

**OUTCOMES OF SMALL INTESTINE ANASTOMOSIS  
AFTER EMERGENCY LAPARATOMY AT KENYATTA  
NATIONAL HOSPITAL. A PROSPECTIVE  
LONGITUDINAL STUDY**

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**Dissertation submitted as partial fulfilment of the requirements for the award  
of Master of Medicine (MMed) in General Surgery Degree, of the University  
of Nairobi**

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**February, 2012**

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## DECLARATION

I hereby declare that this study is my original work and has not been presented for dissertation at any other university.

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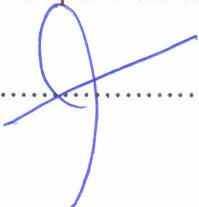
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## LIST OF ABBREVIATIONS

KNH	Kenyatta National Hospital
RCT	Randomized Control Study
SPSS	Statistical Package Social Science
U .O. N	University of Nairobi
ERC	Ethics and Research Committee
SHO	Senior House Officer
Hb	Haemoglobin
ANOVA	Analysis of Variance
CI	Confidence Interval
Vs	Versus

## TABLE OF CONTENTS

DECLARATION.....	ii
ACKNOWLEDGEMENTS.....	iii
LIST OF ABBREVIATIONS .....	iv
TABLE OF CONTENTS.....	v
ABSTRACT.....	ix
Chapter 1: INTRODUCTION .....	1
Chapter 2: LITERATURE REVIEW .....	3
2.1 Background .....	3
2.2 Systemic Factors .....	4
2.3 Local Factors .....	4
2.4 Choice of suture material and suturing technique .....	5
2.5 Naso-gastric Decompression .....	6
2.6 Abdominal Drains .....	6
2.7 Study Justification.....	7
2.8 Objectives of the Study .....	8
Chapter 3: MATERIALS AND METHODS.....	10
3.1: Study Area.....	10
3.2:Study Population.....	10
3.3: Study Design.....	10
3.4: Study Period.....	10
3.5: Methodology.....	10
3.6: Sample Size .....	11
3.7: Patients .....	12

3.8: Data management and analysis.....	13
3.9: Ethical considerations .....	13
3.10: Study limitations .....	14
<b>Chapter 4: RESULTS.....</b>	<b>16</b>
<b>4.1: Patient demographic characteristics .....</b>	<b>16</b>
<b>4.2 Indications of emergency laparotomy .....</b>	<b>17</b>
<b>4.3: Duration of hospital stay.....</b>	<b>19</b>
<b>4.4: Complications of emergency laparotomy.....</b>	<b>21</b>
<b>Chapter 5: DISCUSSION.....</b>	<b>31</b>
<b>Chapter 6: CONCLUSION .....</b>	<b>35</b>
<b>Chapter 7: RECOMMENDATION .....</b>	<b>36</b>
<b>REFERENCE.....</b>	<b>37</b>

## LIST OF TABLES

Table 1: Demographic characteristics.....	16
Table 2: Intra-operative procedures and management of patients during emergency laparotomy	18
Table 3: Naso-gastric tube removal among patients undergoing small gut anastomosis .....	19
Table 3: Duration of hospital stay for various indications of emergency laparotomy .....	21
Table 4: Comparison of age and duration of hospital stay among patients with and those without anastomotic leakage.....	22
Table 5: Anastomotic leakages in relation to intra-operative procedures.....	23
Table 6: Comparison of age and duration of hospital stay among patients with and those without wound dehiscence. ....	25
Table 7: Wound dehiscence and its relation with intra-operative procedure.....	26

Table 8: Comparison of hospital stay duration among patients with and those without wound sepsis .....	27
Table 9: Wound sepsis and its relation with intra-operative procedures. ....	28
Table 10: Patient hemoglobin levels and complications after small gut anastomosis .....	29
Table 11: SHO training level and complications following small intestine anastomosis.....	30

## LIST OF FIGURES

Figure 1: Indications of emergency laparotomy among patients at KNH.....	17
Figure 2: Distribution of duration of hospital stay following emergency laparotomy at KNH. ...	20
Figure 3: Prevalence of anastomotic leaks after emergency laparotomy with small intestine anastomosis at KNH.....	22
Figure 4: Prevalence of wound dehiscence after emergency laparotomy with small intestine anastomosis at KNH.....	24
Figure 5: Prevalence of wound sepsis after emergency laparotomy with small intestine anastomosis at KNH.....	26

## APPENDICES

Appendix I: Consent by the participating patients' parents/ guardians .....	40
Appendix II: Kibali cha ruhusa .....	42
Appendix III : Questionnaire .....	44
Appendix IV: Approval letter from KNH-ERC.....	47

## ABSTRACT

### Background

Small intestine anastomosis is one of the commonest procedures in general surgery. In Kenya where incidence of abdominal trauma is increasing, this procedure is important. At Kenyatta National Hospital (KNH), laparotomy with small intestine anastomosis is one of the most common surgical procedures and yet there has not been a comprehensive review probably because the technique has not been questioned as it is considered a basic skill. Anastomotic failure has always been a cause for concern in patient's under-going surgery with intestinal anastomosis, as it adversely affects the surgical outcome.

The consequences of a failed anastomosis are devastating with high morbidity and mortality. Failure of anastomosis with leakages of intestinal contents is still, regrettably, a common surgical experience.

**Objective** - This was a prospective longitudinal study to determine the outcomes of emergency laparotomy with small intestine anastomosis at KNH.

### Materials and methods

This was a prospective longitudinal study carried out at Kenyatta national hospital [KNH]. Sixty nine patients admitted in the general surgical wards who underwent emergency abdominal surgery with small intestine anastomosis were recruited into the study from Sept 2011 to November 2011. The data was collected using a structured questionnaire entered and verified using Microsoft excel. Data analysis was performed using SPSS version 17. Main outcome measures were anastomotic leaks, wound dehiscence, wound sepsis and duration of hospital stay.

## **Results**

There were 53 males (76.81%) and 16 females (23.91%) giving a male-to-female ratio of 3: 1 and the average age of all patients was 32.5 (SD 13.4) and the age range was from 16 to 76 years. Most (44.93%) patients were aged 20-29 years. The most common indication was penetrating abdominal injury which occurred in 35 (50.7%) of all patients in the study. The minimum duration of hospital stay following emergency laparotomy was 4 days and the maximum duration of stay was 28 days. On average patients stayed in hospital for 8.4 days (SD = 4.9) after the emergency laparotomy procedure. The prevalence of anastomotic leakage was 10.1% while 13 (18.8%) developed wound dehiscence and 23.2% developed wound sepsis.

## **Conclusion**

The study found that duration of hospital stay in patients with any of the three complications was significantly longer than that of patients who do not develop complications thus increasing the morbidity. Patient characteristics did not predict the occurrence of surgical complications. The use of intra-peritoneal drain and naso-gastric decompression did not offer added advantage. Surgical technique, whether you use single or double layer, did not influence complications.

## Chapter 1: INTRODUCTION

Intestinal obstruction, peritonitis secondary to perforated bowel and abdominal trauma, are common surgical problems encountered throughout the world<sup>1</sup>. These problems usually require to be treated operatively. Intestinal anastomosis is an important procedure in general surgery in which bowel must be accurately approximated without tension while retaining blood supply to both ends.

At the Kenyatta National Hospital laparotomy with small intestine resection and anastomosis is one of the most common surgical procedures and yet there has not been a comprehensive review on the outcomes of intestinal anastomosis probably because the technique has not been questioned as it is considered a basic skill<sup>2</sup>.

Healing of the intestinal tract is rapid when free of complications. Unlike cutaneous wound healing progress cannot be observed on a daily basis and intervention instituted early if necessary. Healing of the intestinal anastomosis cannot be anatomically observed from inspection, allowing the surgeon only to judge the success of operation by assessing the patient's parameters of general well being. For the same reason, complications usually warrant re-exploration, with associated morbidity and mortality.

This places great responsibility on the surgeon who should be aware of all the pre-operative, intra-operative and postoperative factors related to the healing of anastomosis and which might compromise the healing process. Awareness of all these factors is pivotal in limiting complications to a minimum.

