TOPIC:


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DECLARATION:

THIS THESIS IS MY ORIGINAL WORK AND HAS NOT BEEN PRESENTED FOR A DEGREE IN ANY OTHER UNIVERSITY.

CANDIDATE.

THIS THESIS HAS BEEN SUBMITTED FOR EXAMINATION WITH MY APPROVAL.

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FINALLY MY SPECIAL THANKS TO JULIET MY DAUGHTER FOR
HAVING BEEN TOLERANT.
IV.

CONTENTS:-

<table>
<thead>
<tr>
<th>CONTENTS</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>SUMMARY</td>
<td>1</td>
</tr>
<tr>
<td>CHAPTER I - INTRODUCTION</td>
<td>4</td>
</tr>
<tr>
<td>- AIMS AND OBJECTIVES</td>
<td>5</td>
</tr>
<tr>
<td>- HISTORICAL REVIEW</td>
<td>7</td>
</tr>
<tr>
<td>CHAPTER 2. MATERIAL AND METHODS</td>
<td>16</td>
</tr>
<tr>
<td>CHAPTER 3. RESULTS</td>
<td>18</td>
</tr>
<tr>
<td>CHAPTER 4. DISCUSSION</td>
<td>69</td>
</tr>
<tr>
<td>CHAPTER 5. CONCLUSION</td>
<td>86</td>
</tr>
<tr>
<td>CHAPTER 6. REFERENCE INDEX</td>
<td>90</td>
</tr>
</tbody>
</table>
SUMMARY

The pattern of complication in Kenyatta National Hospital is as found in other centres.

Pulmonary complication occurred in 3.37% of all laparotomies, with males predominating. Pulmonary complication associated with abdominal distension carried a poor prognosis. Majority of complications occurred on the first day postoperatively. Cases of high incisions of the abdomen developed pulmonary complication much more than any other incision.

Abdominal distension occurred in 2.77% of the laparotomies. Patients either improved spontaneously between 3rd - 7th day or they died in the same period. The males also predominated

Postoperatively adhesions occurred in 2.5% of the laparotomies. The females predominated in the ratio of F:M A:3. The peak age group in which adhesions did occur was in the 20-29 year age group. Most of the adhesions manifested themselves in less than two months time. 59.17% of the cases had to undergo laparotomy to relieve the obstruction.
Burst abdomen occurred in 2:47\textsubscript{r} of the laparotomies. The males predominated with a M:F ratio of 2:1. Majority of wounds burst when the stitches were removed on the same day. The majority of burst abdomen occurred between the 7th day and the 12th day.

Incision hernias occurred in 1.2\% of the cases. The factors that played in developing these hernias were as follows:

1. Post operative distension.
2. Respiratory complication leading to coughing.
3. Wound sepsis

Post operative infection occurred in 4.7\textsubscript{r} of the laparotomies with a ratio of M:F 2:1. The highest incidence occurred in the 0-10 age group. The neonates, children on antineoplastic chemotherapy and those with heavy worm infestation did develop septicaemia. The 8th day was the peak of infection.
Death occurred in 27%, of the cases that underwent laparotomy.

The causes of the death were:

1. Respiratory complication.
2. Shock either due to gram negative septicaemia or haemorrhage.
3. Heavy sedation occurred in one case.
4. The disease process.

Urinary retention occurred in 0.1% and all these patients did not receive analgesics post operatively. The males were more affected than females.

DVT occurred in 0.1%. It did occur in a lady with an ovarian Tumour.
Laparotomy is defined as a surgical incision through the flank, more generally, abdominal section at any point. (Dorland's Medical Dictionary). This is a procedure used by surgeons and gynaecologist for diagnostic or therapeutic purposes. While it is a procedure aimed at helping the patient on the way to recovery or helping the surgeon or gynaecologist to arrive at a diagnosis to initiate an appropriate treatment; it is fraud with complications. 80, 57, 32, 70.

It is in view of this that the study was undertaken to establish the pattern of complication of laparotomy in Kenyatta National Hospital. This is a teaching and national referal hospital. The surgical operations are done by the consultant surgeon and gynaecologist or surgical and gynaecological Registrars.
1.2 **OBJECTIVES:**

The aim was to find out what type of complication have occurred following laparotomy and to establish any pattern in relation to the following:

1. Sex
2. Age
3. Transfusions intra and post operatively (anaemia)
4. Smoking
5. Malnutrition

The type of complications looked at were:

1. Respiratory e.g. atelectasis, pneumonia.
2. Wound infections and septicaemia and the type of organisms frequently isolated.
3. Wound dehiscence and incisional hernias.
4. Cardiovascular:
   
   Deep venous thrombosis.
   
   Pulmonary Embolism.
   
   Cardiovascular colapse.
5. Abdominal distension
6. Adhesions
7. Haemorrhage
8. Death.
1.3 HISTORICAL REVIEW:

Abdominal Surgical conditions must be as old as mankind and it is not known as to when was the first laparotomy done (Janssen P.A.) . In the ancient times where history was recorded, it shows that, there were very tough laws governing ancient surgery: In the code of Hamurabi, the babylonian law provided that if a free person died as a result of an operation, the surgeon's right hand was to be cut off, and incase the person was a slave then the surgeon was bound to repay the owner of the slave an equal value. In ancient Persia, Surgeons were not allowed to practice until they performed three successful operations on infidel. If unsuccessful, the surgeon was declared forever to be unfeasible to practice the art.

In such draconic laws, and the absence of antibiotics, anaesthesia and lack of knowledge in anatomy, physiology and aseptic techniques; it is doubtful that major surgery was undertaken in these communities. The same went for Europe. The surgeons were unlettered, low-class men who
were scorned in clerical circles. What was happening in America could probably be illustrated by an episode in which a skilled, brave and lucky physician, Ephraim McDowell in 1809 did a laparatomy on one Jane Todd Crawford in Kentucky, to remove a huge ovarian tumour before the introduction of antisepsis. His townsmen gathered around his house in large numbers with a rope slung over a tree ready for use, if the doctor should fail in the butchery they were convinced he was committing. They might well have hanged him had his patient died. These were really set backs in development of surgery, to take up big operations like laparatomy.

It was during Renaissance that Human anatomy was studied and a book written by William Cheselden in 1713 AD. At about the same time John Hunter was carrying out Pathology, physiology and experiemental surgery, and the marriage of this subjects led to inner depth of surgery. The other setback to major surgery like laparatomy was "Hospitalism"; the term coined by the eighteenth Century
Surgeon who used it to describe postsurgical infection so commonly found in surgical wards; erysipelas, pyemia, septicaemia and hospital gangrene (Jones, J. Koch, R) 

The presence of pus in surgical wound was regarded as laudable by surgeons of eighteenth and nineteenth century. This shows how ignorant the surgeon of the time was about wound infection. It was Joseph Lister who convinced the world that wound infection was evil, not laudable and that it would be effectively prevented (Godlee, R. J.) . About the same time the French Scientist Louis Pasteur formulated Germ theory of disease. The work of this two men led to birth of antisepsis in surgery. As late as 1880s the head, chest, and abdomen were still sanctuaries not to be opened, unless by accident”

With the introduction of anaesthesia and antisepsis laparotomy was still not being done as the problem of stitching gut was real. Guillaume Dupuytren and his student Antoine Lembert did succeed in this field by stitching of gut together
T.B. Murphy in the United States and Lord Moynihan of Leeds in England and others at the turn of the Century led to a vigorous campaign for withholding purgatives and resorting to impromptu surgery. It was not until the German and German-trained Surgeons began putting antisepsis and aseptic principles to work did the techniques of abdominal surgery find their way into common practice. These practices coupled with the use of anaesthesia in this century led to major surgery and laparatomy became frequent. A hurdle that loomed on the horizon in laparatomy was the realization that there were complications associated with this procedure that involved various body systems e.g. Respiratory Cardiovascular, genitourinary and gastrointestinal. This did generate a lot of interest in many scholarly doctors from the late twenties up to today. Various researchers found out that there was a high incidence of pulmonary complication after upper abdominal surgery and low incidence in non abdominal procedures.
And that cigarette smoking and pre-existing chronic respiratory disease were shown to be significant factors in increasing the incidence of post operative pulmonary complication. They found also that there was a sex difference in this complication; men developed post operative pulmonary complications more frequently than women, and that this difference was due to high prevalence of cigarette smoking in men. The duration of operation, wound infection and obesity were shown not to be related to the development of pulmonary complication post operatively.

Trying to look for a way of stopping or reducing the rate of pulmonary complication post operatively, antibiotics were used prophylactically in abdominal surgery. This was shown not to affect the incidence of pulmonary complication.

