

**SIGMOID COLON VOLVULUS MANAGEMENT  
AN ANALYSIS OF FACTORS CONTRIBUTING TO MORBIDITY AND  
MORTALITY IN SINGLE AND DOUBLE STAGE OPERATIONS**

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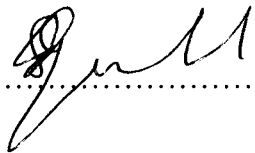
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## COPY DECLARATION

This Dissertation represents my work, and that it has not previously been submitted for a degree at the University of Zambia or any other University.

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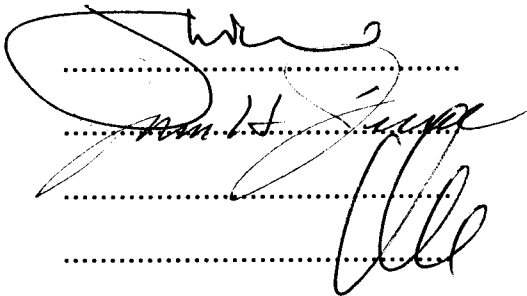
## APPROVAL

This dissertation of **Dr. Gardner S. Syakantu** is approved as fulfilling part of the requirements for the award of the degree of Master of Medicine in Surgery by the University of Zambia.

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## ABSTRACT

A prospective study has been carried out at the University Teaching Hospital (UTH), Lusaka, over a period of one and a half years (July 1995 to December 1996) to study the factors contributing to morbidity and mortality in the treatment of sigmoid colon volvulus and also compare the outcome of single stage versus double stage operations. Fifty four consecutive patients presenting to the UTH with sigmoid volvulus were entered into the study. Fifty two were treated as emergency cases with acute intestinal obstruction due to sigmoid volvulus and three were elective cases. The details of each patient was collected and entered in a proforma designed for the study. The information collected included the name, age and sex of the patient, file number, date of admission, admitting surgical firm, name of the firm consultant, and the mode of surgery, whether emergency or elective. The pre-operative details including symptoms, duration of illness, history of previous operation, vital signs (Blood pressure, pulse, temperature) level of hydration, urine output and whether or not there was any concomitant disease. Radiographs of the abdomen in the supine and erect position, measure of urea, sodium, potassium, chloride and full blood count were done when the facility was available. The operative data included, the surgeon's and the anaesthetist's name and seniority, bowel appearance, type of operation done and whether or not blood was given intraoperatively. Post operative course of the patient was recorded until the time of discharge from the ward.

Follow-up was up to the time of discharge from the Surgical out-patient clinic. Twenty seven patients underwent double staged operations. These were subdivided into resection, anastomosis and transverse colostomy (n=10); resection and double barrel colostomy (n=13); and Hartmann's operation (n=4). There were five mortalities in these 27 patients, with 11 patients developing complications, mostly colostomy related such as prolapse (n=6), bleeding colostomy (n=1), Burst abdomen following colostomy break down (n=1), wound infection (n=4) and anastomotic leak after colostomy closure (n=3). Twenty five patients underwent primary resection with immediate anastomosis. One died post-operatively after an anastomotic leak and five developed complication of wound infection (n=2), intestinal obstruction due to hernia (n=1), prolonged ileus (n=1) and chest infection (n=1). One patient had a deflation of the volvulus by tube and absconded on the third day while another had an operative reduction and was subsequently lost to follow up. The morbidity and mortality rate seen in single stage operation was 20 percent and 4 percent respectively, while in double staged operations it was 40.7 percent and 18.5 percent respectively. Presence of bowel gangrene was associated with a 45.4 percent mortality.

**ACKNOWLEDGEMENTS**

I wish to thank the following, Prof. Krikor Erzingatsian for his valuable contribution and guidance, Ms Moonga Simuyandi for her tireless effort and valuable assistance in typing and printing this work, all the Doctors who greatly assisted in the recording and collection of data. And lastly but not least to my wife Daisy and son Chikopa who endured those long hours supporting me while I put this work into what it is. I dedicate this Dissertation to them.

TABLE OF CONTENTS

	<u>Page</u>
Introduction.....	1
Objective.....	4
Rationale of Study.....	5
Literature Review.....	6
Methods.....	10
Results.....	14
Discussion.....	31
Conclusion.....	37
References.....	38
Appendix.....	44



## LIST OF DEFINITIONS AND ABBREVIATIONS

- |                             |   |   |
|-----------------------------|---|---|
| <b>Colostomy</b>            | - | The surgical creation of an opening (stoma) between the colon and the surface of the body.  |
| <b>Hartmann's Operation</b> | - | Resection of a diseased portion of the colon with the proximal and of the colon brought out as a colostomy and the distal stump or rectum being closed by suture. Bowel continuity can later be restored. Called also Hartmann's Colostomy. |
| <b>One stage Operation</b>  | - | Resection of the diseased (affected) portion of the colon with immediate restoration (anastomosis) of bowel continuity.   |

- Double stage Operation** - Colectomy in stages, including resection of the diseased (affected) portion of the colon and;
- a. immediate restoration of continuity by anastomosis with creation of a proximal defunctioning colostomy (RTC).
  - b. Exteriorisation of the proximal and distal ends as a double barrel colostomy (RDBC).
- Operative Reduction** - That in which a laparotomy is performed and volvulus untwisted at operation without resection of the affected portion of the bowel.
- General Surgical Units** - That which deals with surgical problems of all kinds rather than those in restricted area, or in a surgical speciality. There are five general surgical units in the Department of Surgery.
- "On call"** - Being on stand by and/or attending to emergencies.
- n** - Number of patients.

## **INTRODUCTION**

Sigmoid Volvulus is a common cause of acute intestinal obstruction in adults in Zambia. The treatment of patients with acute intestinal obstruction due to sigmoid volvulus remain diverse. Sigmoid volvulus is as a result of axial rotation of the sigmoid colon on its mesocolon leading to a closed-loop type of obstruction. The aetiology of this condition is not well known but several conditions have been advanced as possible predisposing factors. These are, a long sigmoid mesocolon with a narrow attachment, loaded sigmoid loop, high fibre diet, chronic constipation (Northeast et al 1984) and congenital malformations. Many patients with redundant sigmoid volvulus usually have long standing symptoms of recurrent abdominal pain, constipation and excessive passage of flatus.