Despite most recent advances in surgery, complications still do occur even with experienced surgeons. The outcome of small bowel anastomosis depends on a number of factors principally the suture technique, surgeons, experience, patient's general condition and timing of surgery.

Anecdotal evidence has shown that small intestine anastomosis in emergency setup is mostly done by SHO and yet there is no comprehensive review on the outcomes of intestinal anastomosis at KNH. The study's aim is to document the outcomes of small intestine anastomosis after emergency laparotomy as seen at KNH.

## Chapter 2: LITERATURE REVIEW

### 2.1 Background

The basic principles of the intestinal suture were established more than 100 years ago by Travers, Lambert and Halsted<sup>3</sup>. Two-layer anastomosis was done by Larry in the 19<sup>th</sup> century<sup>4</sup>. Historically, two-layer anastomosis using interrupted silk sutures for an outer inverted neuromuscular layer and a running absorbable suture for a transmural inner layer has been standard for most surgical situations.

Some recent reports have described single-layer continuous anastomosis using monofilament sutures as requiring less time and cost than any other method, without incurring any added risk of leakage<sup>5,6,7,8</sup>.

The single-layer continuous anastomosis is a contemporary innovation first described by Hautefeuille in 1976<sup>9</sup>. In the USA, the first mention of this technique was by Allen et al<sup>10</sup>. Length of surgery was less in single-layer than in two-layer anastomosis and less trauma was caused in single-layer anastomosis.

A leaking anastomosis greatly increases morbidity and mortality associated with the operation. It can double the length of the hospital stay and increases the mortality by as much as ten fold<sup>11</sup>. Dehiscence when it occurs, has been associated with one fifth to one third of all post operative deaths in patients who underwent intestinal anastomosis<sup>12</sup>.

Failure of anastomosis with leakages of intestinal contents is still, regrettably, a common surgical experience. Reported failure rates range from 1.5% to 2.2%, depending on whether the operation was an elective or an emergency procedure<sup>13,14</sup>.

## 2.2 Systemic Factors

Dehiscence has been linked adversely with increasing age<sup>14,15</sup>. This connection may be secondary to a number of factors, including the presence of co morbid conditions such as cardiac, renal, liver disease, malnutrition, and vitamin deficiency<sup>16</sup>.

Several factors that are known to inhibit collagen synthesis, such as vitamin C deficiency, zinc deficiency, hyper-bilirubinemia, and uremia, have a detrimental effect on tissue healing<sup>14</sup>. A critical stage in collagen formation is the hydroxylation of proline to produce hydroxyproline. This process is believed to be important for maintaining the three-dimensional triple-helix conformation of mature collagen, which gives the molecule its structural strength. Vitamin C deficiency results in impaired hydroxylation of proline and the accumulation of proline-rich, hydroxyproline-poor molecules in intracellular vacuoles.

In high doses, corticosteroids have been associated with poor healing. One study employing therapeutic doses, however, reported no difference in leakage rates found between control subjects and those treated with steroids<sup>15</sup>.

## 2.3 Local Factors

Blood flow is a critical factor in tissue healing. The increased vascularity of the bowel wall is the reason why gastric and small bowel anastomosis heals more rapidly than anastomosis involving the esophagus or the large bowel. In preparing the bowel ends for anastomosis, it is imperative that the mesentery be prepared carefully and not dissected too far from the bowel edge. Mesenteric compromise, secondary to overly enthusiastic dissection or inappropriate

suturing, may result in a reduction of perianastomotic blood flow<sup>17</sup>. Radiation may damage the microcirculation and thereby predispose to poor healing<sup>15</sup>.

## **2.4 Choice of suture material and suturing technique**

Apart from inert substances, most foreign materials will evoke an inflammatory reaction in the human body. Surgical sutures are no exception. Silk has a potent ability to cause a cellular infiltrate at the site of the anastomosis that may persist as long as 6 weeks after implantation. Substances such as polypropylene (Prolene), polyglycolic acid (Dexon) evoked a milder response. There is little difference between absorbable and nonabsorbable sutures in respect to the strength of the anastomosis<sup>18</sup>.

The ideal suture material is one that elicits little or no inflammation while maintaining the strength of the anastomosis during the lag phase of healing.

Both continuous and interrupted sutures are commonly used in fashioning intestinal anastomosis. Retrospective reviews have not shown interrupted sutures to have any advantage over continuous sutures in a single-layer anastomosis<sup>19,20</sup>.

Studies have shown no significant difference in the leakage rate (3.1% for the single-layer technique versus 1.5% for the two-layer). The added advantages of reduced operating times and cost were observed. In a case series review that included 3,027 patients who had single-layer anastomosis done with continuous sutures, fistula rates ranged from 0 to 6.8% (mean fistula rate, 1.7%), which demonstrated that this suture procedure could be safely performed<sup>21</sup>.

The technique of double layers anastomosis consists of an inner layer of continuous or interrupted absorbable suture and outer layer of interrupted absorbable or non-absorbable suture

The technique of single-layer anastomosis was championed because of potential advantages such as reduced operating time and lower cost. The main issue to consider, however, is safety in relation to anastomotic breakdown<sup>22</sup>.

## **2.5 Naso-gastric Decompression**

Routine naso-gastric decompression in patients undergoing a procedure involving an intestinal anastomosis remains controversial. In retrospective<sup>23</sup> and prospective<sup>24</sup>, randomized, controlled trials, routine use of a naso-gastric tube conferred no significant advantage in terms of reducing the risk of anastomotic leakage. In fact, there was a trend toward an increased incidence of respiratory tract infections after routine naso-gastric decompression<sup>25</sup>. Nonetheless; one study found that nearly 20% of patients required insertion of a naso-gastric tube in the early postoperative period<sup>24</sup>.

## **2.6 Abdominal Drains**

Leakage with fecal contamination from bowel surgery is a dreaded complication. Peritoneal drainage is a subject of considerable controversy, with two basic schools of thought dominating<sup>26</sup>. The first school accepts the possibility that peritoneal drains may help with diagnosis by serving as an early warning system for either anastomotic leakage or bleeding and makes the point that evacuating blood and serous fluid will reduce the risk of abscesses.

The other school is skeptical about the benefits, arguing that peritoneal drains may irritate the peritoneum, thus increasing the production of serous fluid, and may provide a route whereby microbes can enter the peritoneal cavity. In addition, there is a potential risk that

the peritoneal drain may physically impede the movement of the omentum and adjacent organs and consequently may hinder the body's innate ability to wall off any possible infection. Finally, it is thought that peritoneal drains are at high risk for blockage.

Even before World War I, the old dictum "when in doubt, always leave a drain" was called into question by Yates, who wrote that the peritoneal cavity could not be effectively drained because of adhesions and rapid sealing of the drain tract<sup>27</sup>. A 1999 study of pelvic drainage after a rectal or anal anastomosis showed that prophylactic drainage did not improve outcome or reduce complications<sup>28</sup>. Yet another study reported severe inflammatory reaction caused by drains at anastomotic site<sup>29</sup>.

Despite these findings, many surgeons elect to place an intra-abdominal drain in the pelvis after an anterior resection or a coloanal anastomosis because of the higher than usual risk that a fluid collection will develop. Drainage is rarely helpful, or indeed easy, after a gastric or small bowel anastomosis. Drains are indicated, however, after emergency operations for peritonitis or trauma in which it was necessary to close or anastomose damaged or inflamed bowel.

## **2.7 Study Justification**

At the Kenyatta National Hospital emergency laparotomy with small intestinal resection and anastomosis is one of the most common surgical procedures usually or routinely performed by the Senior House Officer (SHO's) and yet there has not been a comprehensive review of its outcomes probably because the technique has not been questioned as it is considered a basic skill.

The consequences of a failed anastomosis are devastating with high morbidity and mortality. Failure of anastomosis with leakages of intestinal contents is still regrettably, a common surgical experience. Reported failure rates range from 1.5% to 2.2%, whether the operation was an elective or an emergency procedure<sup>13, 14</sup>.

A leaking anastomosis greatly increases morbidity and mortality associated with the operation. It can double the length of the hospital stay and increases the mortality by as much as ten fold<sup>11</sup>. Dehiscence, when it occurs has been associated with one fifth to one third of all post operative deaths in patients who underwent an intestinal anastomosis<sup>12</sup>.