Elkin D.C. has shown that post operative respiratory complication is a grave situation should it occur. A high proportion of patients die from it.
Despite the advancement in Surgery today burst abdomen still plaques us. Factors associated with it are multifactorial:—

1. Type of patient: The following patients were found to be more susceptible:
   a) Those having cancer.
   b) Jaundiced
   c) Anaemic
   d) Diabetic
   e) Low serum albumin
   f) Wound
   g) Post operative abdominal distension
   h) Malnutrition
   i) Respiratory complication.

2. Type of therapy:—

   Patients receiving the following treatment are susceptible;
   (a) Steroid therapy (b) Radiation\textsuperscript{19,10,70}
3) The technique and suture material. If it is a poor technique burst abdomen in early 1-3 days, layered abdominal closure was found to have a high incidence of burst abdomen 3%. Figure of 8 closure was better than the layered one, incidence of 0.27. While through and through mass closure was the best.\textsuperscript{35,12,25,57b}

4) Sex has been shown to be important in burst abdomen. Males are affected much often than females\textsuperscript{70}.

Most of the factors associated with incisional hernias are more less the same as those of burst abdomen. Midline incision are frequently involved than those of oblique or transverse (Blomstedt).

Deep venous thrombosis is an important clinical entity. Whose clinical diagnosis is notoriously unreliable and insensitive. Reliance on the history and physical examination is likely to result in a false positive diagnosis is about 50% of the cases. Quite often\textsuperscript{50} fatal pulmonary embolism
occurs in patients with no signs suggestive of venous thrombosis. It is with this realisation that has led to more objective diagnostic tests. The current objective tests in use are as follows:-

1. Venography
2. Radioactive fibrinogen uptake test.
3. Ultrasonography.
4. Plethysmography (Susahara)

Lewis has shown clearly that there is venous stasis on the operating table, which results as an effect of anaesthesia, stasis is one of the three criteria of thromboembolism (One of Virchows triad).

POST OPERATIVE INTESTINAL OBSTRUCTION.

Adhesions is one of the leading causes of mechanical intestinal obstruction and it starts from 2nd – 15th day. By the fifteenth day adhesions are complete. They cause intestinal obstruction by simple constriction or by acting as a pivot for the formation of Volvulus. When the
obstruction is due to generalised adhesions the onset of symptoms is variable while when it was due to localised adhesions on the loop of bowel it occurred on 2nd - 7th day (McCune W.S.)^®.
CHAPTER 2.

MATERIAL AND METHOD

This is a retrospective study covering the period 1982 to 1985 inclusive. The files of patients were used, to get material, for this study, from our Record Department. All the files coded as 5-541 according to "International Classification for procedures in medicine (W.H.A. 29.35)" were used. From this particular Code certain types of laparatomies were excluded. This are laparatomies for appendicectomies, inguinal Herniorrhaphys and pelvic abscesses.

The total number of cases which underwent laparatomies excluding the above mentioned were 839 both male and female, and were patients of all ages. Each file was studied to reveal if it showed that the patient had developed a problem after he/she underwent laparotomy. The complication that developed in these patients were identified and labelled by the attending doctor.
The data recorded included sex, age, operation date, date discharged, haemoglobin or palor before operation, transfusion, diagnosis, operation, duration of operation existing medical problem and whether patient smokes, type of incision and whether there were possibilities of wound contamination, highest respiratory rate, dyspnoea, cough pulse, high temperature. Reduced breath sounds, bronchial breathing, wound sepsis, type of organism, abdominal distension, burst abdomen, D.V.T., urinary retention, incisional hernia, adhesions, others and death, with remarks about that patients nutritional status and other general commend which were predisposing to the complication.
CHAPTER 3.

RESULTS.

The total number of males was 390 and females was 449. The number of patients who developed complications were 142 patients with actual complication being 166. This ment that some patients developed more than one complication. This makes a rate of complications of laparatomy to be 15.77%. There were 80 males with post operative complications and 62 females with post operative complications-That is 56.37% males and 43.77% females. The male to female ratio is 13.10.

TABLE I

TABLE FOR SEX DISTRIBUTION.

<table>
<thead>
<tr>
<th>SEX</th>
<th>NUMBER</th>
<th>MEAN AGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>MALES</td>
<td>80</td>
<td>24.7 YEARS</td>
</tr>
<tr>
<td>FEMALES</td>
<td>62</td>
<td>20.5 YEARS</td>
</tr>
<tr>
<td>TOTAL</td>
<td>142</td>
<td></td>
</tr>
</tbody>
</table>

THE AGES RANGED FROM DAY 1 - 70 YEARS.
TABLE 2.

TABLE FOR CONDITIONS THAT DEVELOPED RESPIRATORY PROBLEMS.

<table>
<thead>
<tr>
<th>AGE</th>
<th>CONDITION</th>
<th>SEX</th>
<th>DAY OF RESPIRATORY PROBLEM</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 days</td>
<td>Duodenal Atresia</td>
<td>F</td>
<td>1</td>
</tr>
<tr>
<td>9 days</td>
<td>Ascending Colon Atresia</td>
<td>F</td>
<td>1</td>
</tr>
<tr>
<td>7 days</td>
<td>Annular pancreas</td>
<td>F</td>
<td>2</td>
</tr>
<tr>
<td>12 days</td>
<td>Annular pancreas</td>
<td>F</td>
<td>1</td>
</tr>
<tr>
<td>9 months</td>
<td>Hirshsprungs disease</td>
<td>F</td>
<td>2</td>
</tr>
<tr>
<td>1 year</td>
<td>Intususception</td>
<td>M</td>
<td>1</td>
</tr>
<tr>
<td>1 Year</td>
<td>Hirshsprungs disease</td>
<td>F</td>
<td>1</td>
</tr>
<tr>
<td>yrs</td>
<td>Hirshisprung disease</td>
<td>M</td>
<td>3</td>
</tr>
<tr>
<td>yrs</td>
<td>Wilms Tumour</td>
<td>F</td>
<td>1</td>
</tr>
<tr>
<td>1h yrs,</td>
<td>Intestinal obstruction</td>
<td>M</td>
<td>1</td>
</tr>
<tr>
<td>17/12 yrs</td>
<td>Hirshisprungs disease</td>
<td>M</td>
<td>2</td>
</tr>
<tr>
<td>2\ years</td>
<td>Intususception</td>
<td>M</td>
<td>1</td>
</tr>
<tr>
<td>4 yrs</td>
<td>Achalasie condia</td>
<td>M</td>
<td>2</td>
</tr>
<tr>
<td>7 yrs</td>
<td>Mesenteric Cyst</td>
<td>M</td>
<td>1</td>
</tr>
<tr>
<td>8 yrs</td>
<td>Hepatic hydatid cyst</td>
<td>F</td>
<td>1</td>
</tr>
<tr>
<td>19 yrs</td>
<td>Ectopic Pregnancy</td>
<td>F</td>
<td>10</td>
</tr>
<tr>
<td>20 yrs</td>
<td>Chronic Duodenal Ulcer</td>
<td>M</td>
<td>1</td>
</tr>
<tr>
<td>20 yrs</td>
<td>Ruptured Ectopic</td>
<td>F</td>
<td>3</td>
</tr>
<tr>
<td>24 yrs</td>
<td>Ruptured spleen</td>
<td>F</td>
<td>2</td>
</tr>
<tr>
<td>27 yrs</td>
<td>Diaphragmatic Hernia</td>
<td>M</td>
<td>1</td>
</tr>
<tr>
<td>28 yrs</td>
<td>Duodenal Ulcer</td>
<td>M</td>
<td>4</td>
</tr>
<tr>
<td>31 yrs</td>
<td>Perforate duodenal ulcer</td>
<td>M</td>
<td>4</td>
</tr>
<tr>
<td>36 yrs</td>
<td>Abdominal wall wound</td>
<td>M</td>
<td>2</td>
</tr>
<tr>
<td>36 yrs</td>
<td>Ruptured Uterus</td>
<td>F</td>
<td>2</td>
</tr>
<tr>
<td>40 yrs</td>
<td>Hydatid Disease</td>
<td>F</td>
<td>1</td>
</tr>
<tr>
<td>42 yrs</td>
<td>Pyloric Stenosis</td>
<td>M</td>
<td>2</td>
</tr>
<tr>
<td>47 yrs</td>
<td>Duodenal Ulcer</td>
<td>M</td>
<td>1</td>
</tr>
<tr>
<td>70 yrs</td>
<td>Volvulus small gut</td>
<td>M</td>
<td>1</td>
</tr>
</tbody>
</table>
There were a total of 28 cases that developed respiratory complications. This gave an incidence 3.3% of the total and 19.7% of the complicated cases.

The surprising fact that was observed is that, despite chest problem occurring, there were no chest x-rays requested.

SEX INCIDENCE:-

There were 15 males making an incidence of 53.5% while the females were 13 or 46.5%.