The aim of treatment in sigmoid volvulus is to prevent recurrence by resection. Elective operation remains the safest and best approach for patients diagnosed of this condition and not in acute obstruction. However, the majority of patients with this condition present in acute colonic obstruction. It is in this situation that the diversity in treatment exists. Several methods have been described by various authors, and the morbidity and mortality rates associated with the various operations expounded upon. The aims of treatment of sigmoid colon volvulus presenting as acute intestinal obstruction is two-fold; first, to relieve the obstruction and second to prevent recurrence.

The surgical approach in acute sigmoid colon volvulus obstruction can be divided into non-operative and operative with further sub-division into single stage sigmoidectomy and multiple stage sigmoid colectomy.

The non-operative method involves the deflation of the volvulus by a tube introduced through a sigmoidoscope. It relieves the obstruction. However in the presence of gangrenous bowel (dark blood-stained faecal discharge at sigmoidoscopy) it is not feasible. The failure rate with this operation is also high as reported by some authors. The patient has to undergo subsequent operation to resect the redundant sigmoid colon. Barium enema may both be diagnostic as well as therapeutic and has been used in some centres to reduce sigmoid colon volvulus. The operative approach is divided into one stage in which resection and anastomosis is done at one operation, and multi (double) stage in which a resection with or without anastomosis and creation of colostomy is performed at the initial operation. A second operation is done to close the colostomy or reverse a Hartmann's operation.

Mainly, three methods have been used in the double staged technique, namely; primary resection, anastomosis and creation of proximal defunctioning transverse colostomy; resection with exteriorisation of the bowel ends as double barrel colostomy; and Hartmann's operation.

Other methods have been described in the treatment of sigmoid colon volvulus such as Sigmoidopexy, Mesosigmoidoplasty, Plication and Retroperitonealisation, and operative reduction (derotation), the merit of the latter can only be justified in the hands of inexperienced operators.

The single stage technique in left colonic obstruction from whatever cause has "traditionally" been avoided due to morbidity and mortality rates associated with it,

particularly before the advent of antibiotics and improvements in anaesthesia and intensive care units. The major concern was that faecal loading and peritoneal sepsis impaired healing at the anastomotic site in left colo-colic anastomoses resulting in anastomotic leaks and peritonitis. However since the 80s, many publication have come up advocating a single stage technique in left colonic disease, with comparable results to the traditional double stage approach. On-table lavage as described by Dudley (1980) has been used with good results in emergency resection and anastomosis of the left colon.

The advocates of the "traditional" approach of resection with creation of colostomy argue that it affords surgeons the opportunity to deal with the cause of acute obstruction at the initial operation, and later permits preparation of the bowel pre-operatively at the second operation of colostomy closure. The real draw back of this approach lies in the complications of colostomy which are a handicap to patients.

Colostomy complication rates have been reported to be as high as 30%. Prolapse, stenosis, peristomal excoriation, parastomal hernias, retraction and not to mention lack of colostomy appliances (bags) and the negative psychological effect on patients, create a severe burden on these patients. The closure of colostomy or reversal of Hartmann's operation carries a considerable risk of morbidity (leaks) and mortality.

It was with this in mind that the investigator embarked on this study to determine the trends and results of treatment of sigmoid volvulus at the University Teaching Hospital, Lusaka.

**OBJECTIVE**

To study the management of Sigmoid Volvulus and Analyse Factors Contributing to Morbidity and Mortality in single and double stage sigmoid colectomy.

## **RATIONALE OF STUDY**

The treatment of acute intestinal obstruction due to sigmoid volvulus may be non-operative or operative. In the non-operative approach, only deflation by a tube or a sigmoidoscope alone is done. The operative approach may be primary resection with immediate anastomosis (single stage operation) or resection with creation of a colostomy (double staged method). The single stage operation is desirable because it obviates the need for a second operation, but is said to have the potential for a leak at the anastomosis. In the double staged method, resection with formation of colostomy, is mistakenly believed to eliminate the risk of an anastomotic leak. Comparative studies on the results of the two approaches to management have been done elsewhere, however, the author is not aware of a prospective comparative study carried out in Zambia on the subject.

A study of this nature will permit the author to determine as to which of these techniques is more appropriate in our environment for managing volvulus of the sigmoid colon.

## LITERATURE REVIEW

Sigmoid volvulus is a common cause of intestinal obstruction in many parts of Africa (Gilbney, 1992). In one study done in Kenya, sigmoid volvulus has been ranked second to adhesions amongst the common causes of obstruction (Ojara, 1982). Gwakaya (1991) found sigmoid volvulus to be the most common cause of intestinal obstruction in Uganda. Other series done in Africa have reported similar findings (Gaya, 1990 and Udezue 1990).

In South America, Ausbun et al (1992) noted sigmoid volvulus to be a common cause of intestinal obstruction among the rural population of Bolivia and Peru. It accounted for up to 30 percent of all cases of intestinal obstruction occurring in India (Subrahmanyam 1992), whereas colonic volvulus accounts for only one to two percent of intestinal obstruction seen in Western populations (Wertkin et al 1978).

The male preponderance of the disease is almost a Universal finding with several studies done in different parts of the world reporting similar findings (Ojara 1982, Faranisi 1989, King 1992, Subrahmanyam 1992, Yerzingatsian 1996 and Ausbun et al 1992).

Sigmoid volvulus is common in adults and rare in children. The peak incidence has been reported to be in the fifth decade of life (Ojara 1982, Faranisi 1989 and Gwakaya 1991). It has been observed, however, in infancy and early childhood (Ojara 1982 and Smith 1990).



The therapeutic approach to sigmoid volvulus is diverse. Non-operative methods have been used such as deflation by tube passed per rectum, however, the failure rate with this operation is over 30 percent (Ojara 1982, Schlabach 1980, Gaya 1990 and Yerzingatsian 1996). In addition, patient default on definitive surgery (Sigmoid resection) following relief of their symptoms after successful deflation by tube as observed in various studies by Ojara (1982) and Yerzingatsian (1996). Faranisi (1989) recording a 25 percent non-compliance to interval resection. Barium enema has been used in some centres for diagnostic and therapeutic purposes (Smith et al 1990) but it is time consuming and may lead to bowel perforation. Other methods described are colonoscopy, with good success rate of 90 percent (Ojara 1982) and operative deflation alone which has been associated with appreciable morbidity and mortality of over 26% (Ojara 1982 and Smith et al 1990).