Despite recent advances in surgery complications still do occur even with experienced surgeons thus it was useful to conduct this study to:

1. Chart the future approach to patients who have undergone small intestine anastomosis thereby improving the outcome.
2. Help form a data base for future reference.

No study on the outcome of intestinal anastomosis has been done at Kenyatta National Hospital

The information collected will be relevant in reducing the mortality and morbidity of intestinal anastomosis by explaining the factors that lead to morbidity and mortality following small bowel anastomosis.

## **2.8 Objectives of the Study**

### **Broad Objectives**

To study the outcomes of emergency laparotomy with small intestine anastomosis at KNH.

### **Specific Objectives**

1. To study the prevalence and indications of emergency laparotomy with small intestine anastomosis at KNH.
2. To determine the incidence of complications following emergency laparotomy with small intestine anastomosis performed at KNH.
3. To determine the duration of hospital stay after emergency laparotomy with small intestine anastomosis at KNH.

## **Chapter 3: MATERIALS AND METHODS**

### **3.1: Study Area**

KNH general surgery wards 5A, 5B and 5D.

### **3.2: Study Population**

Patients admitted in the general surgical wards that underwent emergency abdominal surgery and small intestine anastomosis, as well as patients referred for surgical intervention from other departments or units at KNH.

### **3.3: Study Design**

This was a prospective longitudinal study.

### **3.4: Study Period**

The study period was from September 2011 to November 2011, with cumulative enrolment of patients meeting the enrolment criteria until the desired sample size was attained.

### **3.5: Methodology**

After presentation of proposal at the University of Nairobi (UON) department of surgery, approval was sought from the KNH-Ethics and Review Committee (ERC). Consent from the patient was sought and the principle investigator collected the data from consenting patients and recorded it in a preformatted data sheet.

The principal investigator recorded demographic details of each patient, indications for operation, operation performed and postoperative complications namely, clinical anastomotic leak, wound infection and wound sepsis.

Clinical anastomotic failure was considered when patient developed postoperative peritonitis (local or generalized), established fecal fistula, or intra-abdominal abscess with communication with bowel (on contrast studies) or if leak was apparent at re-exploration.

Contrast studies were not used routinely but was performed selectively to document clinical suspicion of anastomotic failure in various anastomosis or to localize the fistula in cases of failed conservative management.

Intra-peritoneal abscess means clinical presentation with ultrasonic evidence of intraperitoneal collection of pus. Wound infection was defined as discharge of pus, with or without systemic features, yielding a positive culture.

Data was collected on the pre-operative findings hemoglobin [hb], and cormobid conditions. Patients with previous history of abdominal surgery with small gut anastomosis were excluded. Intra-operative data was collected with emphasis on the diagnosis, technique of anastomosis, suture materials used and if drain was left in situ.

Post-operatively data on time taken to remove the drain if it was left in situ was noted together with the complications (anastomotic leaks, wound dehiscence, burst abdomen (wound sepsis) coupled with the duration of hospital stay. Patients were followed up-to the date of discharge.

### **3.6: Sample Size**

Since the population size is unknown, the following formula was used to estimate the desired sample size.

$$n = [(z^2 * p * q) + ME^2] / [ME^2]$$

Where;

z is the critical z score at 95% confidence level = 1.96

p is the estimated population proportion of patients who develop complications  $\approx 34\%$ <sup>29</sup>.

q = 1-p = 66% the proportion of patients who do not develop complications

ME is the margin of error set at 10%

This means we required 69 patients.

### **3.7: Patients**

Inclusion criteria was

- Patients who gave their informed consent.
- Patients who underwent emergency laparotomy with small intestine anastomosis.

**Exclusion criteria was**

- Patients who required anastomosis to the stomach and colon.
- Patients receiving external beam radiation to the abdomen.
- Patients on cytotoxic / immuno-suppressive therapy.
- Patient who declined to give consent.

### **3.8: Data management and analysis**

Data collected was entered into a password-protected Microsoft access database and patient files kept in a lockable cabinet only accessible to the principal investigator and the statistician. After data entry, the principal investigator compared the entered data with the hard copy forms to ensure accuracy and correctness of the soft copy. Analysis was performed using SPSS version 17.

Continuous variables such as age were summarized using measures of central tendency such as mean or median and measures of dispersion such as standard deviation and variance. Associations of continuous variables with anastomotic complications were demonstrated using Students t-test or Mann Whitney U test.

Categorical variables such as sex, occupation, type of anastomosis, naso-gastric tube, drain versus no drains, anastomotic leaks and wound dehiscence were summarized using proportions. Associations of categorical variables with anastomotic complications were demonstrated using the Chi-square test. All statistical tests were performed at 5% significance level (95% confidence interval).

Logistic regression analysis was performed to determine independent predictors of complications.

Results are presented in the form of tables, charts and graphs. .

### **3.9: Ethical considerations**

1. Approval for the study was sought from the Kenyatta National Hospital Ethics and Research Committee (KNH-ERC).

2. All patients prior to enrolment into the study were explained about the nature of the study and a written informed consent in either English or Swahili was sought from them, depending on the language of their choice. Where a patient was not able to append his/her signature but had fully understood the nature of the study and consented, a print of his/her right thumb was obtained.
3. Patient confidentiality was guaranteed and all collected data was treated with utmost confidentiality.
4. No monetary gain or other form of remuneration was promised or given to the participants by the investigators.
5. Patients who declined to participate in the study were not discriminated upon or have any detrimental consideration in the management of their conditions or follow up for the same. Neither was their future relation with KNH or UON affected by their declining participation.
6. No extra expense was incurred by the participants of the study upon enrolment for purposes of the study.
7. Participants of the study had a right to withdraw from the study at any point after enrolment and no coercion by the investigator was undertaken in an attempt to reverse *their decision*.
8. The findings of the study will be availed to both the Department of Surgery of UON and the library of KNH for future reference by interested parties.

#### **10: Study limitations**

- Study limitations included the variability of the surgeon's experience and possibly the techniques used in procedure.

- Poor documentation of post operative notes.
- Limited duration for collecting of data.

## Chapter 4: RESULTS

### 4.1: Patient demographic characteristics

A total of 69 patients undergoing emergency laparotomy with small intestine anastomosis at KNH between May and October 2011 were included in the study. The analysis of the basic demographic characteristics of these patients is shown in Table 1.

The study sample consisted of 53 males (76.81%) and 16 females (23.91%) giving a male-to-female ratio of 3: 1. The average age of all patients was 32.5 (SD 13.4) and the age range was from 16 to 76 years. Most (44.93%) patients were aged 20-29 years. Based on the findings of a t-test there were no significant differences in age of male (average age = 32.2 years) and female (average age = 33.5 years) patients ( $p = 0.738$ ).

Table 1: Demographic characteristics of patients undergoing emergency laparotomy with small intestine anastomosis at KNH.

Demographic characteristic	Number (%)
Sex	
Female	16(23.19)
Male	53(76.81)
Age group	
Below 20 years	5(7.25)
20-29 years	31(44.93)
30-39 years	18(26.09)
40 years and above	15(21.74)

The average hemoglobin level among all patients was 13.76 g/dl (SD 2.34) with a range from 5.3 to 19 g/dl. Male patients (mean = 13.9 g/dl) had a slightly higher hemoglobin level compared to females (mean = 13.0 g/dl),  $p = 0.178$ .

#### 4.2 Indications of emergency laparotomy

Figure 1 shows the indications for emergency laparotomy among patients at KNH. The most common indication was penetrating abdominal injury which was the cause for emergency laparotomy in 35 (50.7%) of all patients in the study. The other common indications for emergency laparotomy were blunt abdominal injury (10.1%) and intestinal obstruction (10.1%). Hernias and small gut volvulus each occurred in less than 10% of patients. The remaining 11(16.0%) patients presented with other indications for laparotomy and this included: closure of ileostomy ( $n = 2$ ), intussusceptions ( $n = 2$ ), and single cases of small gut gangrene, typhoid perforation, tuberculosis peritonitis, tumor, iatrogenic injury, adhesion and enterocutaneous fistula.

