysmotility usually predominantly affects the stomach and colon, with the small intestine recovering normal function 4 to 8 hours after laparotomy, the right colon within 24 hours and the left colon at up to 72 hours. The stomach empties poorly for up to 24 hours with pooling in the fundus and body unless the patient is sat at 45˚or more, at which time passive emptying occurs. Hence, feeding after 24 hours post laparotomy is very well tolerated.

Starvation post-resection and anastomosis of the bowel is often associated with an increase in patients' morbidity in that, it reduces the collagen content in anastomotic scar tissue and also diminishes the quality of healing. Additionally, these surgical patients are subjected to post-operative stress and hypercatabolic state; hence these patients require some form of early enteral nutrition (Sheth et al.,2015).

Evidence from clinical studies have shown that early oral feeding is advantageous in post gastrointestinal surgery and primary anastomosis in that, it reverses mucosal

atrophy induced by starvation, increases anastomotic collagen deposition and strength, helps in wound healing, favours early mobilization of the patient and may reduce sepsis in such patients (S J Lewis et al.,2001) and (Stewart et al., 1998).

Early feeding after elective open colorectal resections is successfully tolerated by the majority of patients, leading to earlier resolution of ileus and hospital discharge (Stewart et al., 1998). Traditionally, for so many years the introduction or commencement of enteral feeds post bowel resection and anastomosis has been delayed until there is an evident passage of flatus or stool, evidence of resumed bowel sounds by auscultation for fear of nausea, vomiting, aspiration pneumonia and anastomotic dehiscence (Osland et al., 2009). However, a growing number of randomized controlled clinical trials suggest that early commencement of oral feeds after resection and anastomosis does not result in adverse clinical incidents but in fact improves postoperative outcomes.

Study rationale

Sigmoidectomy and primary anastomosis for sigmoid volvulus are usually associated with a more extended hospital stay, high morbidity, and mortality. Traditionally, delayed introduction of enteral feeding after sigmoidectomy and anastomosis has been the standard practice, but studies have shown that starvation increases morbidity, reduces collagen content in anastomotic scar tissue thereby diminishing the quality of healing.

Therefore, this study is intended to compare the outcomes between early oral feeding and late (conventional nil by mouth 4 to 5 days) oral feeding post one stage sigmoidectomy and primary anastomosis for uncomplicated sigmoid volvulus. This study will help in the reduction of mortality and morbidity, early mobilization of the patient which will lead to quick recovery and eventually reducing the length of hospital stay, cost-saving for the patients and the hospital as all.

1.2 Statement of the Problem

1.2.1. Sigmoidectomy and primary anastomosis for uncomplicated sigmoid volvulus is often associated with extended length hospital stay averaging 10 to 16 days post-operative and high rate of morbidity.

1.2.2. Traditionally, the late introduction of oral feeds after sigmoidectomy and primary anastomosis for uncomplicated sigmoid volvulus is a common practice locally, but studies have shown that starvation increases morbidity, reduces collagen content in anastomotic scar tissue, thereby diminishing the quality.

1.3 Study Justification

There is more extended hospital stay in patients who undergo sigmoidectomy and primary anastomosis for uncomplicated sigmoid volvulus (Mugala D. et al., 2016).

Patients stay longer nil by mouth 4-5 days post one stage for sigmoidectomy, and primary anastomosis that are already have been starving, early introduction of oral feeding helps in reversal of mucosal atrophy induced by starvation.

Costly to patients, drain on government resources.

1.4 Research Question

Does the early introduction of oral feeds after one stage sigmoidectomy and primary anastomosis for uncomplicated sigmoid volvulus have better outcomes compared to delayed method nil by mouth 4-5 days?

1.5 Hypothesis (Null Hypothesis)

There is no difference in outcomes between early and conventional or delayed (nil by mouth) oral feeding post one stage sigmoidectomy and primary anastomosis in patients with uncomplicated sigmoid volvulus.

1.6 Objectives

1.6.1General objective

To compare the outcomes between early introduction of oral feeds with the delayed or conventional approach nil by mouth for 4-5 days post one stage sigmoidectomy and primary anastomosis for uncomplicated sigmoid volvulus at the University Teaching Adult Hospital, Lusaka, Zambia.

1.6.2 Specific Objectives

i) To compare the length of hospital stay in those patients who have early oral feeds with those who have delayed oral feeds 4-5 days post one stage sigmoidectomy and primary anastomosis for uncomplicated sigmoid volvulus.

ii) To evaluate whether early introduction of oral feeding is well tolerated post one stage sigmoidectomy and primary anastomosis for uncomplicated sigmoid volvulus.

iii) To determine whether there is any significant difference in terms of anastomotic leaks between patients who have the early and late introduction of oral feeds after one stage sigmoidectomy and primary anastomosis for uncomplicated sigmoid volvulus.

CHAPTER 2: LITERATURE REVIEW

Introduction: Sigmoid colon volvulus, defined as an abnormal twisting of the sigmoid colon around its mesentery, it accounts for about 20% to 50% of all colonic obstruction in Africa with significant morbidity of about 6% to 24% and is associated with prolonged stay in the hospital postoperatively (Gingold D et al, 2012). The classical clinical features are colicky abdominal pains, abdominal distension, vomiting, absolute constipation and dehydration (Rajsiddharth et al., 2016). Radiologically, sigmoid volvulus is diagnosed on plain abdominal x-rays up to 90% cases. Many signs are like coffee bean sign, bent inner tube, omega sign, inverted U sign, horseshoe and a massive dilated loop of bowel running diagonally across the abdomen from right to left with two air-fluid levels seen, one within a loop of bowel. A barium enema may show bird beak appearance.

Sigmoid volvulus affects both sexes with males being affected more. It is believed that wider pelvis which provides space of spontaneous untwisting and lax abdomen are said to be the reasons for a lesser rate in females (String ST et al., 1971).

Postoperative starvation until flatus is passed per rectum has been a routine surgical practice for fear of anastomotic leak (Garth A.K et al., 2010). It is known that the physiological stress of surgery increases metabolic rate. If postoperative patients are not provided with adequate nutritional support, excessive muscle proteolysis occurs. Protein catabolism with negative nitrogen balance and insulin resistance are some of the main consequences of prolonged starvation following surgery. Besides, malnutrition is associated with increased intestinal permeability and impaired gut barrier function.