The major draw back of these non definitive steps (without resection of sigmoid colon) is the high recurrence of volvulus associated with them (Schlaback 1980, Smith 1990 and Yerzingatsian 1996). Ojara in his study reported a 11.9 percent recurrence rate while awaiting sigmoid resection.

Emergency surgery for sigmoid volvulus was associated with high mortality rates of between 38 percent and 50 percent more than 30 years ago (Ojara 1982) but this was in an era when improvements in antibiotics, intensive care and anaesthesia were still lacking. Double staged operation in which resection is done as an emergency operation with creation of colostomy are favoured by many who consider primary anastomosis a risk in the presence of faecal loading of bowel and peritoneal sepsis (Alaovi et al 1990,

Kunin et al 1992). The creation of a proximal defunctioning Colostomy after primary resection and immediate anastomosis in left colonic obstruction though advocated by some authors (Maddern et al 1995) has been found to be of doubtful value in protecting against anastomotic leaks at the site of anastomosis (Irvin et al 1973).

In the presence of bowel gangrene or gross peritoneal sepsis, Hartmann's operation has been advocated by several authors (Bagarani et al 1992, Totte et al 1993, Darby et al 1992 and Gaya 1990). Colostomy, however, have been associated with several complications constituting a handicap both mentally (stress) and physically on the patient. The multiple admissions and operations with risk of morbidity and mortality from colostomy closure, prolonged stay in hospital, increased medical care costs puts colostomised patients at a disadvantage (Faranisi 1989, Tan and Nambiar 1995). The complications of colostomy per se remain frequent (30 percent) with one third of patients requiring another operation to treat the colostomy complication (Digest, Br. J. Surg 1996). Reversal of Hartmann's operation is associated with significant morbidity and mortality of 5-25% (Maddern et al 1995).

Johanet et al (1991) has described staged operations as often being associated with increased mortality, morbidity and loss of autonomy in elderly patients or in those with multiple disease. Because of this primary resection and immediate anastomosis in emergency cases has gained wider acceptance over the past 15 years for it affords the surgeon one stage definitive treatment. Gaya (1990), Johanet et al (1991), Bagarain et al (1993) and Yerzingatsian (1996) advocate for one stage resection and anastomosis in patients with viable bowel.

Elective surgery for symptomatic redundant sigmoid colon gives the best results (Gwakaya 1991 and Smith et al 1990). Presence of gangrenous bowel, worse still, with free perforation and peritoneal contamination with faecal content, has been shown to carry a very high mortality rate no matter which technique is undertaken (Salah and Suleiman , 1980).

## METHODS

A prospective study was carried out at the University Teaching Hospital (UTH) from July 1995 to December 1996 (one and a half years). The UTH as it is commonly referred to, is the tertiary care hospital in Zambia.

Data was collected by a proforma designed for the study. All patients entered in the study were followed up from the time of admission until final discharge from the surgical out-patient clinic. In the case of mortalities after operation, the cause of death was based on clinical grounds as autopsies could not be performed due to various reasons among them being refusal by next of kin to consent for autopsy.

There are five firms in general surgery named as follows; Blue, Green, Yellow, White and Red. Each firm is headed by a consultant, and then the rest of the surgical staff from Senior Registrar down to the house officers. Each firm has a fixed "on call" weekday in the emergency admission ward with weekends done on rotational basis.

All the patients who presented with signs and symptoms of sigmoid volvulus during the period of study, were recruited into the study. The doctors in the surgical department were informed about the study and greatly assisted in the collection of data at different stages of the patients' hospital stay.

All patients with ileo-sigmoid knot were included in the study because of the Sigmoid Colon component in the condition. The surgical management and outcome would be influenced more by the Sigmoid Colon component in this condition rather than the ileal one where primary anastomosis is the rule rather than the exception. Thus the reason for including sigmoid knot in the study.

The choice of operation was influenced by the clinical condition of the patient which was recorded on the proforma based on specific parameters as shown in the appendix. The operating surgeon made his decision based on his experience in the absence of unit policy.

Four methods of operation for sigmoid volvulus were mainly used, namely:-

- (a) Primary resection with immediate anastomosis (RA).
- (b) Primary resection and immediate anastomosis with a defunctioning colostomy in the transverse colon (RTC).
- (c) Primary resection and exteriorisation of bowel ends as double barrel colostomy (RDBC)
- d) Hartmann's operation. (Hart.)

Other techniques used were, operative reduction (OR) in one patient where an emergency laparotomy and untwisting of the volvulus was done by an inexperienced operator; and deflation of the volvulus by tube at sigmoidoscopy (Tube).

All colo-colic anastomoses and ileo-ileal anastomoses in the case of ilieosigmoid Knot, were hand sutured. Various types of sutures were used, depending on the surgeons preference. This also applied to the method of decompression of the distended bowel in which various methods Viz, decompression by tube, by operative needle puncture, and via enterostomy were employed.

All the emergency operations were done without prior bowel preparation or on table colonic lavage (as described by Dudley 1980). The elective cases had preoperative bowel preparation.

The collection of data was by proforma, as earlier mentioned. All patients presenting with intestinal obstruction due to sigmoid volvulus had their name, age, sex, file number, operating firm and name of head of unit entered on the proforma on admission.

The pre-operative assessment included; duration of symptoms, Blood pressure, Pulse, body temperature, Hydration, type of nasogastric tube aspirate, urine out-put and the presence or absent of concomitant illness.

Plain abdominal X-rays, Haemoglobin level, urea and electrolytes were done when the facility was available in the radiology and laboratory departments. All the patients were adequately resuscitated as shown by Blood pressure before induction of anaesthesia. The operative findings such as type of sigmoid volvulus, viability of bowel and presence of peritonitis were noted. The name and seniority of the operating surgeon as well as the attending anaesthetist were entered on the proforma. So was the type of operation performed and the surgical technique used.

