A FIVE YEAR RETROSPECTIVE STUDY ON PATTERN OF
ACQUIRED INTESTINAL OBSTRUCTION IN ADULTS AS SEEN
AT KENYATTA NATIONAL HOSPITAL, JANUARY 1996-
DECEMBER 2000

A DISSERTATION SUBMITTED IN PART FULFILMENT FOR THE DEGREE
OF MASTER OF MEDICINE IN SURGERY, UNIVERSITY OF NAIROBI, 2003

BY

DR. G. MUSILA GIBSON (M.B.Ch.B - Nairobi)

2003
DECLARATION

I certify that this dissertation is my original work and has not been presented for a degree in any other university.

Signed……………………………………………… Date…………………………

Dr. G. Musila Gibson
MBChB (Nairobi).

This dissertation has been submitted for examination with my approval as a university supervisor.

Signed……………………………………………… Date…………………………

Mr. Ngugi Mungai
Senior Lecturer and specialist urological surgeon
Department of Surgery
University of Nairobi.
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I also wish to thank Janet Musia for her role in preparation of this manuscript.

Lastly, I thank the Ethical and Research Committee (ERC) KNH for allowing me to carry out the study.
DEDICATION

This work is dedicated to my dear wife Ann Musila and my son Victor Mumo.
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<td>DRE</td>
<td>Digital Rectal Examination</td>
</tr>
<tr>
<td>DVT</td>
<td>Deep Venous Thrombosis</td>
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<tr>
<td>ERC</td>
<td>Ethical and Research Committee</td>
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<td>KNH</td>
<td>Kenyatta National Hospital</td>
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<tr>
<td>LBO</td>
<td>Large Bowel Obstruction</td>
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<tr>
<td>LIH</td>
<td>Left Inguinal Hernia</td>
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<tr>
<td>RIH</td>
<td>Right Inguinal Hernia</td>
</tr>
<tr>
<td>SBO</td>
<td>Small Bowel Obstruction</td>
</tr>
<tr>
<td>SPSS</td>
<td>Statistical Package for Social Sciences</td>
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<tr>
<td>TB</td>
<td>Tuberculosis</td>
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SUMMARY.

This was a descriptive retrospective study on the pattern of acquired intestinal obstruction in adults as seen at Kenyatta National Hospital between January 1996 and December 2000.

With permission from the ERC (KNH), files were retrieved from the records department and data obtained as per set criteria. Confidentiality was observed and data analysed using SPSS version 10 computer software. A total of 441 case files with adequate data were retrieved and included in the study.

Majority of the patients 407 (92.3%) came from within Nairobi while 34 (7.7%) were referred from other health institutions outside Nairobi.

The male to female ratio was 3.2:1 with 335 (76%) male and 106 (24%) female patients. The youngest patient in this study was 13 years while the oldest was 94 years with a mean age of 37.50 years. The peak age was between 21-40 years. Most of the patients 56.9% presented within the first 3 days.

The frequencies of common presenting symptoms were abdominal pain 96.1%, vomiting 87.3%, constipation 77.3% and abdominal distension in 66.4% of the cases. The main physical findings included abdominal distension 73%, abdominal tenderness 68.5%, increased bowel sounds in 59.2% and previous abdominal surgical scars in 32.4%. Other signs included decreased bowel sounds in 26.1% of cases, dehydration recorded in 15.4%, while tachycardia and visible peristaltic movements were recorded in 10.9% and 8.8% respectively.

Digital rectal examination was performed in 50.8% of the cases.

The most commonly used investigation was plain abdominal x-rays 354 (80.3%), followed by haemogram, urea and electrolytes in 56.5% each while abdominal ultrasound was taken in 6.3% of the cases.

Mechanical obstruction accounted for 92.3% as mechanical SBO, 65.1%, mechanical LBO, 25.4% and mechanical SBO/LBO 1.8% overall. Paralytic ileus was found in 6.1% of the cases while the type of obstruction was not determined in 1.6% of the cases.

Overall, adhesions (36.7%) from previous abdominal surgery was the leading cause of small bowel mechanical obstruction followed by stangulated hernias, 20%, while sigmoid volvulus, 12.7%, led in the large bowel category. The main cause of paralytic ileus was TB peritonitis 5.0%.