Lewis SJ et al., (2009) evaluated early commencement of postoperative enteral feeding in 13 randomized clinical trials (RCTs) in 1173 patients. Although statistical significance was not reached, there was a trend in favour of early enteral feeding in reducing anastomotic dehiscence, intraabdominal abscess and wound infection.

In a study done by Reissman et al. (1995), 2.5% of patients had anastomotic dehiscence in the case group and 3.75% in the control group, P-value was < 0.05, which was insignificant. Wound infection was a common complication after resection and anastomosis of the bowel. In this study, one patient (3.3%) had wound infection in the case group, which was due to intra-abdominal abscess after proximal perforation in Meckel's diverticulum resection and anastomosis and no patient had an infection in stoma closure. Seven patients (23.3%) had wound infection in the control group, six patients had wound infection after stoma closure, and one patient had a wound infection after ileoileal anastomosis for a Koch's ileal stricture. P-value was 0.023. Data in this study showed that early enteral feeding is beneficial in post bowel resection and anastomosis.

Osland et al., (2015), analyzed fifteen studies where they involved a total number of 1240 patients. A statistically significant reduction (45%) in the relative odds of total postoperative complications was seen in patients receiving early postoperative enteral feeding (odds ratio [OR] 0.55, Confidence interval [CI], 0.35-0.87, P=0.01). Early enteral feeding did not have an adverse effect in terms of anastomotic dehiscence (OR-0.75, CI -0.39-1.4, P=0.39), mortality (OR-0.71, CI-0.32-1.56, P=0.39). Rather it reduced hospital length of stay Weighten Mean difference (WMD)-1.28, CI-2.99 to 0.38 P=0.13. The direction of clinical outcome favoured early enteral feeding; thus Osland et

al., (2015) concluded that early enteral feeding postoperatively is associated with a significant reduction in total complications compared with the conventional postoperative feeding practice and does not negatively affect outcomes such as mortality, anastomotic leakage, resolution of bowel function, or length of hospital stay.

In a study done by El Nakeeb A et al., (2009) anastomotic leakage was 1.66% in the early feeding group and 3.33% in the traditional group where fever and anastomotic leak were diagnosed. All the leakages occurred after low anterior resection of a tumour located in the lower rectum and healed after conservative measures; hence surgical interference was not needed.

Gianotti et al., (2011) in their study looked at the safety, feasibility and tolerability of the early oral feeds after colorectal resection outside an enhanced recovery after surgery program. In his study, one hundred patient candidates to elective colorectal resection were prospectively enrolled in the early oral feeding. In this comparative study, the early oral feeding group had better recovery of short half-life protein synthesis compared with the control group ($p<0,001$). The tolerance to the resumption of feeding was similar in the two groups. The overall rate of postoperative complications was 22% in the early oral feeding group versus 27% in the control group ($p=0, 51$). The median length of hospital stay was 9 days (6-25 days) in the early oral feeding versus 12 days (range 6-31days) in the control group ($p=0,01$). From this study, he concluded that early oral feeding after the colorectal operation is feasible and safe outside an enhanced recovery after surgery program.

Tolerability

In their study on 161 patients who underwent elective colorectal surgery, Reissman et al., (1995) found that 79% of patients tolerated early diet. Early oral diet tolerance had an average of 2.6± 0.1 days in the early oral feeding group as compared to 5.0 ± 0.1 days in the late feeding group, suggesting a statistically significant difference. In this study, the frequency of vomiting in the participants was 21% in early oral feeding patients and 14% in the late oral feeding patients. In a similar study done by Ng and Neill they reported early oral diet tolerance in 86% of patients (ranging from 73% to 100%).

In a study done by Tavasolli et al., (2010), they reported three cases of vomiting (4.7%) in each group of early oral feeding and late oral feeding, and there was no statistically significant difference between the two groups with regards to the frequency of vomiting.

In a study concerning ordinary diet, the tolerance among patients who underwent elective colorectal surgery, Ortiz et al., (1996) found that tolerance was 80% for the first four days in the early oral feeding group, which was significantly higher than that in the late group. Then this difference disappeared after four days.

In their study, Stewart et al. (1998) examined eighty patients under open resection in colorectal and anastomosis in two groups. The tolerance was 80% in the early oral feeding group for 48 hours. In the study above, the difference in the frequency of tolerability was not statistically significant between early oral feeding and late oral feeding groups.

Seenu and Goel et al., (1995) in their study on eighty patients with early feeding and eighty-one patients with late feeding under elective colorectal surgery, they noticed that

tolerance in the early enteral feeding group was 79% and 86% in the late oral feeding group. The findings obtained were similar to that of the current researches by Ortiz et al. (1996). In this study, tolerance of normal diet was 2.6 ± 0.1 days in the early feeding group while it was 5.0 ± 0.1 days in the late feeding group indicating a significant difference. It was noted that these figures were also consistent with the results of (Reissman et al., 1995).

Jan Y et al.,(2014) in their study were they enrolled 120 patients, found that six patients (10%) had vomited on starting early oral sips of fluid on postoperative on which stopped spontaneously or with antiemetic but without need for re-insertion nasal gastric tube, while only four patients (6.6%) had vomited in the late oral feeding. There was no statistical significance difference between both studied groups (p=.3715).

Resolution of ileus

Livingston and Passaro, (1990) defined ileus as the functional inhibition of propulsive bowel activity irrespective of the pathologic mechanism. A reasonable definition of the duration of ileus is the time from surgery to the passage of flatus or stool accompanied by a patient tolerating an oral diet (Delaney et al., 2004). In their study, Mahla V et al., (2016) found that in the early oral feeding group, the postoperative resolution of ileus was evidenced by the appearance of the bowel sounds which occurred at a mean duration of 23 hours, 33 hours and 47 hours respectively. By contrast, it was significantly delayed in the delayed oral feeding group. In this study, the difference was statistically significant and therefore, concluded that early oral feeding does have an impact on ileus resolution.

In a study done by Ng and Neill.,(2006), it was noted that the average first time bowel sound an auscultation was 2.36 days in the early oral feeding group and 3.20 days for the late oral feeding group with the statistically significant difference between the two groups of patients.

According to the findings of Charoenkwan K et al., (2007), the first hearing of bowel sounds under early oral feeding group occurred on an average half a day sooner in the patients. Based on the findings by Ng W.Q and Neill J., (2006) results, initiating early enteral diet postoperative improved ileus faster.