Post-operative care on the surgical wards was recorded on a daily basis including the complications which occurred in some cases. Although registrars are often the senior most surgeon present in the emergency theatres, the post-operative management in the wards was done with the supervision of consultants of the various firms.

## **RESULTS**

Fifty four patients were consecutively treated for Sigmoid colon Volvulus during the period of study. Fifty one presented with acute intestinal obstruction due to Sigmoid volvulus while three were treated as elective cases.

In the emergency group, 50 patients underwent emergency laparotomy and one had volvulus deflation by tube passed at sigmoidoscopy. In the remaining three patients who underwent elective operation, resection and anastomosis was performed in two patients after pre-operative bowel preparation and the third patient underwent a reversal of Hartmann's operation after the first operation at another hospital.



Table 1:                      **Sex distribution of 54 patients.**

SEX	FREQUENCY	PERCENTAGE
MALE	44	81.5%
FEMALE	10	18.5%
TOTAL	54	100%

Forty four were male and 10 were female with male to female ratio of 4.4:1. This finding is similar to what has been found in previous studies, (Ojara, 1982, Subrahamanyam , 1992 and Peoples et al 1990)

Table 2      **Age distribution of 54 patients (in 10-year age groups.)**

AGE (YEARS)	FREQUENCY	PERCENTAGE
20-29	11	20.4%
30-39	14	25.9%
40-49	15	27.8%
60-59	6	11.1%
60-69	3	5.6%
70-79	5	9.3%
TOTAL	54	100%

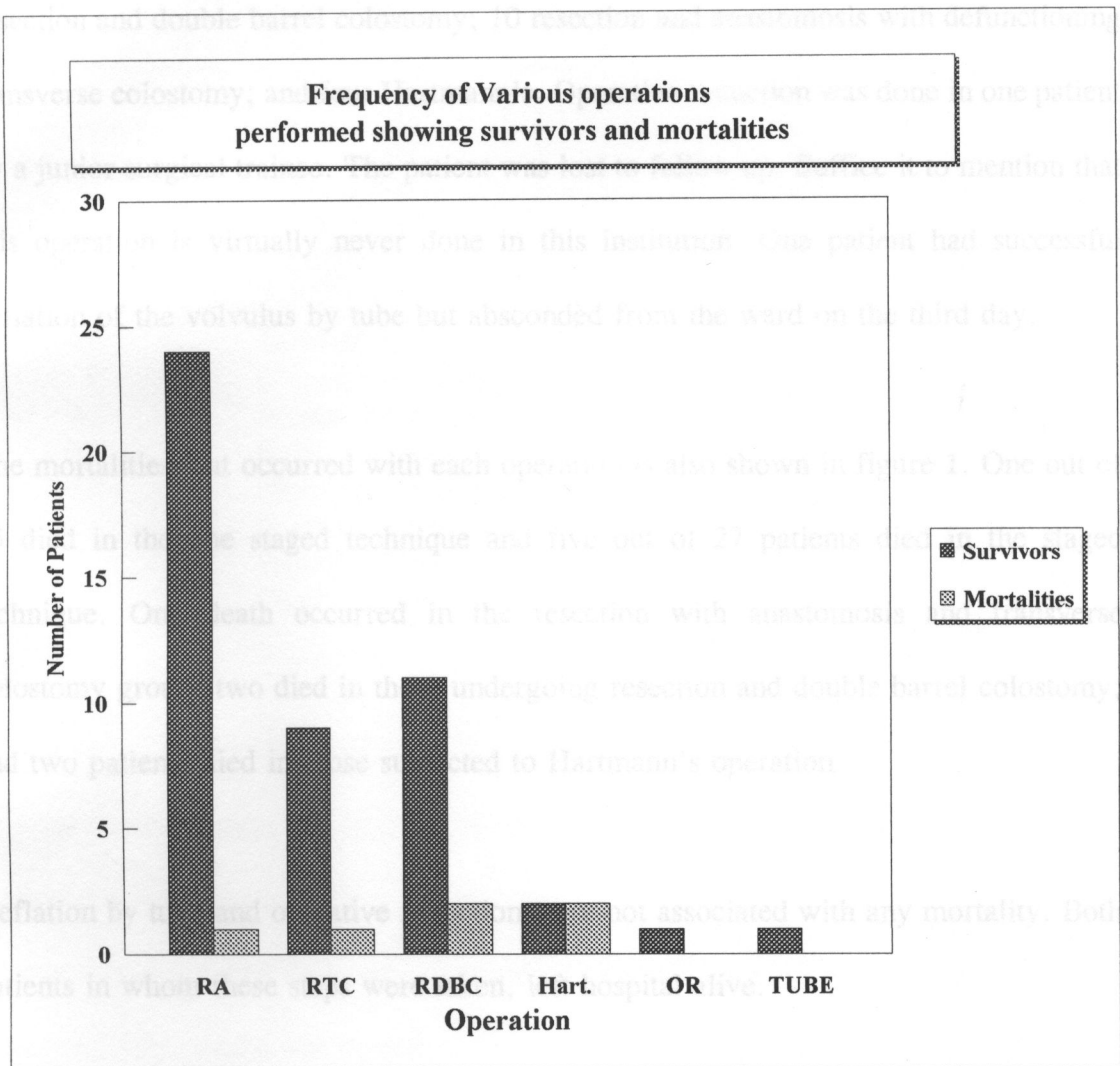
The median age was 42 years (range 21-76 years). The majority of patients were in the fourth and fifth decades of life. This is a reproduction of what has been observed in almost all the studies done in the region and Africa in general (Faranisi, 1989 and Gwakaya, 1991).

Table 3.      **The distribution of 54 patients among the surgical firms.**

FIRM	FREQUENCY	PERCENTAGE
Red	14	25.9%
Blue	13	24.1%
White	10	18.5%
Green	9	16.7%
Yellow	8	14.8%
Total	54	100%

Table 3 shows the distribution of the 54 patients among the various firm. Red firm had the highest number of patients ( $n = 14$ ) followed by Blue ( $n = 13$ ), White ( $n = 10$ ), Green ( $n = 9$ ) and Yellow firm saw the least number of patients ( $n = 8$ ). There is no special reason found for this pattern of distribution.