<table>
<thead>
<tr>
<th>SEX</th>
<th>NUMBER</th>
<th>PERCENTAGE</th>
<th>RATIO</th>
</tr>
</thead>
<tbody>
<tr>
<td>MALES</td>
<td>15</td>
<td>53.5%</td>
<td>6</td>
</tr>
<tr>
<td>FEMALES</td>
<td>13</td>
<td>46.5%</td>
<td>5</td>
</tr>
</tbody>
</table>
THE AGE INCIDENCE:

Majority of patients with respiratory complications were in the age group 0-9 years. This age group claimed 15 of them out of 28. This is more than a half 53.57". Eleven of them were below two years of age. This is also the age group in which most patients would have their incisions made above the umbilicus. This is the transverse incision.

The age group 10-19 years had 3 patients. 10.7%. Age group 20-29 had another 10.7%. 30-39 3 patients another 10.7%. The age group 40-49 year group had 10.7%. 50-59, 60-69 did not have any patient. In the age group of 70-79 there was only one patient.

This results are better depicted on the histogram showing the number of cases that developed respiratory complication.
TABLE 4.

TABLE FOR AGE COHORT DISTRIBUTION.

<table>
<thead>
<tr>
<th>AGE</th>
<th>0-9</th>
<th>10-19</th>
<th>20-29</th>
<th>30-39</th>
<th>40-49</th>
<th>50-69</th>
<th>70-79</th>
</tr>
</thead>
<tbody>
<tr>
<td>NUMBER OF CASES</td>
<td>15</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>PERCENTAGE</td>
<td>53.3</td>
<td>10.7</td>
<td>10.7</td>
<td>10.7</td>
<td>10.7</td>
<td>3.6</td>
<td></td>
</tr>
</tbody>
</table>
THE INCIDENCE ON THE DAY OF COMPLICATION:-

The respiratory complication occurred more frequently on the first day post operatively. Out of 28 cases, 15 of them (53.57%), had showed that there was a problem with their pulmonary function. The second day showed 8 cases, that is 28.67%. The third and fourth day each had 2 patients respectively. A rate of 7.1%, on the 10th day one patient developed respiratory problem. This results are better depicted on the histogram and table.

TABLE 5.

<table>
<thead>
<tr>
<th>DAY OF COMPLICATION</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>NO. OF PATIENTS</td>
<td>15</td>
<td>8</td>
<td>2</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>PERCENTAGE</td>
<td>53.5</td>
<td>28.6</td>
<td>7.1</td>
<td>7.1</td>
<td>3.6</td>
</tr>
</tbody>
</table>
CIGARETTE SMOKING

In this series of study, there was only one patient who was documented as a cigarrete smoker. This patient did not develop respiratory problem at all.

CASES THAT DEVELOPED PULMONARY COMPLICATION AND OTHER COMPLICATIONS:-

In the 28 cases of pulmonary complication there were some cases which developed other complication.

There were such 12 cases which developed abdominal distension on top of the pulmonary complication. It is not indicated in the files which complication appeared first. This is a high proportion, 42.9\% of the 28 cases.

Of these 12 cases, seven patients died. This is 58.3\% of 42.9\% of the 12 cases. There were 6 males and one female in the group of patients who died.
TABLE 6:

TABLE FOR PATIENTS WHO DIED.

<table>
<thead>
<tr>
<th>SEX</th>
<th>NO. OF PATIENTS</th>
<th>RATIO</th>
</tr>
</thead>
<tbody>
<tr>
<td>MALE</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>FEMALE</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>TOTAL</td>
<td>7</td>
<td></td>
</tr>
</tbody>
</table>

These patients died between the 3rd day and 7th day.
Four patients died on the 3rd day two on the 4th day and one on the seventh day.

THE SITE OF INCISION:

The incision were put into 3 categories with the umbilicus as a reference point.

1. High incision was the one situated above the umbilicus.

2. Medium incision, this was the one situated such that it was both above and below the umbilicus.

3. Low incision, this was the one situated below the umbilicus.

there were sixteen cases of the high incision group. Six of the medium group and six of the low incision group
**TABLE 7:**

**TABLE OF INCISIONS:**

<table>
<thead>
<tr>
<th>SEX</th>
<th>HIGH</th>
<th>MEDIUM</th>
<th>LOW</th>
<th>OVERAL</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>MALES</td>
<td>10</td>
<td>4</td>
<td>1</td>
<td></td>
<td>15</td>
</tr>
<tr>
<td>FEMALES</td>
<td>6</td>
<td>2</td>
<td>5</td>
<td></td>
<td>13</td>
</tr>
<tr>
<td>TOTAL</td>
<td>16</td>
<td>6</td>
<td>6</td>
<td></td>
<td>28</td>
</tr>
</tbody>
</table>
FIGURE 1.
HISTOGRAM OF THE NUMBER OF CASES THAT DEVELOPED RESPIRATORY PROBLEMS AND DAY OF COMPLICATION.

NO OF CASES THAT DEVELOPED RESPIRATORY COMPLICATION AND THE DAY THEY OCCURRED.
FIGURE 2.

HISTOGRAM SHOWING THE NUMBER OF CASES THAT DEVELOPED RESPIRATORY COMPLICATION POSTOPERATIVELY AND AGE COHORT.
HOW THEY PRESENTED:

The most frequently found symptom was cough followed by dyspnoea. The signs which were present consistently were increased respiratory rate and pulse. Following these, patients had an elevated temperature in 25 of 28 cases. The temperature was of low grade one in most cases. There were six patients with a temperature of 39°C and this were cases which had typical features of pneumonia. Bronchial breathing and reduced breath sounds were reported in some cases. Adventitious breath sounds were heard in 20 cases.

In this 28 cases, most patients received blood transfusions. 25 cases out of 28 had received transfusion intra-operatively. Non had any reaction.
3.3. RESULTS ON ABDOMINAL DISTENSION

TABLE 8 SHOWING AGE, DIAGNOSIS, DURATION OF ABDOMINAL DISTENSION AND SEX.

<table>
<thead>
<tr>
<th>Age</th>
<th>Sex</th>
<th>Condition</th>
<th>Surgery/Involve-ment</th>
<th>Distension</th>
<th>Abdominal</th>
</tr>
</thead>
<tbody>
<tr>
<td>9 days</td>
<td>M</td>
<td>Ascending Colon</td>
<td>Resection and Anastomosis</td>
<td>died 3rd day</td>
<td>+</td>
</tr>
<tr>
<td>9 Months</td>
<td>M</td>
<td>Hirshsprungs disease</td>
<td>Resection and Colostomy</td>
<td>Died 7th day</td>
<td>+</td>
</tr>
<tr>
<td>10 Months</td>
<td>F</td>
<td>Internal Obstruction</td>
<td>Milking worms in colon</td>
<td>5 days</td>
<td>-</td>
</tr>
<tr>
<td>1 yr</td>
<td>M</td>
<td>Hirshsprungs disease</td>
<td>Resection and pull through</td>
<td>4 days</td>
<td>+</td>
</tr>
<tr>
<td>\ yrs</td>
<td>F</td>
<td>Intussusception</td>
<td>Reduction</td>
<td>Died 4 days</td>
<td>-</td>
</tr>
<tr>
<td>\ yrs</td>
<td>M</td>
<td>Hirshsprungs</td>
<td>Resection and pull through</td>
<td>5 days</td>
<td></td>
</tr>
<tr>
<td>3 yrs</td>
<td>M</td>
<td>Abdominal Lymphoma</td>
<td>Biopsy</td>
<td>Died 3rd day</td>
<td>+</td>
</tr>
<tr>
<td>12 yrs</td>
<td>M</td>
<td>Intestinal Obstruction</td>
<td>Untwisting</td>
<td>Died 4th day</td>
<td>+</td>
</tr>
<tr>
<td>21 yrs</td>
<td>F</td>
<td>Intestinal Obstruction</td>
<td>Releasing adhesion</td>
<td>4 days</td>
<td></td>
</tr>
</tbody>
</table>
3.3. RESULTS ON ABDOMINAL DISTENSION

TABLE 8 SHOWING AGE, DIAGNOSIS, DURATION OF ABDOMINAL DISTENSION AND SEX.