In their study, Ortiz et al., (1996) found that first bowel motility occurred on an average of 4.3 days postoperative in patients with early oral feeding and 4.7 days after surgery in patients with late feeding. The average time for bowel sounds auscultation based on the findings of this study was longer in both early and late oral feeding groups of patients compared to this current study. According to the findings of Sekhavat et al., the resumption of postoperative ileus was faster in early oral feeding as compared to late oral feeding group. A study done by Seenu Goel,.(1995), the average postoperative resolution of ileus was of 2.85 days for the early feeding group versus 3.05 days for the late feeding group which did not indicate the statistically significant difference. El Nakeeb A et al., (2009) concluded that resolution time of ileus and onset of bowel sounds on auscultation occurred shorter in the early oral feeding group 3.3 ± 0.9 (2-8) days postoperatively as compared to traditional group 4.2 ± 1.2 (2-9) days.

In their study, Jan Y et al., (2014) found that the mean duration for the appearance of bowel sounds was (1.08 ± 0.27) and (3.01 ± 0.6) days in early oral feeding and delayed oral feeding respectively which was statistically significant.

Length of hospital stay

The overall duration of hospital stay had a remarkable effect on patient satisfaction with the treatment procedure and costs. The criteria of discharge from the hospital in the two groups of patients were similar in a study done by Nematihonar et al., (2018), including tolerance of normal diet for at least 24 hours in patients with early feeding. The average duration of hospital stay after surgery was four days with a standard deviation of 0.64. In contrast, the average duration of hospital stay after surgery in late feeding patients was 6.1 days with a standard deviation of 0.84, which indicated a significant difference between the two groups.

From the eleven studies meta-analysis for the length of hospital stay done by Lewis SJ et al., (2001), it was estimated that the mean length of hospital stay ranged from 6.2 days to 14 days in an early feeding group and 6.8 days to 19 days in the delayed group. Combined results showed a statistically significant reduction in the hospital stay by 0.84 days (0.36 to 1.53 days, p=0.001).

In the study done by Tavasolli et al., (2010), the duration of hospitalization was 6.3 days in patients with early feeding and 9.8 days in the control group, which was statistically significant. El Nakeeb A et al., (2009), in their study, the postoperative hospital stay for the early oral feeding and traditional groups was 6.2 ± 0.2 days (3-11) and 6.9 ± 0.5 days (3-12), respectively (p-value 0.05).

Jan Y et al.,(2004) in their study found that early oral feeding group post-operative hospital stay ranged between 4-5 days with a mean length of stay (4.4 ± 2.9) days, while in delayed oral feeding group, the range of 7-15 days with the mean length of stay of (8.6 ± 1.6) days, showed a significant difference between two groups. In a study by Tito et al., (2006), showed significantly shorter mean hospital stay in early feeding group (2.5 + 1.7) days compared to mean hospital stay in delayed feeding group of (9.93 + 2.60) days.

Naald N et al., (2018) conducted a study done in Katete Zambia using a novel approach to the treatment of sigmoid volvulus by combining minimally invasive surgery with enhanced recovery postoperatively. In their study, 31 patients were enrolled with uncomplicated sigmoid volvulus; from this study, not all principles of enhanced recovery after surgery were instituted. The following were done namely no bowel preparation was applied, no limiting preoperative fasting, no preoperative carbohydrate loading, no thrombosis prophylaxis, Antimicrobial prophylaxis given, no epidural perioperative, surgical of minimal length incision, no postoperative nasal gastric tube, restrictive fluid management, no drains of the peritoneal cavity, no postoperative epidural catheter applied, commence of oral diet as soon as possible, early mobilization.

From this study, Naald et al. had only one anastomotic leakage and therefore concluded that early oral feeding post sigmoidectomy primary anastomosis is safe, feasible in our environment.

CHAPTER 3: RESEARCH METHODS

3.1 Introduction

In this part of the dissertation, detailed descriptions of the methods used in the study are presented. Important aspects include data collection techniques, study type, sampling methods and procedure, data collection and analysis, ethical considerations.

3.2 Study Design

This was a prospective block randomized comparative study, by using AABB, ABAB, BBAA, BABA BAAB to allocate patients.

3.2.1 Study Site

This study was conducted at the University Teaching Adult Hospital, Department of Surgery, Lusaka, Zambia. Patients were recruited from the surgical admission ward (GO1) post-operative.

3.2.2 Study Population

All patients who presented with uncomplicated sigmoid volvulus post sigmoidectomy were enrolled.

3.2.3 Study Sample Size

Using the comparative formula of proportions and by using our hypothesis

Where $f(\alpha,\beta)$ at 80%=7.84

The formula used to calculate the number of patients is

$$n = \frac{\left(Z\,{}^{\alpha}/_{2} + Z\beta\right)^{2} \times (P1(1-P1) + P2(1-P2))}{(P2-P1)^{2}}$$

Where

$$Z\frac{\alpha}{2} \text{ at } 0.05 = 1.96, Z\beta \text{ at } 80\% \text{ power} = 0.84, P1 = 0.321 \text{ and } P2 = 0.0357$$

$$n=\frac{7.84 \times \{0.321(1-0.321) + 0.0357(1-0.0357)\}}{(0.0357-0.321)^2}$$

n=24 patients (Abid et al., 2013)

A total of 48 patients were recruited in our study, 24 patients were randomly offered traditional (conventional) nil by mouth 4-5 days approach and other 24 patients for early introduction of oral feeding after 24-48 hours postoperatively.

3.2.4 Study Duration

This study took ten months from ethical approval to meet the sample size based on the local audit at University Teaching Adult Hospital, Lusaka, Zambia.

3.2.5 Inclusion and Exclusion Criteria

Inclusion criteria

- all patients who presented with uncomplicated sigmoid colon volvulus
- all patients who consented for an operation
- both sexes
- Age group, from 18-75 years

Exclusion criteria

- Patients with co-morbidity example Diabetes Mellitus
- ASA ≥ III
- Patients with Hb < 10g/dl
- Patients post deflation of sigmoid colon

3.2.6 Sampling strategy

Block randomized sampling of the patients meeting the inclusion criteria was used to allocate patients to early oral feeding group or conventional method group

Data collection: Data was collected using a specially designed hospital record card, including patient demography, vitals and intraoperative findings. After the operation, a special questionnaire was completed.

Data Entry: Data collected was entered on a personal computer into an excel spreadsheet for analysis.