Figure 1



The frequency of various operations done is as shown in fig. 1 Primary resection and immediate anastomosis (single stage) was the most frequently performed operation, being done in 25 patients. Double stage operations were done in 27 patients of which 13 were resection and double barrel colostomy; 10 resection and anastomosis with defunctioning transverse colostomy; and four Hartmann's. Operative reduction was done in one patient by a junior surgical trainee. The patient was lost to follow up. Suffice it to mention that this operation is virtually never done in this institution. One patient had successful deflation of the volvulus by tube but absconded from the ward on the third day.

The mortalities that occurred with each operation is also shown in figure 1. One out of 25 died in the one staged technique and five out of 27 patients died in the staged technique. One death occurred in the resection with anastomosis and transverse colostomy group; two died in those undergoing resection and double barrel colostomy; and two patients died in those subjected to Hartmann's operation.

Deflation by tube and operative reduction were not associated with any mortality. Both patients in whom these steps were taken, left hospital alive.

**Table 4: Incidence of Complications encountered with each type of operation.**

<b>Operation</b>	<b>A.L</b>	<b>C.P</b>	<b>W.I</b>	<b>B.A</b>	<b>B.C</b>	<b>I.O</b>	<b>P.I</b>	<b>C.I</b>	<b>TOTAL</b>
<b>RA</b>	1	-	2	-	-	1	1	1	<b>6</b>
<b>RTC</b>	-	5	1	-	-	-	1	-	<b>7</b>
<b>RDBC</b>	2	1	1	-	1	-	-	-	<b>5</b>
<b>Hart.</b>	1	-	2	1	-	-	-	-	<b>4</b>
<b>TOTAL</b>	<b>4</b>	<b>6</b>	<b>6</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>2</b>	<b>1</b>	<b>22</b>

**KEY.**

<b>AL</b>	-	<b>Anastomotic leak</b>
<b>CP</b>	-	<b>Colostomy prolapse</b>
<b>WI</b>	-	<b>Wound Infection</b>
<b>BA</b>	-	<b>Burst Abdomen</b>
<b>BC</b>	-	<b>Bleeding per colostomy</b>
<b>IO</b>	-	<b>Intestinal obstruction</b>
<b>PI</b>	-	<b>Prolonged Ileus</b>
<b>CI</b>	-	<b>Chest Infection</b>

Table 4 shows the incidence of complications associated with the various operations. In the single stage group, six out of the 25 patients in whom the operation was done developed a complication. Two patients developed superficial wound infection which subsequently cleared by daily wound cleaning. One patient had crepitation in the chest, post-operatively, which was treated as chest infection and cleared uneventfully. Another had prolonged ileus, post operatively, which resolved. In one patient, a re-laparotomy was done for intestinal obstruction due to small bowel internal hernia two weeks after a single stage resection. There was one death in this group in a patient who had gangrenous bowel with peritonitis at operation and developed anastomotic leak following the operation.

In the double stage group, the majority of complications observed were colostomy related. In the 27 patients who underwent double stage operation, sixteen patients developed complications. Most complication were as a result of the presence of colostomy. There were six cases of prolapsed colostomy which necessitated closure and in one of these patients, the bowel became gangrenous necessitating an immediate resection. Four wound infections occurred with colostomies but healed uneventfully. Three patients had anastomotic leaks following closure of colostomy, with subsequent mortality in two of them due to septicaemia and the third patient had a re-laparotomy and Hartmann's colostomy made. These results show that closure of colostomy can carry significant morbidity and mortality. However, none of the patients undergoing transverse colostomy closure developed any complication.

One patient had a burst abdomen after a Hartmann's colostomy broke down due to bowel necrosis leading to faecal peritonitis and death despite a re-laparotomy and peritoneal toileting. Another patient was re-admitted, nearly three weeks after resection and double barrel colostomy, with severe bleeding per colostomy and rectum. He died of hypovolaemic shock. Prolonged ileus occurred in another patient with full recovery.

**Table 5. Duration of hospital stay for 54 patient undergoing various operations**

Operation	DURATION OF STAY (DAYS)					
	< =7	8-14	15-20	> =21	RANGE	MEDIAN
RA	20	3	2	-	4-19	7
RTC	1	5	4	-	7-20	13
RDBC	-	6	6	1	11-30	15
Hart.	-	3	1	-	12-19	12
OR	1	-	-	-	-	4
TUBE	1	-	-	-	-	3

In Table 5, one stage technique was associated with a shorter duration of hospitalisation than these staged ones. The average period of hospitalisation for the single stage technique was one week (ranged 4 -19 day). Two patients had prolonged hospital stay in this group due to factors not directly related to the type of operation they underwent. One was a psychiatric patient who had to stay a little longer than usual because of his mental condition. The other patient had a re-laparotomy for internal hernia of small bowel after the initial operation, hence prolonging his stay in hospital to 19 days.



Double stage operations were characterised by longer periods of hospital stay. The majority of patients were hospitalised for, between eight and fourteen day ( $n = 14$ ), with the rest going into the third week. The patient who was hospitalised for only one week, was the one who died following the initial resection and anastomosis with transverse colostomy. He died of suspected aspiration, seven days after operation. One patient stayed for 30 days due to operative complications. Initially he underwent a resection and double barrel colostomy. He returned for closure of colostomy after which he developed an anastomotic leak and a third step Hartmann's operation had to be done. He finally had a reversal of the Hartmann's without incident.

Table 6      Details of mortality in 6 patients who died after surgery

AGE	FIRM	VOLVULUS	DURATION OF SYMPTOMS	OPERATION	BOWEL VIABILITY	SURGEON	ANAE	COMPLICATION	CAUSE OF DEATH
49	Red	Ileo sigmoid knot	1 day	RDBC	Gangrene	R	CO	Peritonitis due to anastomotic leak.	Septicaemia
57	Red	Sigmoid loop	Elective	Reversal of Hartmann	Viable	R	CO	Pelvic abscess due to anastomotic leak.	Septicaemia
21	Red	Ileo-Sigmoid knot	1 day	RTC	Gangrene	R	CO	Abdominal distension uncooperative patient.	Aspiration
23	Blue	Sigmoid loop	2 days	RDBC	Gangrene	R	CO	Bleeding per colostomy.	Haemorrhagic shock
73	Blue	Sigmoid Loop	2 days	Hartmann	Gangrene	R	CO	Colostomy break down and faecal peritonitis.	Septicaemia
76	White	Sigmoid Loop	7 days	RA	Gangrene	R	CO	Anastomotic leak	Septicaemia.