<table>
<thead>
<tr>
<th>AGE</th>
<th>SEX</th>
<th>CONDITION</th>
<th>SURGERY</th>
<th>RESPIRATORY INVOLVEMENT</th>
<th>DURATION OF DISTENSION</th>
</tr>
</thead>
<tbody>
<tr>
<td>24 yrs</td>
<td>F</td>
<td>Ruptured Ectopic pregnancy</td>
<td>Salpingectomy</td>
<td></td>
<td>4 days</td>
</tr>
<tr>
<td>24 yrs</td>
<td>F</td>
<td>Tubal Ovarian Mass</td>
<td>Salpingectomy</td>
<td>-</td>
<td>5 days</td>
</tr>
<tr>
<td>24 yrs</td>
<td>M</td>
<td>Stab wound</td>
<td>Exploration</td>
<td>+</td>
<td>5 days</td>
</tr>
<tr>
<td>27 yrs</td>
<td>M</td>
<td>Ruptured spleen</td>
<td>Splenectomy</td>
<td></td>
<td>4 days</td>
</tr>
<tr>
<td>28 yrs</td>
<td>M</td>
<td>Perforate D/U</td>
<td>Repair</td>
<td>+</td>
<td>4 days</td>
</tr>
<tr>
<td>28 yrs</td>
<td>M</td>
<td>Ruptured jejunum</td>
<td>Repair</td>
<td></td>
<td>6 days</td>
</tr>
<tr>
<td>32 yrs</td>
<td>F</td>
<td>Reptured Ectopic</td>
<td>Salpingectomy</td>
<td></td>
<td>3 days</td>
</tr>
<tr>
<td>36 yrs</td>
<td>M</td>
<td>Stab wound</td>
<td>Exploration</td>
<td>+</td>
<td>5 days</td>
</tr>
<tr>
<td>36 yrs</td>
<td>M</td>
<td>Ruptured Spleen</td>
<td>Splenectomy</td>
<td>-</td>
<td>4 days</td>
</tr>
<tr>
<td>40 yrs</td>
<td>M</td>
<td>Hydatid disease</td>
<td>Excision</td>
<td>+</td>
<td>Died 3rd day</td>
</tr>
<tr>
<td>40 yrs</td>
<td>F</td>
<td>Intestinal Obstruction</td>
<td>F.B. Removal</td>
<td></td>
<td>7 days</td>
</tr>
<tr>
<td>44 yrs</td>
<td>F</td>
<td>Cystic Masses</td>
<td>Excision</td>
<td></td>
<td>days</td>
</tr>
</tbody>
</table>
3.3. RESULTS ON ABDOMINAL DISTENSION

Table 8 showing age, diagnosis, duration of abdominal distension and sex.

<table>
<thead>
<tr>
<th>AGE</th>
<th>SEX</th>
<th>CONDITION</th>
<th>SURGERY</th>
<th>INVolVEMENT</th>
<th>DISTENSION</th>
<th>ABDOMEN</th>
</tr>
</thead>
<tbody>
<tr>
<td>55 yrs</td>
<td>M</td>
<td>Stab wound I</td>
<td>Exploration</td>
<td>+</td>
<td>Died</td>
<td></td>
</tr>
<tr>
<td>60 yrs</td>
<td>M</td>
<td>Ca Rectuii</td>
<td>Abdominal Perineal Resection</td>
<td>+</td>
<td>6 days</td>
<td></td>
</tr>
</tbody>
</table>

KEY

+ Complication present
- Complication not present
M- Male
F- Female.
ABDOMINAL DISTENSION:

There is a mild paralytic ileus after laparotomy, but soon the patient recovers in a few hours. The cases selected in this group are those whose abdominal distension was more than 48 hours.

There were 23 such cases out of 839 laparatomies. That is 2.7% of laparatomies. Their ages varied from 9 days old to 60 years old. See table 8.

There were 14 males and 9 women. These is 56.17% males and 43.87% females. The other complication that were associated with abdominal distension were respiratory complications and burst abdomen. There were twelve cases of abdominal distension and respiratory complication of the twelve cases, seven died. Their death occured on 3rd - 7th day. There were 4 patients who died on the 3rd day, two on the 4th day and one on the 7th day. The other complication of burst abdomen, was in one case only.
The abdominal distension lasted between 3 and seven days which resolved spontaneously except for the seven cases who died.

3.4 ADHESIONS:

There were 21 cases out of 839 patients who underwent laparotomy. This makes an incidence of 2.5%. This percentage is of the people who developed adhesions postoperatively.

The adhesions manifested themselves with features of intestinal obstruction which was total or incomplete. The remaining two cases were asymptomatic. The adhesions were identified with a second look. One of the two cases was a ruptured, ectopic pregnancy which led to salpingectomy. When she had a second ruptured ectopic,a second laparotomy was done and this is the time adhesions were identified. The other patient a second look "was afforded when Hartmann's Colostomy was closed. There were abundant adhesions."
SEX INCIDENCE:-

In the 21 cases, there were 12 females who developed adhesions. 11 symptomatically and one on second look. There were 9 males in this group, eight of them symptomatic and one of them on second look. The difference between this two is small and the figures themselves are small.

TABLE 9.

TABLE OF SEX RATIO

<table>
<thead>
<tr>
<th>SEX</th>
<th>NO. OF PATIENTS</th>
<th>RATIO</th>
</tr>
</thead>
<tbody>
<tr>
<td>FEMALES</td>
<td>12</td>
<td>4</td>
</tr>
<tr>
<td>MALES</td>
<td>9</td>
<td>3</td>
</tr>
<tr>
<td>TOTAL</td>
<td>21</td>
<td></td>
</tr>
</tbody>
</table>

AGE INCIDENCE:-

The ages varied from 4 days old to 70 years. There was only one patient below one year. There were three below 10 years. The age group between 10-19 yrs had three patients also. There was a sudden rise in the number of patients in the age group of 20-29. The next age group of 30-39 had the same number as the earlier two age groups, that is 3 patients. From the
FIGURE 3.

HISTOGRAM SHOWING AGE INCIDENCE
remaining age groups from 40 years of age group. This results are better represented graphically on the histogram. See the histogram. Figure 3.

It is interesting to note also that the peak incidence of adhesions postoperatively occurred between 20-29 years of age. This is also the age group in which the mean age of the patients who underwent laparotomy falls.

FROM OPERATION TO PRESENTATION OF INTESTINAL OBSTRUCTION:

The earliest time this cases presented with features of intestinal obstruction was in 3 weeks time. There were 8 cases who presented within one month. In the following month 7 more cases presented. In two months time 15 cases out of 21 had manifested themselves with either complete or incomplete intestinal obstruction. This is 71.47% of the group in consideration, which presented in 2 months. Two cases presented after 6 months post-operatively and one more case at seven months. In only seven months 85.77, of the cases had presented to the hospital's casualty department with features of intestinal obstruction, the remaining 3 cases or 14.37% presented much later; one at 2 years and 2 at 3 years after laparotomy. Refer table 10.
Presenting such scattered figures graphically does not make sense, because it would not help in showing any pattern of which a reasonable conclusion could be reached. In dealing with large numbers the graphical presentation would have been ideal, but in this series the figures we are dealing with are small.

**TABLE 10.**
**TABLE SHOWING THE FREQUENCY OF PRESENTATION OF CASES WITH TIME.**

<table>
<thead>
<tr>
<th>NUMBER OF YEARS POST OPERATIVELY</th>
<th>1ST</th>
<th>2ND</th>
<th>3RD</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>NUMBER OF PATIENTS</td>
<td>18</td>
<td>1</td>
<td>2</td>
<td>21</td>
</tr>
</tbody>
</table>

**TOTAL = 21 Patients**

All these cases warranted admission and out of the lot 12 patients had to undergo another operation to relieve the intestinal obstruction. This is 59.17% of the total. The remaining patients were managed conservatively, that is 40.93% of all the adhesions. It is interesting to note that the patients who developed abdominal distension in the first few days postoperatively, only one manifested later with intestinal obstruction due to adhesions. See early abdominal distension in this series.
3.5 BURST ABDOMEN

There were 21 burst abdomens post-operatively in this series of study. The ages varied from 7 months to 63 years, the twenty one burst abdomen occurred in 20 patients i.e. that there was one patient who developed burst abdomen twice. The total percent of burst abdomen 2.47% of all laparotomies.

SEX INCIDENCE:-

There were 13 males who developed burst abdomen and seven females. In terms of percentage 61.97% for males and 38.17% for females. This gives an approximate M:F ratio of 2:1.

TABLE 11.
TABLE FOR SEX DISTRIBUTION:- (RATIO OF 2:1 M:F.)

<table>
<thead>
<tr>
<th>SEX</th>
<th>NO. OF PATIENTS</th>
<th>PERCENTAGE</th>
<th>RATIO</th>
</tr>
</thead>
<tbody>
<tr>
<td>MALES</td>
<td>13</td>
<td>61.9</td>
<td>2</td>
</tr>
<tr>
<td>FEMALE</td>
<td>7</td>
<td>38.1</td>
<td>1</td>
</tr>
</tbody>
</table>
TIME OF WOUND DISTRUPTION POST OPERATIVELY-

The earliest time the wound disrupted was on, the sixth day and the longest time it took to occur was on the 13th day. The number of cases which had burst abdomen before removal of the stitches were 2. The number of patients whose wounds were disrupted on the same day the stitches were removed were 11. The number of cases which had wound disruption one day after stitches were removed 4. Those that took 2 days after stitches were removed before their wounds disrupted were 2 and one in which it occurred 3 days after stitches were removed. Most of burst abdomen occurred between the 7th and the 12th day with a peak at the 12th day. See figure 4.