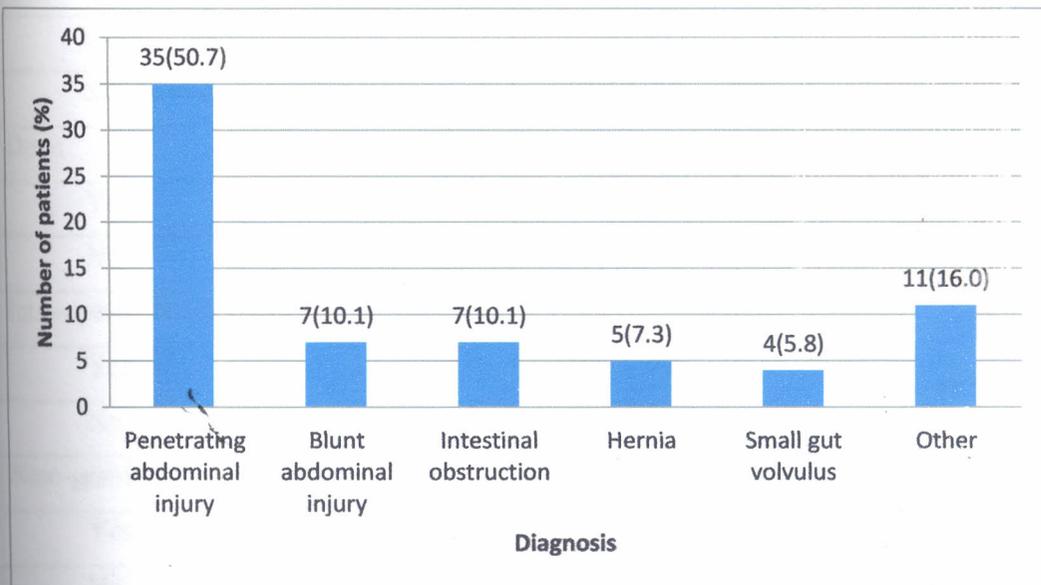


Figure 1: Indications of emergency laparotomy among patients at KNH

Table 2 summarizes the intra-operative procedures conducted during the 69 emergency laparotomy procedures in this study. Most laparotomy procedures were conducted by Senior House Officer (SHOs) in the third (n = 35, 50.72%) or fourth (n = 28, 40.58%) year of training in surgery. The 6 (8.7%) remaining procedures were conducted by SHOs in second year. The most common anastomotic site was the ileum (59.42%), followed by the jejunum (39.13%). Only a single anastomosis involved the duodenum.

Table 2: Intra-operative procedures and management of patients during emergency laparotomy at KNH.

	Number (%)
Anastomotic site	
Ileum	41(59.42)
Jejunum	27(39.13)
Duodenum	1(1.45)
Anastomotic technique	
Double layer	57(82.61)
Single layer	12(17.39)
Drain	
Yes	58(84.06)
No	11(15.94)
Intra-operative antibiotics	
Yes	18(26.09)
No	51(73.91)
Naso-gastric tube inserted	
Yes	57(82.61)
No	12(17.39)

The commonest anastomotic technique used was double layer technique performed in 57 (82.61%) of cases.

Table 3 shows that nasogastric tube insertion was commonly used post operatively. Out of the 69 patients in the study 57 (84.06%) had a nasogastric tube inserted and 58 (84.06%) of patients had a drain inserted. Most of the nasogastric tubes inserted intraoperatively were removed either on day 2 (28.99%) or day 3 (43.48%). Antibiotics were administered intraoperatively to 18 (26.09%) of patients.

Table 3: Naso-gastric tube removal among patients undergoing small gut anastomosis at KNH

Naso-gastric tube removal	
day 2	20(28.99)
day 3	30(43.48)
day 4	6(8.7)
day 5	2(2.9)

#### 4.3: Duration of hospital stay

The minimum duration of hospital stay following emergency laparotomy was 4 days and the maximum duration of stay was 28 days. On average patients stayed in hospital for 8.4 days (SD = 4.9) after the emergency laparotomy procedure. Figure 2 presents distribution of durations of hospital stay in the study. Most patients (n = 43, 62.3%) were in hospital for between 4 to 7 days.

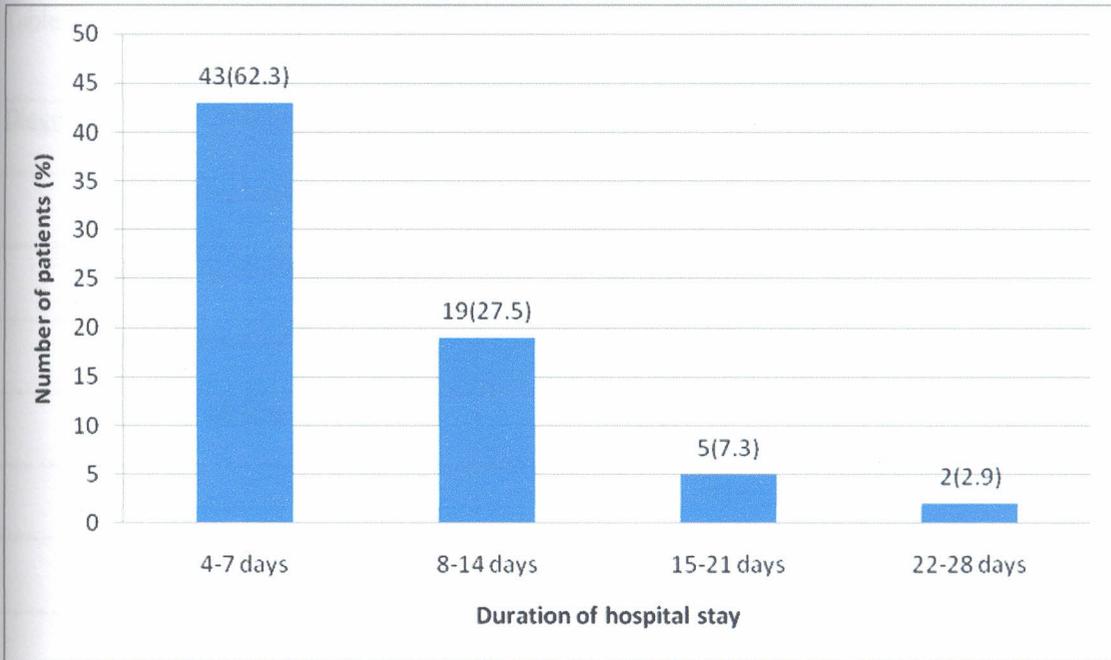


Figure 2: Distribution of duration of hospital stay following emergency laparotomy at KNH.

The mean duration of hospital stay did not differ significantly by diagnosis (ANOVA  $p = 0.60$ ).

Table 3 shows that patients with volvulus had the longest average duration of hospital stay

(mean = 12.25 days) and patients with hernia had the shortest mean duration of hospitalization

(mean = 6.8 days).

Table 3: Duration of hospital stay for various indications of emergency laparotomy

Diagnosis	Mean (SD) duration of stay	ANOVA
Small gut volvulus	12.25 (6.65)	F= 0.73, p = 0.60
Penetrating abdominal injury	8.45 (5.22)	
Blunt abdominal injury	8.14 (4.87)	
Intestinal obstruction	7.0 (2.88)	
Hernia	6.8 (4.08)	
Other	8.9 (4.65)	

#### 4.4: Complications of emergency laparotomy

Among all the 69 patients a total of 16 (23.19%) patients developed complications monitored in this study namely, anastomotic leak, wound dehiscence and wound sepsis. All the three complications occurred concurrently in 6 (8.7%) patients while 8 (11.59%) patients had at least two complications and 2 (2.9%) had a single complication. Details concerning each of these complications are presented in the following section.

##### a) Anastomotic leakage

As shown in figure 3 below, anastomotic leakages occurred in seven of the 69 patients giving an overall prevalence of 10.1% for the complication among patients undergoing emergency laparotomy at KNH.