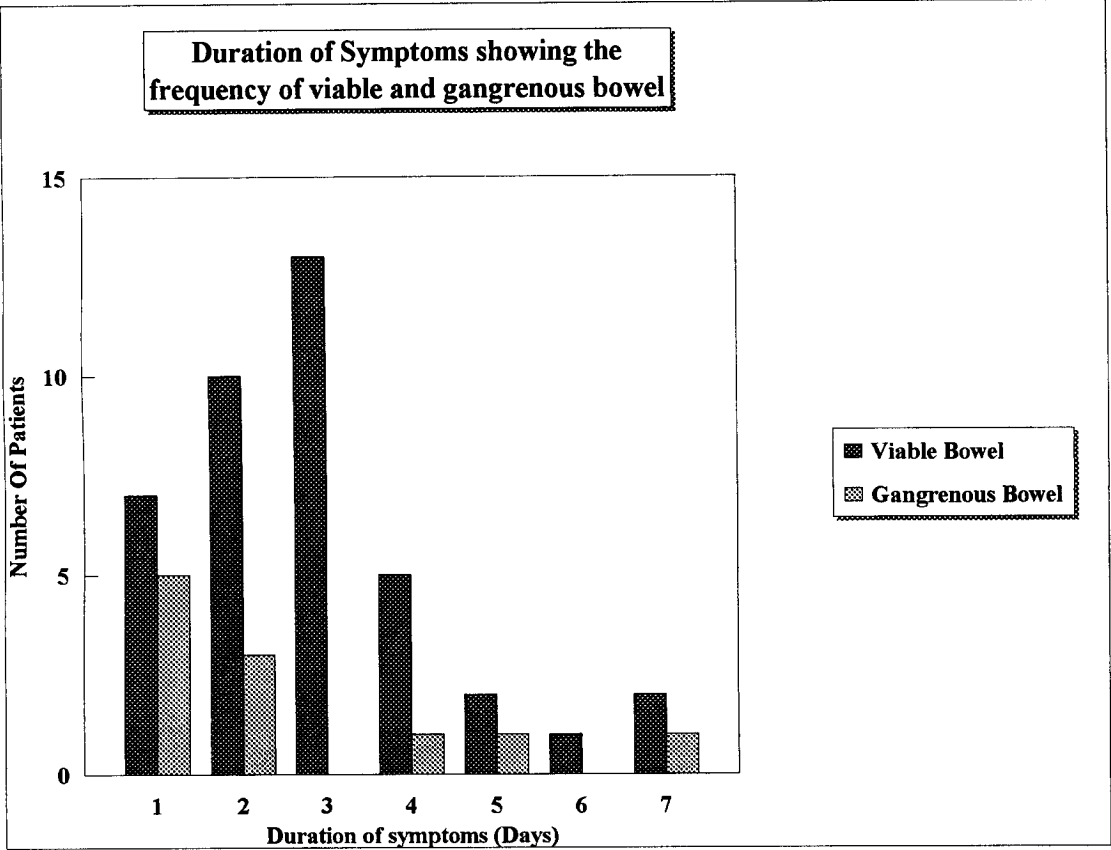
Key

R      Registrar  
CO     Clinical Officer Anaesthetist

Table 6 shows the details of patients who died after operation. Only one patient (1.8 %) out of 25 who underwent single stage operation died. The remaining five deaths (9.2 %), occurred in the double stage group at various stages of treatment. The common factor in the mortality, in all, except one patient who underwent reversal of Hartmann's, was the presence of gangrenous bowel with variable degrees of peritonitis. This emphasizes the significance of gangrenous bowel in the outcome (Ojara, 1982, Peoples, 1990, Sala and Suleiman 1980, and Yerzingatsian 1996.) In figure 2 the proportion of patients with gangrenous bowel versus those found to have viable bowel at operation is shown. Of the 11 patients presenting with gangrenous bowel five died (45.4%).

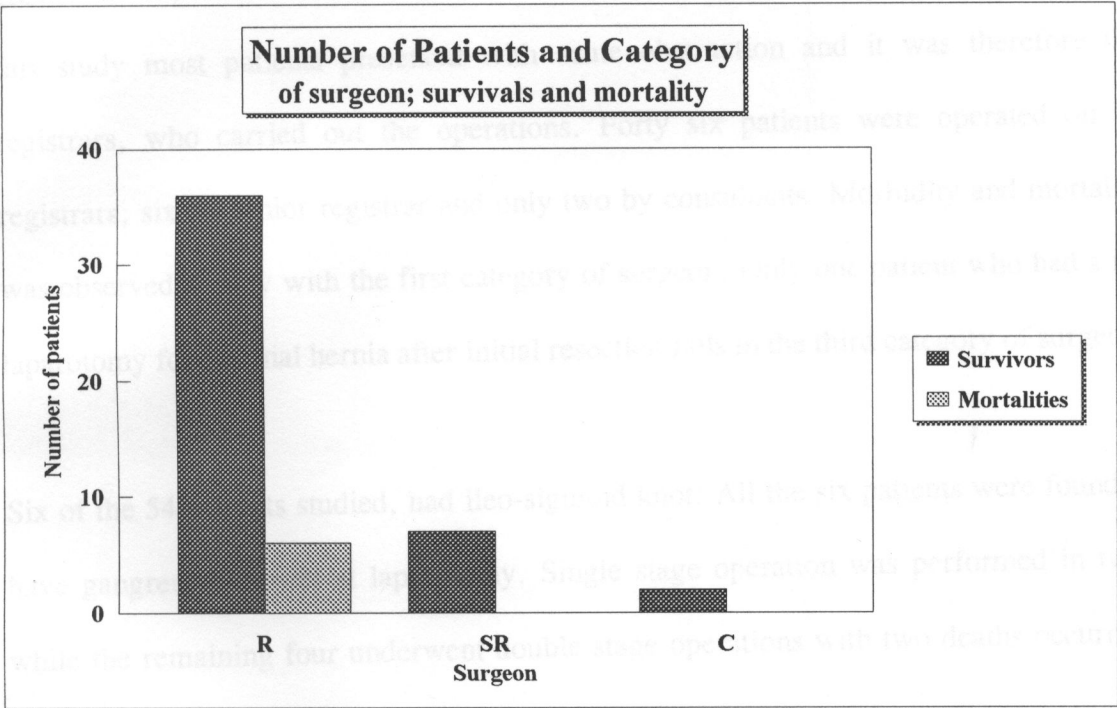
Septicaemia, was the main cause of death in four out of the six deaths, as a result of peritonitis. The duration of symptoms did not seem to influence the incidence of gangrene in this study. However, this could be due to hidden factors such as the inaccuracy of the history given by some patients in terms of duration of illness. Most patients with a poor general health had a longer duration of symptoms.