The distribution of cases according to disease: the leading condition that led to burst abdomen was intestinal obstruction, followed by cancer, then duodenal ulcer, ruptured liver, aortic aneurism and chronic ectopic pregnancy winding up the rear. Of the 8 cases of intestinal obstruction, there
FIGURE A.

THE HISTOGRAM SHOWING THE FREQUENCY OF BURST ABDOMEN AGAINST THE PERIOD AT WHICH IT OCCURRED AND WHEN THE STITCHES WERE REMOVED.

NO. OF CASES

KEY

x - NUMBER OF PATIENTS
BURST ABDOMINAL DEVELOPED ON THAT DAY.

0 - NUMBER OF PTS ON THE DAY STITCHES WERE REMOVED.

(x) NUMBER OF PATIENTS WHOSE ABDOMEN BURST THE SAME DAY STITCHES WERE REMOVED.

1 2 3 4 5 6 7 8 9 10 11 12 13
PERIOD IN DAYS.
FIGURE 5.

HISTOGRAM SHOWING AGE DISTRIBUTION

<table>
<thead>
<tr>
<th>Ages</th>
<th>Cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-10</td>
<td>5</td>
</tr>
<tr>
<td>10-20</td>
<td>4</td>
</tr>
<tr>
<td>20-30</td>
<td>3</td>
</tr>
<tr>
<td>30-40</td>
<td>2</td>
</tr>
<tr>
<td>40+</td>
<td>1</td>
</tr>
</tbody>
</table>
TABLE 12.

Table of distribution of cases in relation to their conditions:-

<table>
<thead>
<tr>
<th>CONDITION</th>
<th>NUMBER OF CASES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intestinal obstruction</td>
<td>8</td>
</tr>
<tr>
<td>Cancer</td>
<td>5</td>
</tr>
<tr>
<td>Perforate D/U</td>
<td>3</td>
</tr>
<tr>
<td>Ruptured Liver</td>
<td>2</td>
</tr>
<tr>
<td>Aortic Aneurism</td>
<td>1</td>
</tr>
<tr>
<td>Chronic Ectopic pregnancy</td>
<td>1</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>20</strong></td>
</tr>
</tbody>
</table>

were six children, all of whom were considered to have features of malnutrition. About of cough caused the abdomen to burst in one case. Abdominal distension was responsible in two cases of abdominal disruption. There was infection of the wound in 9 cases and there were two cases that had both infection and malnutrition. These two cases were from Kamiti Prison.

The site of incision in relation to burst abdomen was 13 cases had a paramedian incision and midline incisions were 7.
AGE INCIDENCE:

The number of cases that occurred at any age group did vary. It is seen here that there were more cases between the ages of 0-10 year olds than in any other age group. The next age group in which there were more cases of burst abdomen is the 20-30 year age group. The following age groups then following in line 40-50, 60-70 being equal in their distribution of number of cases of each. Then followed 10-20 and 50-60 also being equal in their distribution of cases.

The element of malnutrition playing a big part in the 0-10 year age group. 20-30 age group is where the mean age group that undergo laparotomy falls. The ages of 40 and above is where malignancy is increased and frequent.
This picture shows a patient who had a laparotomy and developed a burst abdomen nine days later. The loop of bowel is visible. After removal of stitches, the entire wound gave way see the picture below.
This is the same picture as above, the marks for stitches can be seen on the edges of wound. This is a case of burst abdomen with evisceration. The loops of gut are clearly visible after stitches were removed.
### 3.6 RESULTS OF INCISIONAL HERNIA

**TABLE 13.**

<table>
<thead>
<tr>
<th>AGE IN YEARS</th>
<th>SEX</th>
<th>CONDITION</th>
<th>DURATION OF OPERATION</th>
<th>RESPIRATORY PROBLEMS</th>
<th>HOSPITAL STAY DURATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1%</td>
<td>M</td>
<td>Intussuception</td>
<td>80 Minutes</td>
<td>Yes</td>
<td>16 days</td>
</tr>
<tr>
<td></td>
<td>M</td>
<td>Intussuception</td>
<td>90 Minutes</td>
<td>Yes</td>
<td>17 days</td>
</tr>
<tr>
<td>36</td>
<td>M</td>
<td>Intussuception</td>
<td>75 Minutes</td>
<td>No</td>
<td>12 days</td>
</tr>
<tr>
<td>37</td>
<td>F</td>
<td>Hydronephrosis</td>
<td>85 Minutes</td>
<td>No</td>
<td>16 days</td>
</tr>
<tr>
<td>36</td>
<td>F</td>
<td>Pyloric Stenosis</td>
<td>150 Minutes</td>
<td>Yes</td>
<td>44 days</td>
</tr>
<tr>
<td>44</td>
<td>F</td>
<td>Cystic Masses</td>
<td>105 Minutes</td>
<td>-</td>
<td>17 days</td>
</tr>
<tr>
<td>45</td>
<td>M</td>
<td>Bleeding D/U</td>
<td>85 Minutes</td>
<td>-</td>
<td>17 days</td>
</tr>
<tr>
<td>51</td>
<td>M</td>
<td>Dilating Aoertic</td>
<td>85 Minutes</td>
<td>-</td>
<td>11 days</td>
</tr>
<tr>
<td>58</td>
<td>M</td>
<td>Chronic D/U</td>
<td>110 minutes</td>
<td>-</td>
<td>6 days</td>
</tr>
</tbody>
</table>
INCISIONAL HERNIAS:-

This complication occurred in 10 patients out of 839 cases of laparotomy. This makes an incidence of 1.27%. The cases varied in their ages. These ages varied from 1½ years to 58 years. This figure of 10 is quite small to represent it on the histogram to try and show age distribution. It is so small that conclusion will not be reasonably reached at. There were only two children one of 1½ years and that of years. The rest were adults, the lowest age being 36 yrs and the oldest 58 years.

There were six males and 4 females all the females were adults and the two children were all males.

These cases of abdominal incisional hernias were found to have certain associated factors which accompanied them in different proportions:-

1) There were three cases which had abdominal distension earlier on after operation. This is about 30%.

2) There were a further three cases with incisional hernias who had developed respiratory complication which led them to have
coughs during immediate post operative days.

3. There were two other case which had developed infection of the wound post operatively.

4. The remaining two cases; one was a 58 year old man with chronic duodenal ulcer who had features of malnutrition. The other patient had multiple cystic masses in the peritoneum, aged 44 years. She had undergone, 7 laparatomies 4 in Rusia and three here in this hospital. The cause of these cystic masses were not known, but they caused abdominal distension with very weak apponeurosis. The type of incisional hernias were multiple.

Of these 10 cases, there were 8 cases that had midline incisions. The other two cases had paramedian incisions.

The number of days these patients took in the hospital were higher than the rest of the hospital's laparatomies, while the rest of the hospital's laparatomies took an average hospital bed occupancy of 10.2 days. These patients who eventually developed incisional hernia took a mean of 16.6 days in the hospital before they were discharged.
The patients who received blood transfusions were 5.

This is 50% of patients who developed incisional hernia.

Time of operation was recorded in 8 of this cases and when the operation ended. This gave the duration of operation which varied from 75 minutes to 150 minutes. This gave a mean 95.4 minutes.
This is a patient who had an aortic aneurysm and a midline incision from symphisis sternum to symphisis pubis. There is an incisional epigastric hernia which is quite large. It demonstrates how easy it is to have a hernia in the epigastrium than hypogastrium in a midline incision.
Post operative Infection.

The cases were divided into three categories:-

1. **Clean cases;** these are cases where the gastrointestinal tract was not opened or there was no evidence of strangulation or infective process.

2. **Clean cases with the possibility of contamination.** These are cases where the gastrointestinal tract was opened e.g. vagotomy and drainage.

3. **Dirt cases.** These are cases which were obviously infected and these involved all the cases which had perforations of gut.

The last category was not used in the statistics.

Category 1 and 2 were used. Clean cases that developed post operative sepsis were 19 in number. The clean but with possibility of contamination were 21 in number. These made a total of 40 cases or 4.77% of all laparotomies.
SEX DISTRIBUTION:

There were 26 males out of 40 patients, that is 65%. There were 14 females making 35% of the total. This makes an approximate ratio of M:F to be 2:1.

TABLE 15.