3.3 Data Analysis

All the data collected were entered into a personal computer and analyzed using STATA version 13 software. The difference in proportions was analyzed with the chi-square test. The difference in age was compared with unpaired t-test, paired Mann-Whitney test. The statistical significance was set at p=0.05. Unadjusted and adjusted linear regression, logistic regression and multivariate logistic regression were used.

3.4 Procedure

Post-operatively, a nasogastric tube was inserted for the decompression of the stomach for 24 hours for the early oral feeding group and 4-5 days for the delayed group. The patient was nursed at 45˚ to allow passive stomach emptying.

The patient was put on pethidine and diclofenac intramuscular, intravenous antibiotics ceftriaxone, metronidazole and three litres intravenous fluids Lactate Ringers.

After 24 hours removal of the nasogastric tube was done, then the gradual introduction of oral feeding starting with oral sips clear liquid 30 mls per hour day one, free fluid day two if the patient is tolerating well and then light diet from day three for the early oral feeding group.

For the delayed group, the nasogastric tube removal was done 4 to 5 days post-operative when the output was less than 150 mls, and there was no postoperative paralytic ileus and bowel sounds are audible. Introduction of oral sips, free fluid and eventually, light diet was done gradually.

All patients were monitored post-operatively to record the nasogastric tube removal time, tolerance to oral feeds, vomiting, time of first passage of flatus and stool, duration of postoperative stay and anastomotic leakage.

Re-insertion of the nasogastric tube was done for patients who vomited more than 100 mls on two episodes in a day after introduction of oral sips. A discharge criterion was similar in both early and delayed oral feeding groups once the patients tolerated a normal diet and clinically stable.

3.5 Variables

Primary outcomes

- Anastomotic leakage
- Length of hospital stay
- Tolerability

Dependent Variables: Anastomotic leakage, length of hospital stay, tolerability

Independent Variables:

- Sex
- Age
- Surgical Site Infection,

3.6 Ethical Considerations

3.6.1 Risks

There was minimal risk to the participants. This is a clinical study, and there was no added risk apart from any risk that a patient undergoing sigmoidectomy and primary anastomosis can have like anastomotic leakage and surgical site infection. Current literature and practice show that early oral feeding has better outcomes Osland et al., 2015, Gianotti et al., 2011 and Anderson HK et al., 2011. Patients were explained to when consenting, that anastomotic leakage or surgical site infection does not depend on whether someone starts early or late oral feeding but rather on the blood supply at the anastomotic site. They may be psychological trauma due to some sensitive questions

asked during the patient interview. In this study, there was a gradual introduction of oral feeding starting with oral sips clear fluids, free fluids and then ordinary light diet. In case the patient fails to tolerate oral sips, re-insertion of the nasogastric tube was done, or in case of any emergency, necessary measures were undertaken as per standard practice by the attending medical personnel.

3.6.2 Benefits:

There was no direct benefit for the participants. The participants did not receive any special treatment and did not receive any financial benefits to be recruited in the study as all procedures, investigations and follow up was be per standard routine management.

3.6.3 Voluntarism

Participation in this study was entirely voluntary, and no coercion was used. If the patient feels inconvenienced, they were free to withdraw from the study at any time without any implications for their management.

3.6.4 Written Informed Consent

Written informed consent was obtained from every patient once fully recovered from anaesthesia and stable enough before their enrolment in the study.

3.6.5 Confidentiality

The data collected was kept confidential and available only to the researcher. Participant's names were not used instead; numbers were used for identifications. The data collection sheets were being kept in the locker with keys by the researcher. Once the information had been entered into a computer, it was password-protected, and only the researcher had the password.

Ethical clearance and approval were sought from the Ethical Committee. Permission to conduct the study in the study site was obtained the University Teaching Adult Hospital Management and the Department of Surgery.

Injury clause

In case of any complaints whom to contact:

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CHAPTER 4: RESULTS

This chapter presents the findings of this study. The main objective was to compare the outcomes between early and late oral feeding post one stage sigmoidectomy and primary anastomosis for uncomplicated sigmoid volvulus.

4.1: Baseline demographic characteristics of the study participants

In this study, there were 48 participants, with a mean age of 44.9 (SD, 14.4) almost everyone was male 47 (97.9%) except 1 who was female. All of them were black Africans and majority were married 35 (72.9%). Among the participants, most of them were from the urban 38 (79.2%), the majority were employed 35 (72.9%) and education level for the majority was primary 21 (43.8%) and secondary 21 (43.8%) least being tertiary 6 (12.50%) as in Table 4.1.

Table 4.1: Baseline demographic characteristic of study participants

Variable		
Age*	44.9 (SD,14.4)	
	Category	**Proportions (%)**
Sex	Male	47 (97.9%)
	Female	1 (2.1%)
Marital status	Single	13 (27.1%)
	Married	35 (72.9%)a
Residence	Urban	38 (79.2%)
	Rural	10 (20.8%)
Occupation	Employed	35 (72.9%)
	Not Employed	13 (27.1%)
Education Level	None-Primary	21 (43.75%)
	Secondary	21 (43.75%)
	Tertiary	6 (12.50%)