Operative management was performed in 266 (60.3%) patients depending on requirement while 175 (39.7%) patients were managed conservatively.
The main complications recorded were peritonitis, 58 (13.2%), bowel gangrene, 47 (10.7%), electrolyte imbalance, 25 (5.7%), septicaemia, 22 (5%), recurrence, 16 (3.6%) and wound sepsis, 12 (2.7%). Less common complications included gut perforation, enterocutaneous fistula, renal failure, burst abdomen and DVT (Deep venous thrombosis) of the calf.

The overall mortality rate was 17.7% (78) of the 441 reviewed cases. This was higher in referred patients 41.2% (14) out of 34 referrals and patients who presented late.
INTRODUCTION

Intestinal obstruction is a common surgical emergency that accounts for at least 20% of all admissions to a surgical service. \(^{(1)}\)

It is any impedance to normal flow of bowel contents and can be classified largely as dynamic (\textit{mechanical}) or adynamic (\textit{functional}) obstruction. \(^{(2,3)}\)

Dynamic obstruction is a mechanical problem caused by a physical blockage which can either be extraluminal (\textit{extrinsic}), mural (\textit{intrinsic}) or intraluminal. Adynamic obstruction (\textit{functional}) is due to paralysed bowel without any mechanical cause. \(^{(4)}\)

Other ways of classification depend on nature, site or level and duration of onset. \(^{(5)}\)

(1) **Nature**
   - (a) Simple obstruction - failure without vascular element.
   - (b) Strangulated - obstruction if vascular component is compromised.

(2) **Site/Level**
   - (a) Small gut obstruction - proximal or high.
   - (b) Large gut obstruction - distal or low.

(3) **Duration**
   - (a) Acute - Sudden onset (Mainly small gut)
   - (b) Chronic - Slow or gradual onset (Mainly large gut)

Mechanical obstruction often requires corrective surgery unlike functional obstruction, which mainly relies on conservative management except in certain exceptions.
The term sub-acute obstruction implies an incomplete obstruction and is used for both small and large bowel diseases. It manifests by recurrent episodes of abdominal colicky pain and distension, which are relieved by passage of liquid or semi-formed motion.

Intestinal obstruction is a universal problem with a wide geographical variation in the aetiological patterns. Even in same geographical location the aetiology varies with time\(^{(6,7)}\).

Early diagnosis and immediate corrective measures usually bears a favourable prognosis. In the tropics patients are seen late with dehydration, circulatory collapse, biochemical derrangements and sepsis leading to considerable morbidity and mortality. The management of these patients therefore presents a serious challenge to the surgeon in a tropical environment\(^{(6)}\).

KNH is the main referral and teaching hospital in Kenya. It receives emergencies from Nairobi and its environs as well as referrals from other health institutions all over the country. Some patients are finally seen at the hospital several days after onset of intestinal obstruction especially referrals.

The aim of this study was to find out the presentation, aetiological pattern, management and outcome of intestinal obstruction at the KNH.
LITERATURE REVIEW

Intestinal obstruction is a condition where there is impedance to forward flow of bowel contents. It was recognized as early as the days of Hippocrates who identified and treated it.

The earliest known operation for intestinal obstruction was performed by Praxagora (350 BC) by creating an enterocutaneous fistula to relieve an obstruction. Non-operative treatment remained the general rule during those early days until the nineteenth century when surgical procedures became more frequent for intestinal obstruction amid considerable controversy\(^6,8\).

In our local set up, intestinal obstruction is definitely a major cause of acute abdomen. Different authors have had different opinions in terms of the pattern of presentation.

Warambo M.W. in 1971 analysed 142 patients at KNH and found volvulus of the intestines, strangulated hernias, bands and adhesions, intussusception in children, carcinoma of the colon and worms to be the major causes of obstruction\(^9\).

Wambwa J.R. in 1974 observed that intestinal obstruction was the commonest cause of abdominal surgery in Kenya. He found adhesions and bands to be the commonest cause of intestinal obstruction in Kenya followed by sigmoid volvulus predominantly in males\(^10\).

Ojara E.A. in 1983 found the pattern to be different with external hernias followed by sigmoid volvulus predominantly in males as the leading causes of intestinal obstruction at KNH\(^11\).

Pankaj G. Jani in 1984 noted sigmoid volvulus as a predominantly male disease usually in the elderly. He also found it to be a major cause of intestinal obstruction in E. Africa only second to external hernias\(^12\).
M.Y.D. Kodovwalla and P.G. Jani did a surgical audit for one of the surgical units in KNH and found the highest indication for emergency laparotomy to be due to intestinal obstruction and appendicular pathology.