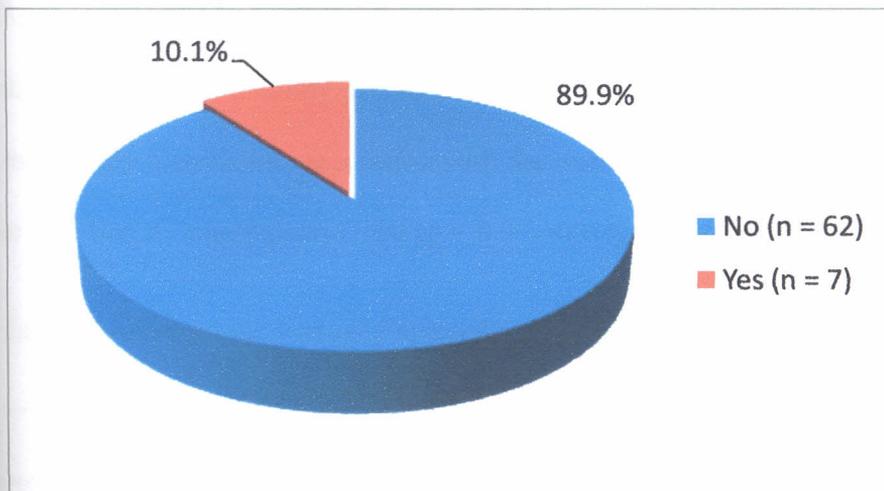


Figure 3: Prevalence of anastomotic leaks after emergency laparotomy with small intestine anastomosis at KNH.

Table 4 shows that the patients with anastomotic leakages had a significantly longer duration of hospital stay compared to patients without leakages ( $p = 0.0159$ ). There were no statistically significant differences in the ages of patients with and those without leakages ( $p = 0.498$ ).

Table 4: Comparison of age and duration of hospital stay among patients with and those without anastomotic leakage.

	Anastomotic leakage		Difference (95% Confidence interval)	T-test
	Yes (n=7)	No (n= 62)		
Average age (SD) in years	30.14 (8.72)	32.77 (13.89)	2.63 (-5.72 to 10.98)	$p = 0.498$
Average duration of stay (SD) in days	14.85 (5.72)	7.72(4.26)	-7.13 (-12.44 to -1.81)	$p = 0.0159$

As shown in Table 5, all the 7 patients with an anastomotic leakage had a drain inserted during the emergency laparotomy procedure. The occurrence of an anastomotic leakage did not show a statistically significant association with the anastomotic technique ( $p = 0.596$ ), site ( $p = 0.725$ ) or insertion of a nasogastric tube ( $p = 0.99$ ) during the laparotomy procedure.

Table 5: Anastomotic leakages in relation to intra-operative procedures.

	Anastomotic leakage		Total	Fishers exact test
	Yes (n =7)	No (n= 62)		P value
<b>Anastomotic technique</b>				
Double	5(8.77)	52(91.23)	57(100)	0.596
Single	2(16.67)	10(83.33)	12(100)	
<b>Anastomotic site</b>				
Ileum	5(12.2)	36(87.8)	41(100)	0.725
Jejunum	2(7.41)	25(92.59)	27(100)	
<b>Drain</b>				
Yes	7(12.07)	51(87.93)	58(100)	0.587
No	0(0)	11(100)	11(100)	
<b>Naso-gastric tube</b>				
Yes	6(10.34)	52(89.66)	58(100)	0.99
No	1(9.09)	10(90.91)	11(100)	

## b) Wound dehiscence

Figure 4 shows the prevalence of wound dehiscence. Out of the 69 patients recruited in the study, 13 (18.8%) developed wound dehiscence following the emergency laparotomy procedure.

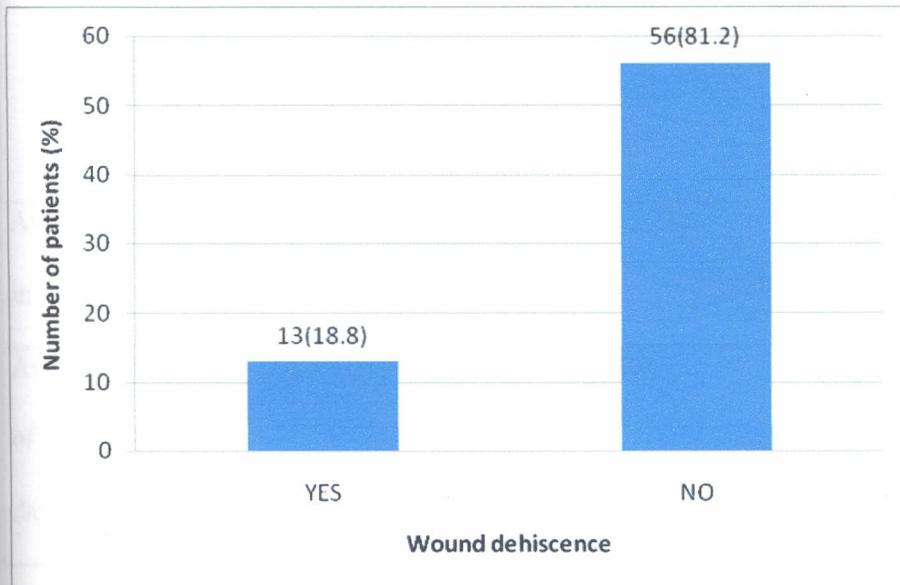


Figure 4: Prevalence of wound dehiscence after emergency laparotomy with small intestine anastomosis at KNH.

Table 6 shows that the duration of hospital stay for patients without wound dehiscence was on average 7.21 days (95% CI-11.46 to -2.96) shorter than the average duration of 14.30 days for patients with wound dehiscence,  $p = 0.0028$ . The ages of these two groups of patients did not differ significantly,  $p = 0.157$ .

Table 6: Comparison of age and duration of hospital stay among patients with and those without wound dehiscence.

	Wound dehiscence		Difference (95% Confidence interval)	T-test
	Yes (n =13)	No (n= 56)		
Average age (SD) in years	39.30 (19.45)	30.92 (11.28)	-8.37 (-20.39 to 3.64)	p = 0.157
Average duration of stay (SD) in days	14.30 (6.94)	7.08 (3.01)	-7.21 (-11.46 to -2.96)	p = 0.0028

As shown in Table 7, a higher percentage of patients with jejunal (25.93%) anastomosis had wound dehiscence compared to those with ileal (14.63%) anastomosis but the difference was not statistically significant,  $p = 0.469$ . The prevalence of wound dehiscence in patients with the double and single technique similarly did not show statistical significance ( $p = 0.220$ ).

Table 7: Wound dehiscence and its relation with intra-operative procedures.

	Wound dehiscence		Total	Fishers exact test
	Yes (n =13)	No (n= 56)		P value
Anastomostic technique				
Double	9(15.79)	48(84.21)	57(100)	0.220
Single	4(33.33)	8(66.67)	12(100)	
Anastomostic site				
Ileum	6(14.63)	35(85.37)	41(100)	0.469
Jejunum	7(25.93)	20(74.07)	27(100)	

### C Wound sepsis

As shown in figure 5 below, wound sepsis occurred in 16 of the 69 patients giving an overall complication prevalence of 23.2% among patients undergoing emergency laparotomy at KNH.

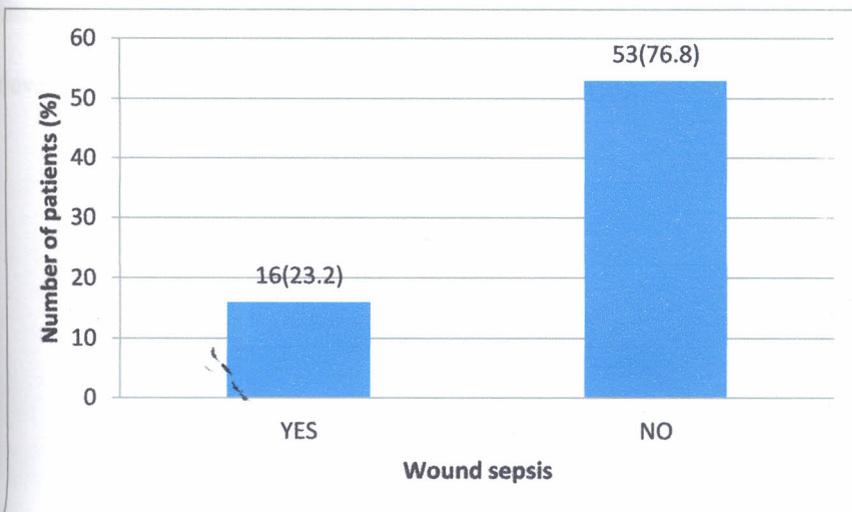


Figure 5: Prevalence of wound sepsis after emergency laparotomy with small intestine anastomosis at KNH.