*mean and standard deviation reported; SD= Standard deviation

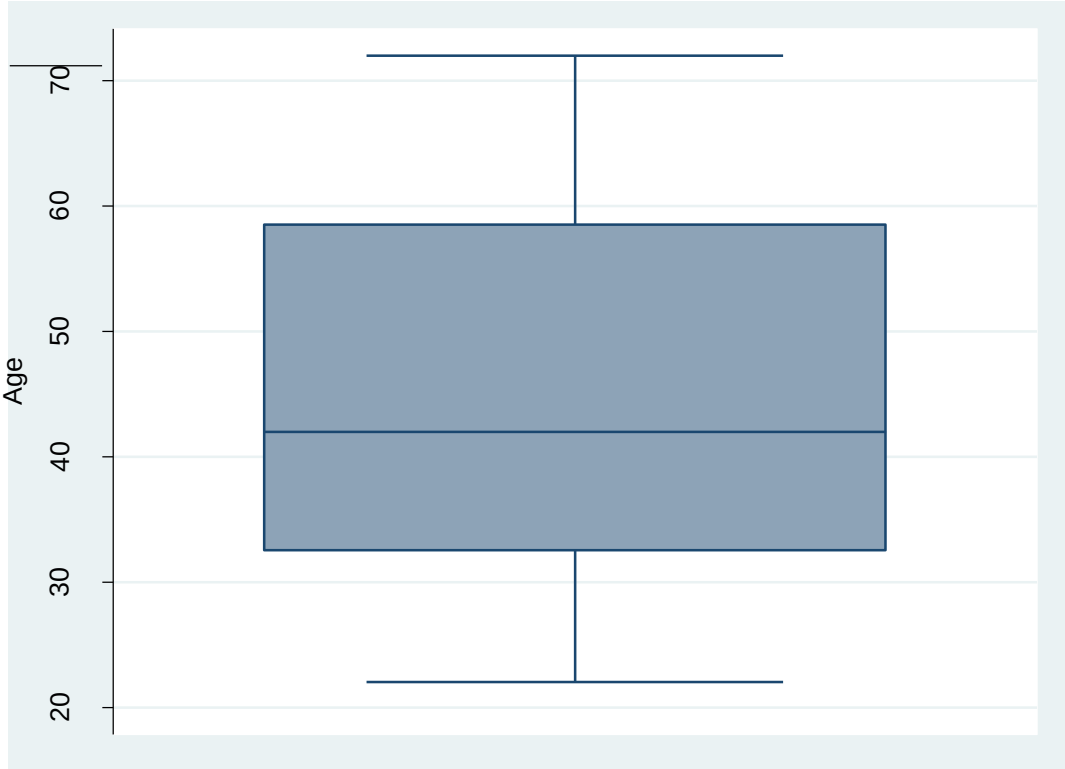

Figure 4.1 Box and Whisker plot for age was normally distributed.

4.2: Clinical characteristic of study participants' post-operative

Of the 48 patients, mean length of hospital stay was 7.2 days with standard deviation ±1.78, majority of them passed flatus on day one 22 (45.8%) and day two 21 (43.6%) respectively, most of the patients opened bowels on day three 22 (45.8%), about 39 (81.25%) had no abdominal distension. For tolerability, 40 (83.3%) tolerated oral feeds, there was 4 (8.3%) surgical site infection, two patients (4.2%) had anastomotic leakage. Almost all the patients were operated on by the registrars 47 (97.9%) and none of the participants were operated on by the consultant as shown in Table 4.2

Table 4.2: Clinical characteristic of study participants' post-operative

Variable		
LOS*	7.2(SD,1.78)	
	Category	Proportions (%)
DOF	Day 1	22 (45.8%)
	Day 2	21 (43.6%)
	Day 3	3 (6.3%)
	Day 4	2 (4.2%)
DOB	Day 1	2 (4.2%)
	Day 2	10 (20.8%)
	Day 3	22 (45.85%)
	Day 4	11 (22.9%)
	Day 5	1 (2.1%)
	Day 6	1 (2.1%)
	Day 7	1 (2.1%)
Abdominal Distension	Yes	9 (18.75%)
	No	39 (81.25%)
Vomiting	Yes	8 (16.7%)
	No	40 (83.3%)
SSI	Yes	4 (8.3%)
	No	44 (91.7%)
Anastomotic Leakage	Yes	2 (4.2%)
	No	46 (95.8%)
Level of Surgeon	Registrar	47 (97.7%)
	Senior Registrar	1 (2.1%)

*mean and standard deviation, SD=Standard deviation, LOS=Length of stay DOF=Day of flatus, DOB=Day of opening bowels, SSI= Surgical site infection

4.3 Comparison of length of hospital stay by EOF/LOF

The mean length of hospital stay for EOF was 5.83(SD, 0.82) days and 8.58(SD, 1.38) days for LOF, p=<0.0001 which was significant with the difference of 2.75 days between the two groups as shown in Table 4.3

Table 4.3: Comparison of length of hospital stay by EOF/LOF

Variable	Mean	SD	95% C.I	p-value
EOF	5.83	0.82	5.49-6.18	<0.0001
LOF	8.58	1.38	8.00-9.17	

C.I=Confidence interval, EOF= Early Oral Feeding, LOF= Late Oral Feeding, SD=Standard deviation