Dan O. Raburu (1990) noted that the commonest cause of acute abdomen at KNH was intestinal obstruction. The main causes were adhesions and fibrous bands, strangulated hernias, sigmoid volvulus, intussusception in children, worms and neoplasms in that order. He also noted that the pattern of aetiology was changing. He observed that adhesions and bands were a common cause following previous surgery or probably due to ascending pelvic infections especially in females (13).

Peter Ngugi Mungai (1991) found the commonest causes of acute abdomen at KNH to be appendicitis, intestinal obstruction and trauma. He found that sigmoid volvulus and adhesions and bands were the commonest causes of intestinal obstruction followed by intussusception in children, worms, strangulated hernias and also to a lesser extent colorectal tumours. He noted increased incidence of intestinal obstruction due to adhesions apparently due to an increase in the number of laparatomies done and also due to increase in pelvic inflammatory diseases (14).

Nganga G.K. in 1998 found appendicitis to be the commonest cause of acute abdomen followed by intestinal obstruction at KNH. He noted the main causes of intestinal obstruction to be adhesions and obstructed inguinal hernias. Other causes were intussusception in children, intestinal worms, sigmoid volvulus and cancer of colon (15).

V. M. Muyembe and N. Suleman (2000) found the leading causes of intestinal obstruction in Nyeri Provincial Hospital to be sigmoid volvulus, external hernia, adhesions and bands, ileocolic intussusception and small bowel volvulus (6).

O. G. Ajoo in Nigeria (1981) describes intestinal obstruction as a common cause of acute emergency admissions only second to appendicitis. He found the main cause of intestinal obstruction to be strangulated or incarcerated hernia in the groin (16).
McEntrie et al 1987, in a prospective study found aetiological factors in the United Kingdom to be adhesions, malignant disease, strangulated hernia, volvulus and faecal impaction\textsuperscript{(17)}.

Looking at above reviews, it appears that adhesions, volvulus and hernias are definitely major causes of intestinal obstruction in our set up. The trends have also been shown to change with time probably due to increased incidence of laparatomies that lead to post-operative adhesions and also increased rates of pelvic inflammatory disease especially in females. Dietary habits also could contribute to increased incidence. High residue bulky diets are thought to increase intraluminal pressures in the sigmoid loop causing relaxation and elongation in a redundant loop predisposing to sigmoid volvulus\textsuperscript{(12)}.

**PATHOPHYSIOLOGY**

This differs depending on the type of obstruction.

1. **Simple Mechanical Obstruction**

Irrespective of aetiology and acuteness, the bowel proximal to obstruction dilates and there is alteration of bowel motility.

The distal bowel continues to exhibit normal peristalsis and absorption until it becomes empty when peristaltic activity diminishes and the intestine becomes contracted and pale.

The initial response of the dilated proximal bowel is characterized by increased strong peristaltic activity due to stimulation of stretch receptors, which accounts to the severe colicky abdominal pains in such patients. This reflex activity diminishes until a total inhibition of intestinal motility ensues several hours later from the time of onset of the obstruction\textsuperscript{(5,18,19,20)}.

The cessation of activity has a protective action in preventing vascular damage from increasing intraluminal pressure\textsuperscript{(2,5,19)}.
The abdominal distension is caused by accumulation of fluid and gas in the bowel lumen proximal to the obstruction. Large quantities of fluid may be sequestered in the small bowel lumen while gas is mainly swallowed (approximately 70%) or produced by digestion and bacterial decomposition\(^{(4)}\).

In health, there is a considerable daily turnover of salt and water in the gastrointestinal tract, which is interrupted by intestinal obstruction. Normally, about 9 litres of fluid are produced in the upper intestinal tract each day as follows:\(^{(18,19,21)}\):

- Salivary gland secretions \(\approx 1000-1500\) mls
- Gastric secretions \(\approx 1500-2500\) mls
- Pancreatic juice \(\approx 1500\) mls
- Bile \(\approx 1000\) mls
- Succus entericus \(\approx 3000\) mls

Most of this fluid and electrolytes are absorbed in the small intestines with only about 1-1.5 litres of fluid reaching the caecum. The colon absorbs most of the water and sodium and secretes potassium so that only about 200mls of water is lost in faeces\(^{(3,21)}\).

In intestinal obstruction, not only is the re-absorption of the fluid and salt disrupted but there is also an increased secretion of water and electrolytes into the obstructed bowel. This leads to dehydration, hypovolaemia and biochemical derangements.