Patients with wound sepsis had a significantly longer duration of hospital stay (mean = 14.12) compared to those without wound sepsis (mean = 6.73),  $p = 0.0003$ .

Table 8: Comparison of hospital stay duration among patients with and those without wound sepsis.

	Wound sepsis		Difference (95% Confidence interval)	T-test
	Yes (n =13)	No (n= 56)		
Average age (SD) in years	38.25 (17.99)	30.77 (11.38)	-7.47 (-17.45 to 2.50)	$p = 0.133$
Average duration of stay (SD) in days	14.12 (6.40)	6.73 (2.56)	-7.38 (-10.85 to -3.92)	$p = 0.0003$

Intra-operative antibiotic administration did not show a statistically significant association with the occurrence of wound sepsis ( $p = 0.746$ ). There was no significant association between anastomotic site and development the occurrence of sepsis ( $p = 0.827$ ). All the 16 patients who developed wound sepsis had a drain inserted during the emergency procedure (Table 9).

Table 9: Wound sepsis and its relation with intra-operative procedures.

	Wound sepsis		Total	Fisher's exact test
	Yes (n =16)	No (n= 56)		P value
Anastomostic site				
Ileum	9(21.95)	32(78.05)	41(100)	0.827
Jejunum	7(25.93)	20(74.07)	27(100)	
Drain				
Yes	16(27.59)	42(72.41)	58(100)	0.056
No	0(0)	11(100)	11(100)	
Intra-operative antibiotic				
Yes	5(27.78)	13(72.22)	18(100)	0.746
No	11(21.57)	40(78.43)	51(100)	

#### Complications of emergency laparotomy and patient haemoglobin levels

Haemoglobin levels were lower in patients who developed all the three complications (Table 10). However these differences among patients with and without complications were not statistically significant. The mean hemoglobin level in patients who had anastomostic leakage was 12.45 g/dl while that of patients without anastomostic leakage was 13.85,  $p = 0.353$  (Table 10).

Table 10: Patient hemoglobin levels and complications after small gut anastomosis

	Anastomotic leakage		Difference (95% Confidence interval)	T-test
	Yes	No		
<b>Anastomotic leakage</b>				
Average Hb level (SD) in g/dl	12.45 (3.62)	13.85 (2.15)	-1.40 (-4.75 to 1.96)	p = 0.353
<b>Wound dehiscence</b>				
Average Hb level (SD) in g/dl	12.82 (2.13)	13.91 (3.04)	-1.08 (--2.50 to 0.34)	0.13
<b>Wound sepsis</b>				
Average Hb level (SD) in g/dl	13.29 (2.91)	13.83 (2.51)	-0.54 (-1.87 to 0.79)	0.42

### Complications of emergency laparotomy and SHO training

None of the three complications studied showed a significant association with level of SHO training. As shown in table 10, the rate of occurrence of wound sepsis following laparotomy was not significantly associated with SHOs level of training, antibiotic use drain insertion or anastomotic site. In addition, surgical training did not show a significant association with either occurrence of dehiscence (p = 0.378) or anastomotic leakage following surgery (p = 0.97).

Table 11: SHO training level and complications following small intestine anastomosis

	Complications		Total	Fishers exact test
	Yes	No		P value
<b>Anastomotic leakage</b>				
SHO training				
Year II	6 (100)	0 (0)	6 (100)	0.97
Year III	31 (88.57)	4 (11.43)	35 (100)	
Year IV	25 (89.29)	3 (10.71)	28 (100)	
<b>Wound dehiscence</b>				
SHO training				
Year II	4 (66.67)	2 (33.33)	6 (100)	0.378
Year III	30 (85.71)	5 (14.29)	35 (100)	
Year IV	22 (78.57)	6 (21.43)	28 (100)	
<b>Wound sepsis</b>				
SHO training				
Year II	4 (66.67)	2 (33.33)	6 (100)	0.829
Year III	27 (77.14)	8 (22.86)	35 (100)	
Year IV	22 (78.57)	6 (21.43)	28 (100)	

## Chapter 5: DISCUSSION

At Kenyatta national hospital, laparotomy with small intestine resection and anastomosis is a most common surgical procedure. A total of 69 patients undergoing emergency laparotomy with small intestine anastomosis at KNH between May and October 2011 were included in this study. The study sample consisted of 53 males (76.81%) and 16 females (23.91%) giving a male-to-female ratio of 3: 1. The average age of all patients was 32.5 (SD 13.4) similar to study by Shahnam et al<sup>29</sup> and the age range was from 16 to 76 years. Most (44.93%) patients were aged 20-29 years. Based on the findings of a t-test there were no significant differences in age of male (average age = 32.2 years) and female (average age = 33.5 years) patients ( $p = 0.738$ ).

The average hemoglobin level among all patients was 13.76 g/dl (SD 2.34) with a range from 5.3 to 19 g/dl. Male patients (mean = 13.9 g/dl) had a slightly higher hemoglobin level compared to females (mean = 13.0 g/dl),  $p = 0.178$ . The mean hemoglobin level in patients who had anastomotic leakage was 12.45 g/dl while that of patients without anastomotic leakage was 13.85,  $p = 0.353$ , thus showing no association to anastomotic leaks. Targart et al<sup>17</sup>, has shown overly enthusiastic dissection or inappropriate suturing may result in a reduction of perianastomotic blood flow.

The most common indication was penetrating abdominal injury which was the cause for emergency laparotomy in 35 (50.7%) of all patients in the study. The other common indications for emergency laparotomy were blunt abdominal injury (10.1%) and intestinal obstruction (10.1%). Hernias and small gut volvulus each occurred in less than 10% of patients. The remaining 11(16.0%) patients presented with other indications for laparotomy and this included: closure of ileostomy ( $n = 2$ ), intussusceptions ( $n = 2$ ), and single cases of small gut gangrene,

typhoid perforation, Tuberculous peritonitis, tumor, iatrogenic injury, an adhesion and an enterocutaneous fistula.

Most laparotomy procedures were conducted by SHOs in the third (n = 35, 50.72%) or fourth (n = 28, 40.58%) year of training in surgery. The 6 (8.7%) remaining procedures were conducted by SHOs in second year

The level of SHO training did not show a significant association with occurrence of anastomotic leakage following surgery (p = 0.97), similar to studies by Everett et al<sup>23</sup> and Ordorica et al<sup>31</sup> in which the operations were performed only by consulting surgeons, staff surgeons, and residents with  $\geq 5$  years experience and above .

The most common anastomotic site was the ileum (59.42%), followed by the jejunum (39.13%). Only a single anastomosis involved the duodenum.

The commonly used anastomotic technique was double layer technique performed in 57 (82.61%) of cases. A similar number of patients had a naso-gastric tube inserted (n = 57, 84.06%) and 58 (84.06%) of patients had a drain inserted. Most of the naso-gastric tubes inserted intraoperatively were removed either on day 2 (28.99%) or day 3 (43.48%). Antibiotics were administered intraoperatively to 18 (26.09%) of patients

The minimum duration of hospital stay following emergency laparotomy was 4 days and the maximum duration of stay was 28 days. On average patients stayed in hospital for 8.4 days (SD = 4.9) after the emergency laparotomy procedure which is similar to the study by Irvin et al<sup>20</sup>.

Most patients (n = 43, 62.3%) were in hospital for between 4 to 7 days. The mean duration of hospital stay did not differ significantly by diagnosis (ANOVA p = 0.60). Among all the 69 patients, a total of 16 (23.19%) patients developed any of the three complications monitored in

this study namely, anastomotic leak, wound dehiscence or wound sepsis. All the three complications occurred concurrently in 6 (8.7%) patients; while 8 (11.59%) patients had at least two complications and 2 (2.9%) had a single complication.