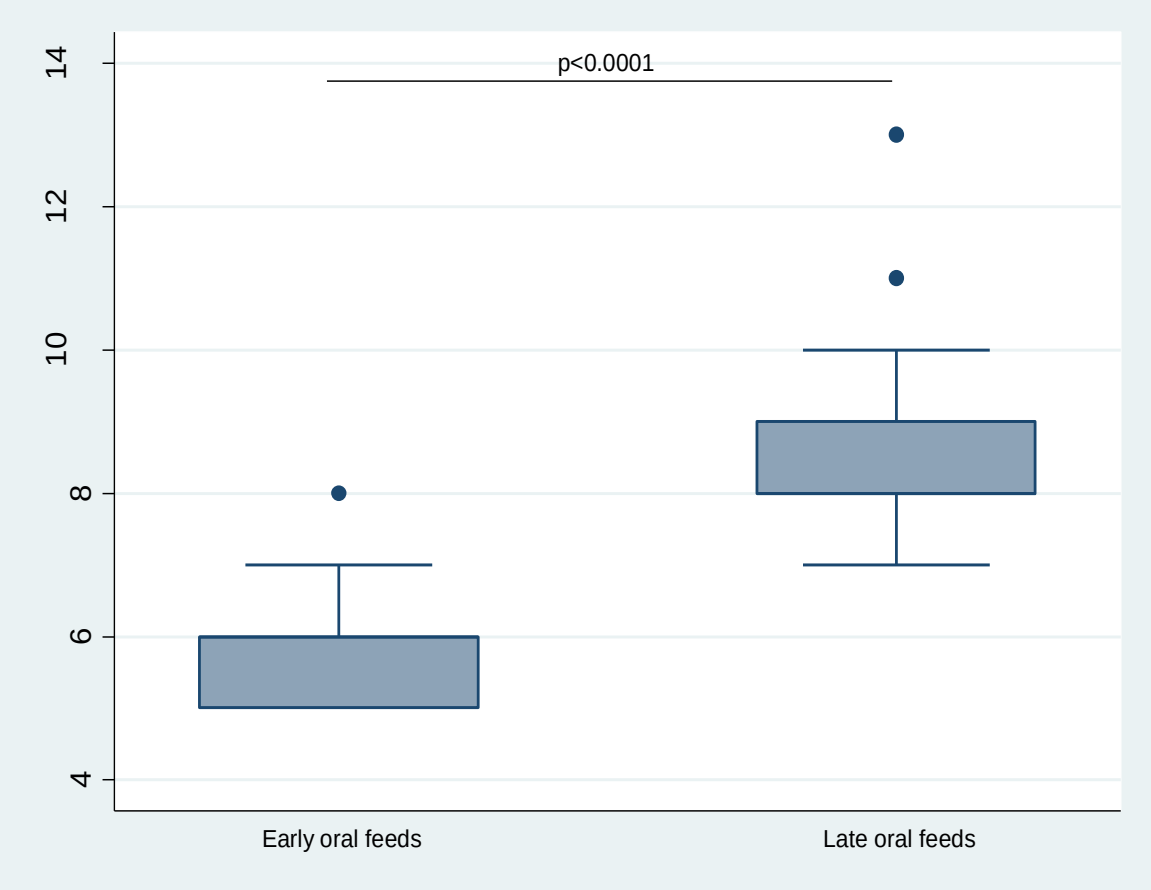

Figure 4.3 Comparison of length of hospital stay between participants who started early and late oral feeds.

4.4 Unadjusted linear regression predicting length of hospital stay as an outcome

Taking length of hospital as an outcome, patients who passed flatus on day two odds ratio was 2.33 longer with p=<0.001, while those whose passed flatus on day four was associated with 3.04 longer stay in hospital and was significant (p=0.005). For the day of opening bowels, for the increase by a day, it was associated with -0.89 days in the increase in the length of stay in hospital as was significant (p <0.001). The length of hospital stay for patients without abdominal distension was reduced by 1.8 days (p= 0.005), for those who tolerated oral feeds well, length of stay was significantly reduced by 1.4 days (p=0.042). For patients who never had surgical site infection their hospital stay was reduced by 2.5 (p= 0.006) which was significant, those without anastomotic leakage stayed 3.4 days less (p=0.006), and those operated on by senior registrar, 1.2 days less but not significant (p=0.500). For participants whose oral feeds started late stayed 2.5 days longer in the hospital which was significant (p= <0.001) as shown in Table 4.4

Table 4.4: Unadjusted Linear Regression predicting LOS as an outcome

Variable		Coefficient (β)	95% Conf. Interval	p-value
DOF				
Day 1		Ref.		
Day 2		2.33	1.5-3.2	<0.001
Day 3		1.7	-0.0007 -3.4	0.050
Day 4		3.04	0.99 - 5.1	0.005
DOB		0.89	0.48 - 1.3	<0.001
Abdominal Distension				
	Yes	Ref.		
	No	-1.8	-3.02 - -0.56	0.005
Vomiting				
	Yes	Ref.		
	No	-1.4	-2.7 - -0.055	0.042
SSI				
	Yes	Ref.		
	No	-2.5	-4.24 - -0.75	0.006
Anastomotic Leakage				
	Yes	Ref.		
	No	-3.4	-5.85 - -1.02	0.006
EOF/LOF		2.75	2.09 - 3.41	<0.001

C.I = Confidential Interval, DOF= Day of passing flatus, DOB= Day of opening bowels, SSI= surgical site infection, EOF= Early oral feeds, LOF= Late oral feeds

4.5 Adjusted multiple linear regression predicting LOS as an outcome

Concerning the length of the hospital using adjusted multiple linear regression, participants who started oral feeds late stayed 2.37 days longer (p=0.002) which was significant as shown in Table 4.5

Table 4.5: Adjusted multiple linear Regression predicting LOS as an outcome

Variable	β	95% Conf. Interval		p-value
DOF				
Day 1	Ref.			
Day 2	-0.17	-1.5	1.21	0.801
Day 3	-0.27	-2.76	2.2	0.828
Day 4	-0.21	-2.7	2.3	0.867
DOB	0.195	-0.321	0.71	0.449
Abdominal Distension	-0.33	-1.44	0 .78	0.549
Vomiting	-0.14	-1.23	0.951	0.796
SSI	-0.404	-1.9	1.096	0.589
Anastomotic Leakage	-1.59	-3.51	0.322	0.100
Level of Surgeon	0.163	-2.99	3.3	0.917
EOF Ref.				
LOF	2.37	0.94	3.8	0.002

CI= Confidential Interval, DOF= Day of passing Flatus, DOB= Day of opening Bowels, LOF= Late Oral Feeds, LOS= Length of Hospital Stay, Ref.= Reference, SSI= Surgical Site Infection

4.6 Clinical Logistic Regression of Tolerability as outcome for DOF/DOB

Concerning tolerability, patients who tolerated oral feeds opened their bowels earlier with the mean of 3.025 days SD±0.973 and those that did not tolerate oral feeds had a mean of 3.625 days with SD±1.597. For those who tolerated well, there was an increase

of DOB with the odds ratio 1.57 of vomiting. For patients who passed of flatus on day 2 the odds ratio of vomiting was 3.125 higher compared to those who passed on day 1. For those who passed flatus on day 4, odds ratio of vomiting were 10 times higher than those who passed on day 1 but not significant as shown in Table 4.6

Table 4.6: Clinical Logistic Regression of Tolerability as an outcome for DOF/DOB

Variable	Odds Ratio	95% C.I	p-value
DOB	1.57	0.818-3.03	0.174
DOF			
Day 1	Ref.		
Day 2	3.125	0.53 - 18.3	0.206
Day 3	1	-------	-------
Day 4	10	0.44 - 228.7	0.149

C.I= Confidential interval, DOF= Day of passing flatus, DOB= Day of opening bowels, SD= Standard deviation, Ref. = Reference

Tolerability as an outcome for DOB using t-test

	Obs.	Mean	SD	95 % C.I	
No	40	3.025	0.974	2.713	3.33
Yes	8	3.625	1.597	2.289	4.96
Diff.	-0.6			-1.45	0.251

SD= Standard Deviation, C.I= Confidential interval, DOB= Day of opening bowels, Obs.= Participants, Diff.= Difference

4.7 Clinical logistic regression of tolerability as an outcome for EOF/LOF

Of the 48 participants, most of them under early oral feeds tolerated well 22 (91.67%), and only 2 (8.33%) did not about 18 (75%) tolerated under late oral feeds while 6 (25%) patients were unable to. The overall tolerability for both early and late oral feeds was 40 (83.33%) while 8 (16.6%) patients did not tolerate oral feeds as shown in Table 4.7.