2. **Strangulated Mechanical Obstruction**

Besides the changes seen in simple mechanical obstruction, the viability of the bowel is threatened as a result of impairment of its blood supply that can be due to
direct vascular occlusion e.g. in volvulus or interruption of the mesenteric blood flow – mesenteric infarction. Venous flow is usually affected before arterial inflow. Capillary pressure increases causing tissue enlargement, local edema and extravasation of extra-cellular fluid and red blood cells\(^{(5,18)}\). If uncorrected, necrosis of the bowel wall occurs. The extravasated fluid is contaminated with aerobic and anaerobic bacteria, which can lead to severe sepsis.

Sequestered fluid may approach 7-8 litres in obstruction at distal small bowel and this coupled with vomiting can lead to severe dehydration and hypovolaemia\(^{(1,4,19)}\).

3. **Functional (Adynamic) Intestinal Obstruction**

This occurs when normal intestinal motility ceases in the absence of a mechanical cause. It can affect both small and large bowel. The pathophysiology is unclear\(^{(22,23)}\). Loss of peristaltic activity may result from:\(^{(18,19)}\)

- Reflex inhibition of intestinal motility.
- Metabolic abnormalities,
- Intra-peritoneal sepsis
- Mesenteric vascular disease.
- Drugs e.g. tricyclic antidepressants.

Most of the cases of adynamic obstruction are related to recent abdominal surgery.
AETIOLOGY

The causes of intestinal obstruction vary depending on the type and level of obstruction.

1. **Small Bowel Mechanical Obstruction**

   This accounts for about 80% of all mechanical intestinal obstructions\(^{19}\). In the developed world, the commonest causes are:\(^{3}\)

   - Adhesions from previous surgery \(\approx 50\%\)
   - Hernias \(\approx 15\%\)
   - Intra-abdominal neoplasms \(\approx 15\%\)
   - Miscellaneous \(\approx 20\%\)

   The causes can be classified as:-

   a) Extraluminal (extrinsic) e.g.
      - Adhesions
      - Hernias
      - Volvulus
      - Intussusception
      - Inflammatory
      - Neoplastic mass

   b) Mural (intrinsic) arising from the wall e.g.
      - Tumour
      - Tuberculosis
      - Crohn’s disease
      - Ischaemia
c) Intraluminal e.g.

- Gall stones
- Parasites
- Polypoid tumours
- Bezoars
- Foreign bodies

2. **Large Bowel Mechanical Obstruction**

This is less common as compared to small bowel mechanical obstruction. The principle cause is a tumour in about 90% \(^{(19)}\) while the remainder are miscellaneous such as \(^{(24,25,)}\)

- Feecal impaction
- Diverticular disease
- Volvulus
- Ischaemia
- Crohn’s disease
- Anastomotic strictures
- Inflammatory bowel disease

3. **Functional Intestinal obstruction**

Certain conditions or factors have been associated with paralytic ileus leading to functional intestinal obstruction namely: \(^{(22,23)}\)

a) Reflex inhibition of motor activity
   - Post-operative paralytic ileus
   - Head injury
   - Spinal injury
   - Retro-peritoneal haemorrhage
b) Metabolic or biochemical derangements like:
   ▪ Hypokalaemia
   ▪ Hyponatraemia
   ▪ Uraemia
   ▪ Hypothermia
   ▪ Diabetic ketoacidosis

c) Sepsis of the peritoneal cavity
   ▪ Peritonitis
   ▪ Pelvic abscess.

d) Mesenteric Vascular Disease e.g.
   ▪ Venous infarction
   ▪ Arterial occlusion

e) Drug induced
   ▪ Tricyclic anti-depressants
   ▪ General anaesthesia

**DIAGNOSIS**

The diagnosis of intestinal obstruction is based on clinical presentation coupled with investigation findings.

Symptoms and signs depend upon the cause and level of the obstruction \(^{(26,27)}\).

The four cardinal features of intestinal obstruction are:-

1) Crampy abdominal pain
2) Nausea and vomiting
3) Abdominal distension
4) Constipation
1. **Pain**
   Pain is an early symptom usually felt over the whole abdomen, worse in the epigastrium and around the umbilicus. It occurs in bouts of increasing colicky pain varying from 3 to 10 minutes in length depending in part on the level of obstruction \(^{(4,18)}\). The more proximal the obstruction the shorter the duration and interval of bouts. The character of pain reflects the viability of the bowel. Change from colicky to constant pain is associated with development of ischaemia of the gut.