<table>
<thead>
<tr>
<th>NO.</th>
<th>PERCENTAGE</th>
<th>RATIO</th>
</tr>
</thead>
<tbody>
<tr>
<td>MALE</td>
<td>26</td>
<td>65</td>
</tr>
<tr>
<td>FEMALE</td>
<td>14</td>
<td>35</td>
</tr>
<tr>
<td>TOTAL</td>
<td>40</td>
<td>100%</td>
</tr>
</tbody>
</table>

THE AGE DISTRIBUTION:

The very young children were more susceptible to post operative infection and was severe. There were seven children below 28 days old. Those below 10 years 15 in number. 10-20 year age group had 3 patients with infection, 20-30 year group had 8 patients 30-40 had 7, 40-50 years 4, 50-60 had 0 and 60-70 had 3. This results is better represented on the histograms. Figure 6.
SEPTICAEMIA:–

Of of 11 cases, seven were neonates. The 3 and 5 year old children who developed septicaemia were patients who had Wilms tumour stage IV. They had undergone nephrectomy and infection set in soon after chemotherapy was started post operatively. The last two cases were aged 7 and 12 years, both of them had heavy infestation with Ascaris Lumbricoides.

THE OFFENDING ORGANISM:–

Of the 40 patients who developed post operative infection, 37 cases had either pus swab or blood culture taken. The most frequent organism cultured was E.Coli in 11 cases, followed by Proteus in 9 cases, the next was Klebsiella 8 cases, then staph.aureus 5 cases and the last one was acinetobactor 4 cases.

There was one patient who developed subphreomic abscess following splenectomy. The rest of 28 patients had wound infection only.

The period taken from the time of operation to the time of recognition of infection varied from 2-12 days. The mean period was 7.6 days. The wound then
was described as oozing pus or wet wound.

Infection increased bed occupancy from
days to 17.6 days. That is an extra one
week in hospital.
FIGURE 6,

THE HISTOGRAM SHOWING AGE DISTRIBUTION

NUMBER OF CASES

<table>
<thead>
<tr>
<th>Age in Years</th>
<th>Number of Cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>20</td>
<td>15</td>
</tr>
<tr>
<td>30</td>
<td>12</td>
</tr>
<tr>
<td>40</td>
<td>8</td>
</tr>
<tr>
<td>50</td>
<td>6</td>
</tr>
<tr>
<td>60</td>
<td>3</td>
</tr>
</tbody>
</table>

AGE IN YEARS.
FIGURE 7.

THE HISTOGRAM SHOWING NO. OF CASES IDENTIFIED AS POST OPERATIVE INFECTION IN RELATION TO PERIOD POSTOPERATIVE.

2 2 4 5 6 7 8 9 10 11 12 NO. OF DAYS POSTOPERATIVE.
3.8 **DEATH:**

Death occurred in 17 patients that had undergone laparotomy, this makes 2% of patients that underwent laparotomy.

These deaths have been discussed in various sections, but it is not out of place to group all the deaths in one section now.

There were 9 females and 8 males. 8 of the patients being of below 5 year age group. The age range varied from 4 day old to 60 years old.

7 patients died of respiratory complications, they had developed following laparotomy.

8 patients had died due to shock, five of these the shock was due to gram negative shock. 3 patients their shock was due to haemorrhage. Those who died due to haemorrhage were one neonate who progressively developed palor and died first day post operatively. The patient had ileal atresia and resection and anastomosis had been done. There was blood under the
dressings. The second was a 60 year old man with carcinoma of the stomach who underwent laparotomy and biopsy done. He developed progressive palor and shock and died on the second day before he could be transfused.

the 3rd case was a 1½ year old child with Hirschsprungs disease who had undergone abdominal rectal pull through and had become pale. She died 30 hrs post operatively.

One death had occurred 9 hrs after operation and three hours after sedation with pethidine.

The last case was not well documented and was thought to be due to disease process.

The death had a mode of approximately the 3rd day post operatively.
URINARY RETENSION:

There were six patients who developed urinary retension. This in terms of percentage is 0.77%. The retension was in the first 24 hours. The patients did not get sedation. Of these six patients there were 4 males and 2 females. Sex ratio of M:j:F 2:1.

Of these six patients there were four patients who had developed abdominal distension also and they have been included in the abdominal distension chapter. Two patients from the four patients with urinary retension and abdominal distension developed respiratory problems and died.
3.10 DEEP VENOUS THROMBOSIS:

There was only one patient recorded in the study. This is 0.17% of all the cases.

This is a patient who had an ovarian cyst. She had been admitted to the hospital where she stayed for two months before surgery was performed on her.

On her 3rd day post operative she was noted to be dehydrated. Attempts to rehydrate her were insituted. By the sixth day attempts were being made to persuade her to be ambulant.

She developed deep venous thrombosis on her sixth day post operatively.

She was heparinised the same day.
AETIOLOGY OF POST-OPERATIVE ATELECTASIS:

The cause of post-operative atelectasis is considered to be bronchial obstruction due to secretions within the lumen. The cause of the accumulation of secretions is due to splinting or relative immobility of the diaphragm and intercostal muscles due to the trauma of surgery, the hypoventilation of the lung interferes with the normal removal of bronchial secretions. Cough is also interfered with by the splinting of the diaphragm. Air behind the obstructed bronchus is absorbed by the circulating blood and no air is replenished because of the block. An airless plate-like, segmental, lobe or lung results, depending upon the site of obstruction.

This blocked channels of air with bronchial secretions could be infected leading to pneumonitis or frank lobar pneumonia.

Other factors have an effect by potentiating the splinting of the diaphragm and intercostal muscles or the production of bronchial secretions. Prolonged immobility, tight chest and upper abdominal binders, and excessive use of narcotics favour post operative atelectasis by accentuating the splinting action. Recent respiratory infection, chronic bronchitis and bronchial asthma predisposes to accumulation of sputum
by increasing its production.

**CLINICAL SYMPTOMS AND SIGNS:-**

This depends upon the extend of the involvemerlt. Plate like atectasis produced no symptoms, but when multiple and atekectasis within thickness of 3 to 4 millimeters is associated with dyspnea on exertion in a few instances. Segmental atelectasis is usually asymptomatic; in aminority slight dyspnoea and cough were present, lobar atelectasis is usually associated with the symptoms of productive cough, dympnoea and chest discomfort.

**PHYSICAL SIGNS:-**

Dullness to percussion, diminished breath sounds, and rales are heard to the lung bases in the majority of patients. Loud rhonchi are heard in patients with lobar collapse and in a few with segmental collapse.

Investigation in chest x-ray which shows streaks of density and is usually present on the-first day of post operative and does disappear on the 5th day or so.
In segmental collapse x-ray shows patchy density. Massive alectectasis or lobar shows diffuse density occupying an entire lobe or lobes and associated with a shift of the mediastinum.

The results of this study on pulmonary complication following laparatomy had an incidence 3.37%. These were 28 cases of abdominal surgery out of 839 laparatomies, this figure is quite low because the diagnosis was made purely on clinical presentation; that is on fever, productive cough, dyspnoea, reduced breath sounds and adventitious breath sounds. The low incidence is accounted for by the fact that x-rays were not employed in this study, as they were not taken.

By excluding x-rays in the diangosis of pulmonary complication post-operatively, it ment that majority of patients who developed lung atelectasis were not diagnosed. This is because Plate like atelectasis, radiologically consisting of minimal streaks of density, produced no symptoms and this makes a large proportion of lung atelectasis. Segmental alectectasis is also usually asymptomatic except for occasional cases. It is the lobar alectectasis which
is usually associated with symptoms of cough, productive sputum, dyspnoea and chest discomfort as they were used in this study.

This study gives comparable results of Dripps and Deming who used the same criteria as in this study and found pulmonary complication having an incidence of 5.57\%.

Wightman (1968) who did a prospective study of laparatomies and pulmonary complication found a higher figure of 10.37\%.

This figure did not involve chest x-ray in the diagnosis. This was in a similar sized population of 785 patients as this was a prospective study the incidence could have been closer to what could-be true incidence of pulmonary complication that were symptomatic. This could be true as the researcher is actually looking for the problem is likely to spot it as it crops up. A comparable figure was by King in 1933 when he found the incidence to be 14.37\%. Davidson did however find pulmonary complication to be 5\%.

The incidence rises steeply when chest roentgenograms are used as explained above. The authors who used this creteria, the incidence varied from 247. to 727\% of
of laparatomies. In 1929 Muller found an incidence of 72.7%. Stringer in 1947 found 24.7%, Rudnikoff 70% in 1951, Thoren 30% in 1954, 517%, Becker in 1960

THE AGE INCIDENCE:

Pulmonary complications were found to be higher in the age group of 0-9 years, the majority being below 2 year of age (See table 4 and figure 2). The number of patients who were in paediatrics age group who underwent laparatomy were 102. This shows that the high number of pulmonary complication is not due to the number of children that underwent laparatomy, but that there is a factor that must have contributed to this. The factor could be due to positioning of the incision. The infants received a transverse upper abdominal incision more frequently than any other incision for laparatomy.