Anastomotic leakages occurred in seven of the 69 patients giving an overall prevalence of 10.1% for this complication among patients undergoing emergency laparotomy at KNH. Patients with anastomotic leakages had a significantly longer duration of hospital stay compared to patients without leakages ( $p = 0.0159$ ) similar to the study by Argov et al<sup>11</sup>. There were no statistically significant differences in the ages of patients with and those without leakages ( $p = 0.498$ ).

All the 7 patients with an anastomotic leakage had a drain inserted during the emergency laparotomy procedure.

The commonly used anastomotic technique was double layer technique performed in 57 (82.61%) of cases. The occurrence of an anastomotic leakage did not show a statistically significant association with the anastomotic technique ( $p = 0.596$ ), site ( $p = 0.725$ ) or insertion of a naso-gastric tube ( $p = 0.99$ ) during the laparotomy procedure, this is similar to the findings in a study by Shikata et al<sup>22</sup>.

Out of the 69 patients recruited in the study, 13 (18.8%) developed wound dehiscence following the emergency laparotomy procedure. The duration of hospital stay for patients without wound dehiscence was on average 7.21 days (95% CI-11.46 to -2.96), shorter than the average duration of 14.30 days for patients with wound dehiscence,  $p = 0.0028$ . The ages of these two groups of patients did not differ significantly,  $p = 0.157$ . A higher percentage of patients with jejunal (25.93) anastomosis had wound dehiscence compared to those with ileal (14.63%) anastomosis

but the difference was not statistically significant,  $p = 0.469$ . The prevalence of wound dehiscence in patients with the double and single layer technique did not show statistical significance ( $p = 0.220$ ). Surgical training did not show a significant association with occurrence of dehiscence ( $p = 0.378$ ).

Wound sepsis occurred in 16 of the 69 patients giving an overall complication prevalence of 23.2% among patients undergoing emergency laparotomy at KNH. Patients with wound sepsis had a significantly longer duration of hospital stay (mean = 14.12) compared to those without wound sepsis (mean = 6.73),  $p = 0.0003$ .

Intra-operative antibiotic administration did not show a statistically significant association with the occurrence of wound sepsis ( $p = 0.746$ ). There was also no significant association between anastomotic site and development of wound sepsis ( $p = 0.827$ ). All the 16 patients who developed wound sepsis had a drain inserted during the emergency procedure. The rate of occurrence of wound sepsis following laparotomy was not significantly associated with the level of training of surgical SHOs.

## Chapter 6: CONCLUSION

This study demonstrated marked similarity in the outcomes of patients undergoing laparotomy at Kenyatta National Hospital and prevalence of three different complications of small gut anastomosis. The prevalence of anastomotic leakage, wound dehiscence and wound sepsis ranged from 10.1% to 23.8%. The findings are similar to those of existing studies conducted in low income countries.

The study found that duration of hospital stay in patients with any of the three complications was significantly longer than that of patients who do not develop complications thus increasing the morbidity. Patient characteristic did not predict the occurrence of surgical complications and the use of intra-abdominal cavity drain or naso-gastric decompression did not offer added advantage. Surgical technique has not been shown to influence prevalence of outcomes, whether you use single or double layer the out- come is still the same.

The findings reported in this study are important for several reasons. First, these results can be directly generalized in developing countries settings, which have a depth of research evidence on the complications of small gut surgery. Secondly, the study documents shorter durations of stay for patients without complications. This finding has important cost implications especially in settings where health care resources are constrained.

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## **Chapter 7: RECOMMENDATION**

Most of the anastomosis done were double layer as compared to single layer even though the current practice is advocating for single layer anastomosis because it takes less time and is cost effective with the same outcome. Possible recommendation is for the surgical SHOs to have a workshop which will emphasize on the single layer technique in laparotomy with intestinal anastomosis. Areas that need further research is probably to recommend a study which will compare the outcomes of single layer versus double layer intestinal anastomosis at KNH.

## REFERENCE

1. Irvin T: Abdominal pain; a surgical audit of 1190 emergency admissions. *Br J Surg* 76:1121, 1987.
2. KNH medical records department: Surgical admission from 2010 – 2011 accessed February 2011.
3. Brooks DC, Zinner MJ: Surgery of Small and Large Bowel. In *Maingot's Abdominal Operations, Volume 2*. 10th edition. Edited by: Zinner MJ. Stamford: Appelton & Lange; 1997: 1309-1310.
4. Cohen Z, Sullivan B: Intestinal anastomosis. In: Wilmore DW et al., *ACS Surgery, Principles and Practice*. New York, WebMD. 2002-803-805.
5. Thompson WHF, Robinson MHE: One-layer continuously sutured colonic anastomosis. *Br J Surg*; 1993; **80**: 1450-1451.
6. AhChong AK, Chiu KM, Law IC, Chu MK, Yip AW: Single-layer continuous anastomosis in gastrointestinal surgery: a prospective audit. *Aust NZ J Surg*; 1996; **66**: 34-36.
7. Sarin S, Lightwood RG: Continuous single-layer gastrointestinal tract anastomosis: a prospective audit. *Br J Surg*; 1989; **76**: 493-495.
8. Brodsky JT, Dadian N: Single-layer continuous suture of gastrojejunostomy. *Am J Surg*; 1997; **63**: 395-398.
9. Hautefeuille P. Reflexions sur les sutures digestives: a propos de 570 sutures accomplies depuis 5 ans au surjet monoplane de monobrin. *Chirurgie* 1976; **102**: 153-165.
10. Allen TW, Salem RJ, Stirman JA: Continuous sutures for single layer enteroanastomoses. Read before the Texas Surgical Society, Austin, TX, Oct. 1, 1979.

11. Argov S, Goldstein I, Barzilai A: Is routine use of the nasogastric tube justified in upper abdominal surgery? *Am J Surg* 1980 **139**:849 - 850.
12. Heughan C, Grislis G, Hunt TK. The effect of anemia on wound healing. *Ann Surg* 1974; **179**: 163.
13. Munday C, McGinn FP: A comparison of polyglycolic acid and catgut sutures in rat colonic
14. Khoury GA, Waxman BP: Large bowel anastomosis: I. The healing process and sutured anastomoses: a review. *Br J Surg* 1983 **70**:61.
15. Schrock TR, Deveney CW, and Dunphy JE: Factors contributing to leakage of colonic anastomoses. *Ann Surg* 1973 **177**:513.
16. Daly JM, Vars HM, Dudrick SJ: Effects of protein depletion on strength of colonic anastomoses. *Surg Gynecol Obstet* 1972 **134**:15 - 21.
17. Tagart RE: Colorectal anastomosis: factors influencing success. *J R Soc Med* 1981 **74**:111 – 118.
18. Koruda MJ, Rolandelli RH: Experimental studies on the healing of colonic anastomoses. *J Surg Res* 1990 **48**:504-515.
19. Olsen GB, Letwin E, Williams HT: Clinical experience with the use of a single-layer intestinal anastomosis. *Can J Surg* 1968 **11**:97- 100.
20. Irvin TT, Goligher JC: Aetiology of disruption of intestinal anastomoses. *Br J Surg* 1973 **60**:461- 464.
21. Burch JM, Franciose RJ, Moore EE: Single-layer continuous versus two-layer interrupted intestinal anastomosis: a prospective randomized trial. *Ann Surg* 2000 **231**:832 - 837.
22. Shikata S, Yamagishi H, Taji Y, Shimada T, Noguchi Y. Single-versus two-layer intestinal anastomosis: a meta-analysis of randomized controlled trials. *BMC Surg*; 2006; 6: 2.