Table 4.7: Clinical logistic Regression of Tolerability as an outcome for EOF/LOF

Variable	Category	Proportions (%)
EOF	No	22 (91.67%)
	Yes	2 (8.33%)
LOF	No	18 (75%)
	Yes	6 (25%)
Overall	No	40 (83.33%)
	Yes	8 (16.67%)

Using Pearson Chi², EOF= Early oral feeds, LOF= Late oral feeds

4.8 Clinical logistic regression for anastomotic leakage as an outcome for EOF/LOF

In this study out 48 participants, there was no anastomotic leakage under early oral feeds, but there were 2 (8.33%) cases under late oral feeds and the overall proportion was 2 (4.17%) as shown in Table 4.7

Table 4.8: Clinical Logistic Regression for Anastomotic Leakage as outcome for EOF/LOF

Variable	Category	Proportions (%)
EOF	Yes	0 (0%)
	No	24 (100%)
LOF	Yes	2 (8.33%)
	No	22 (91.67%)
Overall	Yes	2 (4.17%)
	No	46 (95.83%)

EOF= Early oral feeds, LOF= Late oral feeds

Table 4.9 Adjusted multivariate multiple regression for LOS/ Tolerability

LOS	Coefficient (β)	95% C.I	p-value
Age	0.042	0.008-0.077	0.017
DOF	1.55	0.59-2.5	0.002
Leak	-6.16	-10.37—1.95	0.007
EOF/LOF	2.37	0.94-3.8	0.002
Tolerability	Odds ratio	95% C.I	p-value
DOF			
Day 1	Ref.		
Day 2	3.125	0.53-18.3	0.206
Day 3	1	----------	-------
Day 4	10	0.44-228.7	0.149

C.I=Confidential interval, DOF=Day of flatus, EOF=Early oral feeding, LOF=Late oral feeding, LOS=Length of stay, Ref. =Reference

CHAPTER FIVE: DISCUSSION

Traditionally keeping patients nil by per-oral 4-5 days till the passing of flatus post sigmoidectomy and primary anastomosis has been the approach for fear of anastomotic leakage, however, studies have shown that early oral feeding reduces postoperative morbidities and its tolerated by many patients.

Therefore, this study was carried out to evaluate the primary clinical outcomes such as length of hospital stay, anastomotic leakage and tolerability between early and late oral feeding post-one-staged sigmoidectomy and primary anastomosis for uncomplicated sigmoid volvulus.

In this study, there were 48 participants of which 24 patients were allocated for EOF and other 24 under LOF respectively with the mean age group of 44.9±14.4, the majority of participants were male except one female in terms of sex. It has shown that sigmoid volvulus affects more male than female because of the wider pelvis, which allows easy untwisting of the loop and also female have the lax abdomen (String ST et al., 1971). All participants were black Africans. The post-operative length of hospital stays for early feeding, and late feeding groups were 5.833 days and 8.583 days, respectively, with the overall mean of 7.2±1.78 days. In this study the patients who started late oral feeding stayed 2.75 days longer as compared to those who were on early oral feeding with the p-value of 0.002 which was significant. Studies have shown that resolution ileus is shorter in patients whose oral feeds are introduced early. Findings of this study were similar to studies done by Tong et al. and Tito et al.,(2006), but contrary to Petachia R et al. (1995) reported that early feeding did not show a significantly shorter length of hospitalization. The discharge criterion in both early and late oral feeding groups was the same until the patient tolerated a normal diet.

Of the 48 participants, most of the patients under early oral feeding tolerated well 22 (91.67%) and 18 (75%) under late oral feeding with the overall tolerability for groups was 40 (83.33%). For patients who did not tolerate oral feeding, reinsertion of NGT was done. The findings of this study about tolerability were consistent with the studies done by Mahla et al. (2016), Ortiz et al. (1996) as well as Nematihonar et al. (2018). It was noted in this study that, patients who tolerated oral feeds resolution of ileus, the opening of bowels and length of hospital stay were shorter.

In this study, the overall incidence of anastomotic leakage was 2 (4.17%), there was no case of leakage in the early oral feeding group, but two patients had in the late oral feeding group. The anastomotic leakage occurred on days 4 and 5 post-operative respectively, and both patients were operated on and ended up with Hartmann's procedure. The findings of this study were similar to studies done by Jan et al. (2014), and from, - a systematic review by Lewis et al. (2001) as well as Nematihonar et al. (2018). Concerning the length of hospital stay, this study noted that patients who did not have anastomotic leakage their stay was reduced by 3.4 days. This adds to the mounting evidence that most of the studies have shown that early oral feeding reduces the incidence of anastomotic leakage for the fact that there is early nutritional support at the site thereby improving anastomosis healing and that early introduction of oral has no adverse outcomes Osland et al., (2015), Gianotti et al., (2011) as well as Anderson et al., (2011).

Resolution of postoperative ileus in this study most patients passed flatus on day one 22 (45.83%) and day two 21 (43.75%) respectively, furthermore, it was noted that patients in the early group passed flatus earlier as compared to the one in the late group. Results are in line with the meta-analysis review done by Lewis et al. (2001), Nakeeb et al.

(2009), Ng and Neill et al. (2006). This supports other studies that have shown that early introduction of oral feeds shortens the resolution of postoperative ileus Osland et al., (2015).

The majority of patients 22 (45.83%) in this study opened bowels on day three postoperative. With regard to tolerability, it was noted that patients who tolerated oral feeds opened their bowels earlier with the mean of 3.025 days with SD±0.973 as compared to those that did not tolerate oral feeds 3.625 days with SD±1.597. Findings show that tolerability early introduction of oral feeds shortens postoperative days of opening bowels.

In this study, of the 48 participants, 39 (81.25%) had no abdominal distension. Concerning the length of hospital stay, it was noted that patients who did not have abdominal distension stayed 1.8 days less and was significant.

In this study 4 (8.33%) patients developed surgical site infection, all of which were from the late oral feeding group with no reported case in the early group. The findings of this study are similar to that of Jan et al. (2014), and Charoenkwan et al. (2007) which showed that the likelihood of developing surgical site infection is reduced under early oral feeding post-operative. It was observed in our study that patients who had no surgical site infection stayed 2.5 days less in the hospital as compared to those that did have.