Figure 2



The incidence of viable and gangrenous bowel observed at operation in relation to duration of symptoms is shown in figure 2. In those who presented within 24 hours of the onset of symptoms, seven had viable bowel and five gangrenous. In those presenting within two days after the onset of symptoms, ten had viable bowel and three gangrenous. All patients presenting at three days of onset had viable bowel. In those presenting after four days, five had viable bowel and in one it was gangrenous. In those presenting after five days, two had viable bowel and one gangrenous. The only patient presenting after six days of onset of symptoms had a viable bowel. In three patients who presented after seven days of the onset of symptoms, two had viable bowel and one gangrenous.

Figure 3



**Key**  
R- Registrar  
SR- Senior Registrar  
C- Consultant

Figure 3 shows the distribution of patients operated on by each category of surgeon. Surgeon seniority has been shown to influence outcome. (Yerzingastian, 1996). The greater the experience of the surgeon the better is judgement and the surgical skills. In this study most patients presented with acute obstruction and it was therefore the registrars, who carried out the operations. Forty six patients were operated on by registrars, six by senior registrar and only two by consultants. Morbidity and mortality was observed mainly with the first category of surgeon. Only one patient who had a re-laparotomy for internal hernia after initial resection falls in the third category of surgeon.

Six of the 54 patients studied, had ileo-sigmoid knot. All the six patients were found to have gangrenous bowel at laparotomy. Single stage operation was performed in two, while the remaining four underwent double stage operations with two deaths occurring in the double stage group after operation.

Hartmann's operations was done in four patients, two with gangrenous bowel and the other two, with viable bowel.

**Table 4: Bowel viability and complications versus surgeon seniority.**

	Viable Bowel	Gangrenous Bowel	Complication
Registrar	32	12	19
Senior Registrar	6	0	2
Consultant	2	0	1

Complications encountered in the senior registrar's group were, one superficial wound infection and one prolapsed colostomy. In the two patients operated by consultants, there was one complication of small bowel internal hernia post sigmoid colectomy. In the group that was operated by registrars, 19 complications occurred ranging from minor superficial wound infection to fatal complications.



## DISCUSSION

The University Teaching Hospital is the main hospital providing surgical services, and the only one providing emergency surgical services in the capital Lusaka with a population of one and a half million. It also serves as a teaching and main referral centre countrywide. Fifty four cases of sigmoid volvulus were treated in one and a half year period indicating a relatively high incidence of the condition. However this may not be a direct reflection of a high incidence of sigmoid volvulus in the Lusaka area alone, because the catchment area of the hospital includes other parts of the country.

This finding nevertheless shows a high incidence of sigmoid volvulus in this part of Africa which is in agreement with what has been found in previous studies within the region (Ojara, 1982 and Gakwaya, 1991). An unpublished retrospective study over four years (January 1991 to December 1994) at UTH by the author, found that 140 patients had been treated for sigmoid volvulus, making an annual incidence of 35 cases of sigmoid volvulus.

The male predilection of 44 to 10 females is similar to what has been observed in previous studies in the region and elsewhere (Faranisi 1989, King 1990 and Subrahmanyam 1992). One author suggested that the male preponderance of the condition may be due to the differences between the male and the female pelvis. However there is no known scientific evidence in the literature to support this view (Gakwaya, 1991).

The peak incidence was observed in the fourth and fifth decades of life in our study. Fifteen patients were in the fourth decade of their life while 14 were in the fifth. Eleven patients were in their 20s. Ojara (1982), reported similar findings in his study with peak incidence in the fifth decade of life. Faranisi (1989) and Gakwaya (1991) reported a mean age of 48 years and 44 years respectively. Sigmoid colon volvulus is indeed rare in infants and children. Ojara (1982) reported only one case of sigmoid volvulus in a three day old baby caused by a congenital band. A series done in Ohio, USA reported on four children treated for sigmoid volvulus (Smith et al 1990).

In this study operative treatment was the approach for acute obstruction due to sigmoid volvulus with 50 patients undergoing emergency laparotomy against one deflation by tube through a sigmoidoscope.

Though not much can be inferred from deflation by tube from this study (only one patient treated by tube deflation). Other studies have highlighted its drawbacks such as the inability to carry out the deflation in the presence of bowel gangrene, a high rate of defaulting patients who are for elective sigmoid resection and a significant recurrence rate with this operation alone (Ojara 1982; Faranisi 1989; Schlabach 1980; and Yerzingatsian, 1996). Salah and Suleiman (1980) in their study in Sudan found that 23 patients out of 29 treated by deflation alone failed to return for definitive resection. The one patient undergoing this operation in this study, absconded on the third day and never returned.

Operative reduction alone without resection was carried out in one patient by a junior registrar and the patient was subsequently lost to follow-up. High mortality (26.9%) and recurrence with this operation was reported in a study by Ojara, (1982) and is not a recommended form of treatment.