23. Burg R, Geigle CF, Faso JM, Theuerkauf FJ Jr: Omission of routine gastric decompression. *Dis Colon Rectum* 1978 **21**:98 – 100.
24. Reasbeck PG, Rice ML, Herbison GP: Nasogastric intubation after intestinal resection. *Surg Gynecol Obstet* 1984 **158**:354 -358.
25. Argov S, Goldstein I, and Barzilai A: Is routine use of the nasogastric tube justified in upper abdominal surgery? *Am J Surg* 1980 **139**:849 - 850.
26. Merad F, Yahouchi E, Hay JM, et al: Prophylactic abdominal drainage after elective colonic resection and suprapromontory anastomosis: a multicenter study controlled by randomization. French Associations for Surgical Research. *Arch Surg* 1998 **133**:309 - 314.
27. Yates JL: An experimental study of the local effects of peritoneal drainage. *Surg Gynecol Obstet* 1905 **1**:473.
28. Merad F, Hay JM, Fingerhut A: Is prophylactic pelvic drainage useful after elective rectal or anal anastomosis? A multicenter controlled randomized trial. French Association for Surgical Research. *Surgery* 1999 **125**:529 – 535.
29. Shahanam Askarpour, M Sarmast, et al; Comparison of single and double layer anastomosis in Ahwaz Educational Hospital (2005-2006). *The Internet Journal of surgery: 2010 Volume 23 Number 2.*
30. Everett WG: A comparison of one layer and two layer techniques for colorectal anastomosis. *Br J Surg* 1975, **62**:135-140.
31. Ordorica-Flores RM, Bracho-Blanchet E, Nieto-Zermeno J, Reyes-Retana R, Tovilla-Mercado JM, Leon-Villanueva V, Varela-Fascinetto G: Intestinal anastomosis in children: a comparative study between two different techniques. *J Pediatr Surg* 1998, **33**:1757-1759.

**APPENDIX 1: CONSENT BY THE PARTICIPATING PATIENTS' PARENTS/  
GUARDIANS**

**Study No.....**

**Hospital.....**

**Hospital No.....**

**Purpose of the study**

The purpose of this study is to document outcome of intestinal anastomosis at the Kenyatta National Hospital. The information gathered will be used to determine the outcome of intestinal anastomosis in relation to the technique and complications after laparotomy with intestinal anastomosis.

**Risks and benefits**

This study will provide clinicians with essential information on the outcome of small gut anastomosis in relation to the complications which will occur may form the basis for future studies in which patients will benefit. There is no harm or risk anticipated for participating in this study. However, if a complication does arise appropriate treatment will be given. No additional tests outside the usual ones for treatment will be carried out and no extra cost to you will be incurred for participating in the study.

**Voluntary participation**

Participation in this study is out of your own free will. Medical care will not be denied in case you decline to participate in the study. You may terminate participation at any time with no consequences whatsoever.

**Confidentiality**

All information will be treated with confidentiality. Your identity will not be published.

I the undersigned have been explained to and understand the above and voluntarily accept to participate in the study.

Signature/Thumb print:

(patient, parent, guardian].....

Telephone number (parent/patient, guardian): .....

For any enquiries or further clarification, please contact the following people

- 1. DR KHERI HASSAN – Tel 0722 265625**
- 2. CHAIRMAN, KENYATTA NATIONAL HOSPITAL ETHICS & RESEARCH COMMITTEE 0202726300- Extension 4435**

## **PPENDIX II: KIBALI CHA RUHUSA**

**Ambari ya utafiti:.....**

**Hospitali:.....**

**Ambari ya Hospitali:.....**

### **Sababu ya utafiti**

Utafiti huu unafanywa kuchunguza matokeo ya upasuaji na kuunganisha matumbo madogo.

Utafiti huu utafanyika katika hospitali kuu ya Kenyatta. Taarifa zitakazokusanywa zitatumika kufahamisha wapasuaji na kuwapa ujuzi zaidi.

### **Hatari na manufaa**

Utafiti huu utatoa taarifa muhimu kwa madaktari kuhusu matokeo ya upasuaji wa kuunganisha matumbo madogo (intestinal anastomosis). Huenda ikawa itatengeneza msingi wa masomo ya baadaye ambayo wagonjwa watakaofaidika na upasuaji wa matumbo madogo na kuunganisha. Hakuna madhara au hatari yanayotarajia kwa kushiriki katika utafiti huu. Hata hivyo, kama matatizo yatatokea wakati wa upasuaji au baadaye, matibabu zinazofaa zitapewa.

Hakuna vipimo vya ziada isipokuwa yale ya kawaida kwa matibabu yatakayofanika. Hakuna gharama za ziada zitakazostahitika na wanaoshiriki katika utafiti huu.

## **Uhusika Kwa hiari**

Kuhusika kwa utafiti huu ni kwa hiari yako mwenyewe na hauwezi kushurutishwa. Utahudumiwa ata kama ukikataa kuhusika kwa huu utafiti. Una uhuru kutamatisha kuhusika wakati wowote bila madhara yoyote ile.

## **Usiri**

Habari zozote utakazotoa zitawekwa kwa siri na jina lako halitachapishwa popote.

Ninathibitisha yakuwa nimefahamu yale nimeelezwa na mtafiti na nimekubali kwa hiari yangu mwenyewe kuhusika katika utafiti huu.

Sahihi/Kidole cha Gumba:

(Mgonjwa, Mzazi / Mlinzi) ... ..

Namba ya simu (Mgonjwa, mzazi / mlezi): ... ..

Kwa maswali yoyote au ufafanuzi zaidi, tafadhali wasiliana na watu wafuatao

- 1. Dkt. KHERI HASSAN : SIMU 0722265626**
- 2. MWENYEKITI WA KAMATI YA MAADILI NA UTAFITI YA HOSPITALI KUU YA KENYATTA O202726300-4435**

**APPENDIX III : QUESTIONNAIRE**

**DATA COLLECTION SHEET**

**SECTION: A.**

**TO BE COMPLETED BY PATIENT**

Name .....

Age.....

Sex.....

Date of admission.....

Admission No.....

Date of operation.....

Emergency

Surgeon SHO Year                      1                      2                      3                      4  
                                                                 

Indication for surgery \_\_\_\_\_

**PRE-OPERATIVE**

HB.....

Yes

NO

Diabetes

Systematic Disease

Pre-operative antibiotic

Blood supply to cut end

Bacterial contamination

Abdominal sepsis

**Intra operative**

Site of anastomosis  Duodenum  ileum   
 jejunum

**Anastomotic Techniques**

Single VS double  single  double

Suture material -----

Drain  yes  No

Intra-operative antibiotic  yes  No

N.G tube  yes  No

If yes removed after day 

1	2	3	4	5
---	---	---	---	---

Anastomotic leakage  Yes  No

Relaparotomy

Yes

No

Hospital stay post operative .....

1

2

3

Wound dehiscence Yes

NO

Wound sepsis Yes

NO

DOCTOR'S NAME: \_\_\_\_\_

SIGNATURE: \_\_\_\_\_

**APPENDIX IV: APPROVAL LETTER FROM KNH-ERC**



**KENYATTA NATIONAL HOSPITAL**  
Hospital Rd. along, Ngong Rd.  
P.O. Box 20723, Nairobi.  
Tel: 726300-9  
Fax: 725272  
Telegrams: MEDSUP", Nairobi.  
Email: [KNHplan@Ken.Healthnet.org](mailto:KNHplan@Ken.Healthnet.org)  
5<sup>th</sup> September 2011

Ref: KNH-ERC/ A/231

Dr. Hassan M. Kheri  
Dept. of Surgery  
School of Medicine  
University of Nairobi

Dear Dr. Kheri

**Research proposal: "Outcomes of small intestine Anastomosis at Kenyatta National Hospital.  
A cross-sectional Observational study" (P286/07/2011)**

---

This is to inform you that the KNH/UON-Ethics & Research Committee has reviewed and **approved** your above cited research proposal. The approval periods are 5<sup>th</sup> September 2011 to 4<sup>th</sup> September 2012.

You will be required to request for a renewal of the approval if you intend to continue with the study beyond the deadline given. Clearance for export of biological specimens must also be obtained from KNH/UON-Ethics & Research Committee for each batch.

On behalf of the Committee, I wish you a fruitful research and look forward to receiving a summary of the research findings upon completion of the study.

This information will form part of the data base that will be consulted in future when processing related research study so as to minimize chances of study duplication.

Yours sincerely

**PROF A N GUANTAI**  
**SECRETARY, KNH/UON-ERC**

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c.c. The Deputy Director CS, KNH  
The Dean, School of Medicine, UON  
The Chairman, Dept. of Surgery, UON  
The HOD, Medical Records, KNH  
Supervisors: Mr. Kimanthy Kimende S.G, Dept. of Surgery, UON  
Dr. Wambugu P, Dept. of Surgery, UON