CHAPTER SIX: CONCLUSION AND RECOMMENDATIONS

6.1: Conclusion

From this study, results showed that early oral feeding post one stage sigmoidectomy and primary anastomosis for uncomplicated sigmoid volvulus is feasible tolerated by majority patients (91.7%), reduced the length of hospital stay, postoperative complications and it was beneficial to patients. In this study, there was no adverse outcome concerning anastomotic dehiscence and that it is not associated with the occurrence of anastomotic leakage, moreover related to quicker resolution of postoperative ileus.

Therefore, this study has demonstrated that there is no benefit in keeping patients nil by mouth post sigmoidectomy and primary anastomosis, as most studies have shown that it is associated with a lot of morbidities post-operatively.

6.2: Recommendations

Traditionally nil by mouth 4-5 days post one staged sigmoidectomy, and primary anastomosis has been the mode of management by most of the units at University Teaching Hospital, however, there is no local-based evidence research to confirm its efficacy.

This study, recommend that early oral feeding post one staged sigmoidectomy and primary anastomosis for uncomplicated sigmoid volvulus can be adopted as the routine management for such patients.

To researchers, furthermore, studies to be conducted on other parts of gastrointestinal anastomosis other than sigmoid colon.

Limitations of the study

A limitation of this study was that patients were operated on by different surgeons; however, the minimal level of qualification was at least a second-year registrar to have consistent results.

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APPENDICES

3.7 APPENDIX I

Participant information sheet.

Code No _____

Consent to participate in a comparative study between early oral feeding and traditional (conventional) method post resection of the sigmoid colon and primary anastomosis at University Teaching Adult Hospital, Lusaka, Zambia.

Introduction:

I am Dr Frank Changwe, a postgraduate student at the University of Zambia, School of Medicine, in the Department of Surgery.

The purpose of the study:

To compare the outcomes between early oral feeding and delayed nil by mouth 4-5 days post-resection of the sigmoid colon and primary anastomosis at the University Teaching Adult Hospital, Lusaka, Zambia. This study will be beneficial in that; it will help patients to recover faster, early mobilization, reduce the length of hospital stay, the cost for the patients and the government.

What participation involves?

Once you consent to participate in this study, and the operation has been done, you will need to answer a questionnaire when stable and fit enough to do so. Then 24-48 hours postoperative, gradual introduction of oral sips clear fluids 30mls/hour day one post-operative, day two free fluid, light diet then normal ordinary diet for those who will fall in the early oral feeding group. For the delayed group, oral feeding will be introduced 4-5 days postoperative.

Confidentiality:

All data collected on questionnaires will be entered into a personal computer with a code number. The questionnaire will be handled with great privacy to maintain confidentiality throughout the study.

Risks:

There was minimal risk to the participants. This is a clinical study, and there is no added risk apart from any risk that a patient undergoing resection of sigmoid colon and anastomosis can have like anastomotic leakage and surgical site infection. Current literature and practice show that early oral feeding is safe and has better outcomes Osland et al., 2015, Gianotti et al., 2011 and Anderson HK et al., 2011. Patients will be explained to when consenting, that anastomotic leakage or surgical site infection does not depend on whether someone starts early or late oral feeding but rather on the blood supply at the anastomotic site. They may be psychological trauma due to some sensitive questions asked during the patient interview. In this study there was a gradual introduction of oral feeding starting with oral sips clear fluids and then ordinary diet. In case the patient fails to tolerate oral sips, re-insertion of the nasogastric tube was done, or in case of any emergency, necessary measures were undertaken as per standard practice by the attending medical personnel.

Right to withdraw:

Participating in this study is entirely voluntary. If you choose not to participate in the study, you will continue to receive all the services that you would normally get from the hospital.

Benefits:

There was no direct benefit for the participants. The participants did not receive any special treatment and did not receive any financial benefits to be recruited in the study as all procedures, investigations and follow up was per standard routine management.

Who to contact?

A committee that works to protect your rights and welfare reviews all research. If you have questions or concerns about your rights as a research participant or comments regarding the conduct of this research, you may contact:

Dr. Frank Changwe Registrar General Surgeon Principle Investigator Department of Surgery, University Teaching Adult Hospital, Lusaka, Zambia. +260966672707 frankchang2004@yahoo.co.uk	The Chairperson ERES CONVERGE IRB 33 Joseph Mwilwa Road Rhodes Park LUSAKA Tel: +260955155633 +260955155634 Cell: +260966765503 Email: eresconverge@yahoo.co.uk

3.8 APPENDIX II

Consent Form

I_____ _have read the content of this form. All my questions have been answered; I have been told I can ask at any time during the study and that I am free to opt-out of the study at any stage. I am aware that my rights and privacy will be maintained throughout the study period and beyond.

I therefore, agree to participate in this study.

Signature of the participant or thumb print_____

Signature of witness_____

Signature of researcher_____

Date of consent_____

Participant agrees/ participant does NOT agree.

3.9 APPENDIX III

Questionnaire

Code Number:_____

1. SOCIODERMOGRAPHICS

1.1. Sex: ◯ Male ◯ Female

1.2. Age:_____

1.3. Race: ◯ Negroid ◯ Caucasian ◯ Mongoloid ◯ Other

1.4. Marital status: ◯ Single ◯ Married ◯ Divorced ◯ Widowed

1.5. Residence ◯ Urban ◯ Rural

1.6. Occupation: ◯ Employed ◯ Self-employed ◯ Other

1.7. Education level: ◯ None ◯ Primary ◯ Secondary ◯ Tertiary

1.8. Post-operative monitoring

1.8.1 Passing flatus day_____post-operative

1.8.2. Opening bowels day _____post-operative

1.8.3. Abdominal distension ◯ yes ◯ No

1.8.4. Vomiting > 100mls on two episodes after 24 hours post-operative ◯ Yes ◯ No

1.8.5. Surgical site infection ◯ Yes ◯ No

1.8.6. Anastomotic leakage ◯ Yes ◯ No

1.9 Suture materials for anastomosis

◯ Vicryl 2.0 ◯ Silk 2.0

2.0 Level of the surgeon

◯ Registrar ◯ Senior Registrar ◯ Consultant

2.1 Skin prepping solutions

◯ Savlon ◯ Iodine ◯ Methylated Spirit

2.2 Intravenous antibiotics

◯ Ceftriaxone ◯ Metronidazole

2.3 Postoperative Analgesia intramuscular

◯ Pethidine ◯ Diclofenac

2.4 Length of Hospital stay _____days