The incidence of pulmonary complication rises in the elderly Wightman found it to be 14% in the patients over the age of seventy. The other authors echoed the same sentiments.
SEX INCIDENCE:-

In this study males were found to predominate over females (See table 3). The males had an incidence of pulmonary complication of 53.57, while females had 46.57 with a ratio M:F of 6:5. This difference is not statistically significant although studies done by other authors showed a significant difference. Wightman found a ratio of 2.6:1, Marton 3:1. Morton is of the opinion that this is due to man's greater dependence on diaphragm for breathing, so that in laparatomy the diaphragmatic excursion is limited hence leading to pulmonary complication. There is also a greater and longer reduction in vital capacity after upper abdominal operation in men. Stoneburner is of the opinion that pneumonia itself is predominantly a male disease.

Many authors tried to explain the high incidence in the male to be due to high prevalence of men in smoking cigarettes.
INCIDENCE ON THE DAY OF COMPLICATION:-

Of the 28 cases that developed respiratory complication, 15 of them, that is 53.57% showed signs of pulmonary complication in the first 24 hrs. In the first 48 hours 82.17% had developed pulmonary complication. This fact of most pulmonary complications occurring in the first post operative day has been observed by others (See table 5 and figure 1).

Rudnikoff has shown that in upper abdominal surgery 90% of patients will show signs in the first 24 hours. Bailey and Love 18th edition has expressed similar opinion. The slightly lower figure in this study could have been due to delay in noticing the signs in the first 24 hrs, so that it could have been discovered a day later.

The patient who developed pulmonary complication on the tenth day could have had origin in Cardiovascular rather than pulmonary, the tenth day is the day the pulmonary embolism is likely to occur. Small showers of pulmonary embolism could be difficult to differentiate from
pulmonary atelectasis clinically.

**PULMONARY COMPLICATION PLUS ABDOMINAL DISTENSION:**

\(^n\) this study there were 12 cases who had this combination of problems. Out of these, 7 patients, that is 58.3% died and of these seven patients who died, there were 6 males - female, this is a ratio of M:F of 6:1 See table 8.

It is not known in these patients which complication started first. Either of this complication would lead to the development of the other. For example if there was pulmonary complication, it would cause anxiety in the patient. Anxiety in turn would lead to development of aerophagy. Aerophagy is a well known symptom in anxiety. This would lead to gaseous distension of the abdomen (Davidson 9th Edition), looked at it from abdominal distension as the starting point*. This raises diaphragm high, leading to respiratory embarrassment hence pulmonary complication. This process of pulmonary complication and abdominal distension can be seen to have a positive feedback mechanism;
see diagram below:

<table>
<thead>
<tr>
<th>PULMONARY COMPLICATION</th>
<th>ANXIETY</th>
<th>AEROPHAGY</th>
</tr>
</thead>
</table>

Such a process which fuels itself can only terminate in death unless the process is interfered with either by Nasogastric suction and respiratory support or both.
Elkin found that, of the patients who developed pulmonary complication 40\% of them died. Although in his study he did not associate it with abdominal distension.

Electrolyte disturbance could have played a part in this as abdominal distension is one of the early signs of hypokalaemia.\(^8\)

Men predominated in the number of the patients who died, one explanation could be due to the fact that men are abdominal or diaphragmatic breathers. Abdominal distension would severely embarrass his respiratory system than it would do in the females as they are chest breathers. Also another factor that could be of importance in males predominating in this, is that more men underwent upper abdominal operations than females, and upper abdominal operations are known to have a higher incidence of pulmonary complication.\(^2\)

See figure 10.
4.2 In this study post operative abdominal distension occurring in the immediate post operative days occurred in 23 patients out of 839 laparotomies. These cases were not well documented in the files. Therefore analysis as to the possible aetiology of this abdominal distension could not be worked out. It was not indicated in the patients file whether the distension was due to paralytic ileus or a mechanical obstruction. The outcome of these 23 patients was one of the two things; either the patient died or the distension resolved spontaneously. There were such seven deaths and 16 patients who resolved spontaneously. Refer table 8.

The main reason that causes mechanical obstruction not to be recognised, is due to the masking effect of analgesics on symptoms. Asumption of the conservative approach on these cases could be a disaster. The seven deaths possibly could have been avoided if it was ruled out that mechanical obstruction did not exist.
Peter Sykes observed that it is a paradox, when small bowel obstruction occurs immediately after abdominal surgery, when the patient is still under the supervision of his attendant surgeon, it carries a higher mortality than obstruction occurring many months or years after the initial operation.

The cause of death to the seven patients could have been (1) Pulmonary complication as has been explained in the section of pulmonary complication (2) Could have been due to mechanical obstruction. (3) or Electrolyte imbalance.

The mechanical obstruction is due to a number of causes:

1. Due to adhesions.

2. Due to incarceration of intestines in a peritoneal defect. This could be due to partial wound dehiscence, pelvic dehiscence, hernial defect, or unperitonealized ureter, or obstructed anastomosis.

The sixteen cases that resolved spontaneously must have been due to paralytic ileus. The causes of paralytic ileus are due to the following explanation:
Reflex inhibition which accompanies every operation, hypoproteinaemia, electrolyte imbalance, over activity of the sympathetic system. The patients who recovered spontaneously were 16 in number. Small intestinal motility resumes activity within 16-24 hours post-operatively, but when there has been resection and anastomosis activity is resumed between 24-48 hours. Therefore post operative abdominal distension is due to either mechanical obstruction of small gut or paralytic ileus of large gut. The large gut and stomach has an inertia of 3-5 days and most patients of abdominal distension lasted mainly between 3-5 days and then resolved spontaneously\(^8\).\(^{58}\)\(^8\).\(^3\)

Herrington belittles the procedure of gastric decompression. This study does not agree with his findings. For an incidence of abdominal distension of 27\(\%\), is a large figure and is accompanied by a mortality. This study shows gastrointestinal decompression should continue routinely.
In this study adhesions were found to have developed in conditions which presented with blood in the peritoneum. These were 9 cases. The cases which had a high probability of contamination, also made a big contribution. These were 10 of them. The remaining two cases the irritating agent leading to adhesion was not obvious.

The fibrinous type of adhesion can cause intestinal obstruction when there is an element of ileus also. This appears to be important in the immediate postoperative abdominal distension. Most of the fibrinous adhesions disappear as the irritating agent disappears. Some get organised and develop blood supply and become permanent. The presence of blood and bacterial contamination as seen in this study would course this type of adhesion.

The organ which is deficient in blood supply leads to formation of fibrous adhesion as it gets to the omentum or peritoneum to "get supplied with blood. It is difficult to say for these cases in the series whether this mechanism played part. When generalised adhesions
occur they can present at any time - early or late. But when localised they tend to cause volvulus early on.

the asymptomatic cases that had been found on reoperation just show that there could be more adhesions in patients who undergo laparotomy than is realised. The adhesions that course obstruction are usually in the lower ilium

There was no death in this particular group of patients, other studies done elsewhere have 17.57. mortality.
The incidence of wound disruption or burst abdomen in this country is not known. Marsh\textsuperscript{55}, Milbert\textsuperscript{63} and Miles\textsuperscript{2} reported incidence to be between 0.36\% and 5.8\%. Our incidence is 2.4\% of which compares favourably.

The males predominated in wound dehiscence with a percentage of 61.9\% and females 38.1\%. This is approximately a ratio of 2:1 M:F See table II. The \(X^2\) test was applied to this variable and the difference was significant (\(P^2 .001\)). The ratio found by Keil\textsuperscript{7} was M:F 2.4:1. which compares well with this study although his study was large of 4,242 laparatomies when compared to this study of 939 cases.

Wound disruption depends upon a balance between the strength of closure and factors capable of causing a rise in intrabdominal pressure assuming normal healing possibilities. This factors are cough, abdominal distension, haematoma, hiccoughs. There are well known factors that predisposes to wound disruption and this are; sepsis, anaemia,
malnutrition hypoproteinimia, scurvy. In our patients this factors have been observed also to play part in wound disruption \(^70, 55, 66 > 33 > 19\).

There were more cases in the age group of 0-9 years see figure 5. All the patients in this age group received longitudinal incisions which were either paramedian or midline. Although in this age group in this hospital, they receive transverse incisions much more frequently than the longitudinal ones, and there were no transverse incisions involved in the wound disruption. Mowat and Bonar (1977)\(^1\) showed that transverse incisions are less liable to disrupt.

The technique in wound closure is important and in this study it is well shown in a patient whose abdomen burst thrice. The child's abdomen was closed by a new surgical registrar to the Unit. The first two disruption were done by the registrar the third time was closed by the consultant, and healed well.
In early burst abdomen, 1-5 days, the fault lies in the technique and suture material. This was proven by several authors. They went further to show that layered abdominal closure as we do in this institution was found to have a high incidence of burst abdomen. Figure of 8 closure was better than the layered one, incidence of 0.27. While through and through mass closure was the best.