Double stage techniques have been practiced by many surgeons in the treatment of acute intestinal obstruction following sigmoid and / or left colonic obstruction, because of the fear of the leak at the site of the anastomosis in the loaded colon. Alaoui et al (1990) and Kunin et al (1992) are some of the proponents for this approach. The presence of a colostomy, however had been shown to carry a high rate of complications (Digest, Bri. J Surg 1996 and Cheung 1995). In this study, sixteen patients out of 27 who underwent a double stage operation developed complications, representing a 59.2 percent complication rate. Six patients had prolapsed colostomy one of whom required immediate bowel resection because of gangrene following colostomy closure. Three anastomotic leaks occurred with subsequent mortality in two of these. Four had wound infection, and this is in keeping with Tan and Nambir's (1980) observations, who showed a high wound infection rate the presence of colostomies. Moreover, a double stage operation has an added risk of a second major operation, which some patients may not tolerate.

Irvin and Goligher (1973) question the efficacy of a defunctioning colostomy in protecting the anastomosis. Colostomies create a psychological burden on the patient with most African communities shunning colostomised patients (Faranisi 1989). In our situation colostomy bags are hardly ever available leading to the use of ill-fitting improvised bags which are messy and do not seal off faecal odour.

The added cost of medical care as reflected by a cumulatively prolonged hospital stay of more than 10 days in most cases in this study is another draw back of multi stage operations. Single stage operation proved to be cost-effective in that most patients were discharged within a week following operation.

The single stage technique has been advocated by a number of recent studies (Darby et al 1992; Gaya 1990; Johanet 1991; Keller and Auberhard 1990; and Yerzingastian 1996) because it is a definitive treatment with one operation and obviates the complications and inconvenience of a colostomy. In this study 25 patients underwent a single stage technique with one mortality following an anastomotic leak. Only two out of these 25 patients were found to have gangrenous bowel at operation and the remaining twenty three patient had viable bowel.

The significance of a viable bowel in improving outcome in the single stage technique has been alluded to by Bagarani et al (1993) and Faranisi (1989) in their respective studies. Bagarani in his study of 31 consecutively hospitalised patients with sigmoid colon volvulus concluded that resection and anastomosis in emergency situation should be limited to patients with viable bowel, while those with gangrenous bowel should

undergo a staged operation (Hartmann's operation).

The morbidity and mortality rate in our study for single stage operation was 20 percent and 4 percent respectively, whereas for the double stage operation, it was 40.7 percent and 18.5 percent respectively.

The patient's clinical condition was recorded as mentioned earlier on the proforma and the number of patients with gangrenous bowel undergoing the various operative methods, namely single stage and double stage operations including Hartmann's operation are as shown in table 6.

The outcome in one stage surgery, could be further improved by on-table colonic lavage before immediate anastomosis (Gibney 1992 and Dudley et al 1980). One author reported comparable results using dilute povidone iodine to irrigate the distal rectal part and the immediate proximal portion of colon before primary anastomosis in emergency left colonic resection (Maddern et al 1995).

Gangrene of the bowel was shown to be a major cause of morbidity and mortality in this study. Five out of the six patients who died had gangrenous bowel. Several studies have emphasised the importance of gangrene in affecting out-come following the operative treatment for sigmoid volvulus. Ojara (1982) reported 26.9% mortality associated with gangrenous bowel, Peoples et al (1990) 75 percent, Yerzingatsian (1996) 15 percent, Bagarani et al (1993) 21.4 percent, Salah and Suleiman (1980) 60 percent and in this study five out of 11 patients with gangrenous bowel died, representing a 45.4 percent

mortality with gangrenous bowel.

Late admission, in this study did not appear to be uniformly associated with high incidence of gangrene even though 39 (72.2 percent) out of the 54 patients, presented within 72 hours of the onset of symptoms.

Yerzingatsian (1996) in his study cited operator seniority as one of the confounding variable. However in this study 83.3% of the operations were performed by registrars with a mortality of 13.3 percent. Faranisi (1989) in his study included operations performed by registrars with experience. He considered adequate pre-operative resuscitation important in outcome (Faranisi 1989).

## CONCLUSIONS

1. The distribution of single stage versus double stage operations was in the ratio of 1:1.1.
2. Viable bowel was associated with a favourable outcome both in single stage and double stage operations. Substantiated by 100% survival rate even with single stage operation.
3. Ileo-sigmoid Knot was associated with a 100% rate of gangrenous bowel with an increased risk of morbidity and mortality.
4. Gangrenous bowel was associated with a high morbidity and mortality rate.
5. Presence of colostomy appear to carry a significant increased risk of complications, some of which are potentially lethal.

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## APPENDIX

## SIGMOID COLON VOLVULUS STUDY PROFORMA

Name:..... Sex/Age:.....File Number:.....

Firm:.....Consultant:.....Study Number:.....

Mode of Surgery: Emergency/elective

**Preoperative condition**

Symptoms: Vomiting/nausea/constipation/abdominal pain/distension.

Previous operation: Yes/No

Duration of Symptoms (days):.....

Blood pressure (mmHg):..... Pulse:...../minute Temperature:.....°C

Dehydration: none/mild/moderate/severe

Urine output: normal/oliguria/anuria

Haemoglobin:.....g/dl Urea:.....mmol/l

Na<sup>+</sup> .....mmol/l K<sup>+</sup> .....mmol/l Cl<sup>-</sup> .....mmol/lC o n c o m i t a n t  
illness:.....

**Operative details**

Surgeon:.....C/SR/R

Anaesthetist:.....Dr./CO

Type of volvulus: Sigmoid loop/ileo-sigmoid knot

Bowel appearance: Viable/gangrenous

- Operation:
- a. Resection and anastomosis
  - b. Resection, anastomosis and transverse colostomy
  - c. Resection and double barrel colostomy
  - d. Hartmann's operation
  - e. Other:.....

- Technique:
- i. Bowel decompression by .....
  - ii. Hand sutured/stapler
  - iii. Single/double layer closer
  - iv. Type of suture

Intraoperative blood transfusion: No/Yes;.....units

**Postoperative management**

Intravenous fluids:.....

Antibiotics:.....

Daily observations:

BP:.....

Pulse:.....

Temp:.....

Wound (clean/infected):.....

Bowel function:.....

Sodium:.....

Potassium:.....

Chloride:.....

Urea:.....

Haemoglobin:.....

Complications: .....

.....

Date of discharge: .....

Clinic reviews: .....

.....

Date of Final discharge:.....

Date of death: .....

Cause of death: .....