The time period at which the wound disrupted was a little later than other studies. Owosen (1977) and Glenn showed most of the wound disruption were between 5th and 10th day. While in this study most of wound disruption were between 7th and 12th day see figure 4. This means that there is little fault in the technique used in this hospital and other factors play a major role in wound disruption and as seen, infection and mechanical effect of cough or abdominal distension are the culprits.

The pattern of age distribution in wound disruption in this study is surprisingly similar to that of Owosen in Nigeria, where there are two peaks: one in the age group
0-10 years and the second in the age group of 20-30. The mean age that undergoes laparotomy falls in this age group. In the group of 0-10 year in Africa suffers malnutrition, worm infestation leading to anaemia and hypoproteinimia is well shown in one patient who had chronic ectopic pregnancy. For three weeks she ate little and bled more in the periotnium. When evatually she was diagnosed, laparotomy was done and she ended up with burst abdomen.
4.5 In this study, the wound infection was taken when it was purulent, for then it was well documented, but any infection less than this was not documented e.g. erythema or marginal wound infection. Serous secretion was documented as wet wound and this was also taken in the statistics and this is the most mild wound infection I could get into the statistics. The incidence found was 4.77%. The figure compares favourably with the study done by Barnes. He dealt with a large study of 16,000 patients who had undergone Hysterectomies, gastrectomies, appendicectomies and Herniorrhaphy. His incidence was 4.17%. His was a retrospective study, and the definition of post operative wound sepsis was similar to this study. This incidence is much lower when compared to other Authors. Their studies were prospective ones. Thus Clarke¹ found an incidence of 7% in 1957, Jefrey et al 1958 found an incidence varying from 11-16 percent, Burnet" and Macdonald" found on incidence of 87%. Their definition of wound infection encompassed non-purulent infections like erythema, marginal wound infection, also wound ruptures without clinical signs of infection were
included in the statistics.

The males predominated with a M:F ratio of 2:1 and the explanation to this difference in sex is not well understood, but it is a common observation that males need more cleaning swabs before the last swab looks clean in our operating theatres. The other explanation could be that there are more operations on the males gastrointestinal tract, than that of females. Refer table 15.

In this series of study, the very young children were more susceptible to post operative infection and their infection was more severe. The babies below 28 days were 7 and their wound infection culminated into septicaemia. See figure 6.

Jepsen (1969) points out the assumption that wound infection increases with age which was confirmed by the Public Health lab. Service in 1960 that wound infection increase with the age above 60 years. Barnes concluded that age in itself had no influence on the incidence of wound sepsis and Jepsen did agree with him in his study, despite the fact that he had found that there was severe
wound infection in children. His study contradicated in itself. It should follow that if a particular category of patients get severe infections they are the same patients who should have a higher incidence of infection all factors being equal, ie. they are not able to fight infection. In my study the two parameters are pointing one way, that is the age incidence being higher in neonates and at the same time being severe enough to lead to septicaemia. This is explained by the fact that neonates by this time have a poorly developed immune system especially to E.Coli\textsuperscript{45}. The other children had their immune system suppressed by antineoplastic drugs. The rest of the two children had heavy worm load of ascaris lumbricoides leading to malnutrition and hence poor immune system.

89.2% were organisms belonging to intestinal flora with E.Coli leading followed by Proteus, then Klebsiella. Staph aureus next and last acinetobactor staph aureous made 10.8% of the infections. The study done by Jepsen et al showed that infection by staph aureous originated from the
wards, while intestinal flora infection started from the theatre.

Generaly the ratio of staph aureous to Coliform in the wound is 2.1:1\(^7\). While in an orthopaedic unit is 7:1. This ratio is reversed, coliforms to staph is in the ratio of 8:1. This is not suprising as the infection is following a laparotomy.
4.6 Overall post operative mortality in Kenyatta National Hospital in this series of study is 27%. This is quite low when comparing to a mortality of 80% before lister. By then infection accounted 80% of the mortality.

In this study infection has accounted for 29% of mortality.

Patients who developed pulmonary complication 58.37% died, a comparable figure by Elkin was 40%.

Post operative shock was the leading course of mortality, this accounted for 47%. This was followed by respiratory complication making a 41% mortality, 67% was due to heavy sedation in the immediate post operative period. The other 67% was due to a disease process.

In this study burst abdomen was not accompanied by mortality. Studies done elsewhere vary from 13% - 15%. 
4.7 Urinary retension had an incidence of 0.7%. The males predominated over females with a ratio of 2:1.

Post operative urinary retension is fairly common and it is thought to be due to reflex spasm of sphincter of urinary system. It is more so when pelvic viscera have been operated on.

The treatment is usually, privacy and reassurance, a warm bath and the sound of running water could be of help. Occasionally these measures fail and then catheterisation is needed. In the elderly males, prostatic obstruction, hitherto latent, should be suspected.

One common factor is all these patients was absence of analgesics post operatively.
4.8 Only one case was documented as a case that had developed Deep venous Thrombosis (DVT). This does not mean its incidence is low. The diagnosis was purely on history and physical examination. Reliance on clinical findings is quite unreliable. 50% of total pulmonary embolism have no signs or symptoms.

1. This particular case points to certain factors that encourage thrombosis. This are prolonged pre-operative period in hospital79.

2. Dehydration leading to haemoconcentration with slowed circulation.

3. Abdominal Malignancy**9,6.
5.1 CONCLUSION:

This study had clearly shown that despite the refinement of anaesthesia, surgical technique and introduction of antibiotics; pulmonary complication, burst abdomen, incisional hernias, wound infection, postoperative abdominal distension, adhesions and urinary retention still plague us as they did early in this century, only to a smaller scale.

Pulmonary complication together with abdominal distension is a very grave situation indeed that calls for urgent and vigorous management of the patient.

Not all postoperative abdominal distension to be managed conservatively, as some will require reoperation to alleviate the problem. Not necessarily those who develop immediate postoperative abdominal distension will do so later again.

That there are cases with adhesions without symptoms; it means that a particular population followed for a long
time will yield more cases as the asymptomatic cases become symptomatic by either volvulus or constriction.

More cases undergo laparotomy for intestinal obstruction due to adhesions than those who are managed conservatively in this hospital.

Our incidence of incisional hernias is low 1.2%. and there sex distribution is like in other centres.

Post operative sepsis in this hospital is comparable to those in other centres.

The neonates are much more susceptible to infection and is very severe. Similarly the patients who are on antineoplastic drugs and mulnutrition. Therefore these patients should always be put on prophylactic antibiotics known to be effective in that hospital perioperatively.

To reduce postoperative sepsis in the males, they should have a thorough scrub before being taken to the theatre. The mortality could be brought lower than 2% by identifying the risk groups who would develop septicaemia as indicated
above. Heavy dressings in neonates should not be employed as 50 ml may not show on its surface and this is enough blood loss to cause shock that would kill. The cause of restlessness in immediate postoperative should lead the surgeon to evaluate patient before sedation is given. Routine sedation could mask ominous signs be it respiratory, cardiovascular or urinary.

Pain is significant factor in the development of postoperative urinary retention, and being a male is another factor.

Deep venous thrombosis is a complication which can affect any patient, but more so in the patient who has been in the hospital bed for long before the operation is undertaken.

Preoperative preparation should be done as outpatient as much as possible before admission for operation, and patient made ambulant as early as possible.
5.2 COMMENT:-

Many of our patients who develop pulmonary complications do not receive intensive care facilities. I hope with this findings more patients would be given intermittent positive pressure respiration as a support with gastrointestinal decompression. This I trust would lessen the mortality and morbidity.

Close monitoring of cases with partial intestinal obstruction who are being managed conservatively and recognising those who are not benefiting from conservative treatment: and subjecting them to laparotomy helps to reduce the high motality reported from other centres.

Preoperative management is important in correcting anaemia, hypoproteinemimia and treatment of chest infection. This approach would very much diminish wound disruption in the hands of a competent surgeon.
REFERENCES:


Baily & Love (1982), Short Practice of Surgery 18th Ed. page.1154.


Dobson, J: The training of a Surgeon.

Drips, RD et al. Artificial respiration, J.A.M.A.

Dudley H.A.P. layered and mass closure of the abdominal wall - a theoretical and experimental analysis.

Efron G. Abdominal Wound disruption,

Elkin, D.C. 1940; Postoperative pulmonary surgery gynaec. and obst., 70, 491.

Ellis H. et al. Through and through abdominal closure.
J.R. Soc. Med.


Amm. J.Surg.94.611.
Gaudino J. Closure of Abdominal Wounds with through and through safety retention sutures. American J.Surgery. 120:124, July 70.


Jenkins TPN. The burst abdominal wound: 3-6


Jolly Diseases of children 3rd Ed.1976,Page 482.


Morton, H.J.V. (1944), Tobacco smoking and pulmonary complication after operation. Lancet, 1, 368.


Walter, and Israel, General pathology 4th Ed.