2. **Vomiting**
   Obstruction causes retrograde peristalsis up to and including the stomach. Vomiting includes the undigested gastric or upper small intestinal contents. Feculent vomiting occurs with distal small bowel or large bowel obstruction. Vomiting presents earlier in proximal obstruction than in distal obstruction \(^{(5)}\).

3. **Distension**
   This is more marked in obstruction at lower levels of the bowel. It might be very minimal in upper levels of obstruction.

4. **Constipation**
   This is not a constant feature in small bowel obstruction and takes at least 24 hours to occur. It occurs early in colonic obstruction \(^{(4)}\).

**Physical Signs**
On examination the patient appears ill. A good exposure is essential for proper abdominal examination. Findings depend on type of obstruction.
Mechanical obstruction may present with a variety of physical signs.

- Tachycardia, hypotension and dehydration may occur due to fluid loss and hypovolaemia.
- Evidence of abdominal scars or hernias should be sought as these are common causes of small bowel obstruction. Visible peristalsis is usually a late sign.
- Palpation may reveal the causative factor such as intussusception or tumours while percussion of the abdomen yields hyper-resonance.
- Fever coupled with tachycardia and peritoneal irritation suggest ischaemia, inflammation or intestinal perforation while hypothermia indicates septic shock.
- Rectal examination is important. The rectum is often empty and rarely contributes to diagnosis. However, rectal tumours, diverticular masses or malignant deposits in the pouch of Douglas may be revealed.

Functional (Adynamic) obstruction

This is characterized by progressive abdominal distension and effortless vomiting (in the absence of nasogastric decompression). Intestinal colic is absent but the patient experiences diffuse abdominal discomfort. With recovery of intestinal motility, intestinal colic, described as “wind pain”, is often experienced by the patient.

Borborygmis are not heard on auscultation of the abdomen. Instead high-pitched tingling sounds are present due to passive movement of fluid from one dilated loop to another.
INVESTIGATIONS

Radiological studies and serology are crucial in the diagnosis of intestinal obstruction.

Radiological Studies

1. **Plain abdominal radiographs**

   These show abnormally dilated bowels with gas and fluid levels. Erect and supine radiographs are essential and are the initial method of confirming the presence of intestine obstruction \(^{(28)}\). These are confirmatory in about 60% while in about 20% of patients the features are equivocal and in another 20% \(^{(2)}\) may show minimal evidence of obstruction. Some of the radiographic features are as follows:

   a) **Small bowel obstruction**
      - Presence of valvulae conniventes
      - Central bowel loops
      - Pathological dilatation is present if bowel diameter exceeds 5cm

   b) **Large bowel features of obstruction**
      - Presence of haustae
      - Peripheral bowel loops
      - Pathological dilatation if more than 8cm
      - Caecal dilatation is significant if more than 10cm.

   c) **Gall Stone ileus:**
      - Air in the biliary tree and radiopaque calculus near ileocaecal valve.

   d) **Sigmoid Volvulus**
      Gross dilatation of large bowel with apex of the dilated loop on the left lower quadrant.
It is important to reckon that presence of fluid levels may also be seen in non-obstructing conditions (19) e.g.-

- Inflammatory bowel disease
- Acute pancreatitis
- Intra abdominal abscess

2. **Ultrasound**
   
   This has a limited role in the diagnosis of bowel obstruction because the presence of dilated bowel hinders image acquisition.

3. **Contrast Studies**
   
   Barium studies can be used for diagnosis in incomplete intestinal obstruction. This is however contraindicated in complete obstruction. A single contrast study using soluble contrast material is the recommended method of differentiating mechanical and functional bowel obstruction (28, 29).

4. **CT Scan**
   
   Double contrast CT Scan is increasingly being used (3).

   It may show:
   
   - Level of intestinal obstruction
   - Cause of obstruction
   - Viability of involved bowel

**Serology**

Full blood count and serum biochemistry are indicated in intestinal obstruction.

1) Heamatocrit, urea and creatinine are useful guides to the extent of dehydration.
2) Leucocytosis may reflect tissue ischaemia or dehydration causing heamo-concentration. Evidence of peritoneal irritation and a significant leucocytosis greater than 20,000/mm$^3$ in a patient with intestinal obstruction is highly suggestive of bowel ischaemia\(^{(1)}\).

3) Transfusion requirements
This should be dictated by physiological need alone. Correction of fluid deficit may reveal a significant dilutional anaemia especially in a malignant cause of intestinal obstruction.

Other Investigations include:-

- **Urine**
  - Specific gravity of 1.025-1.030 is the rule.\(^{(1)}\)
  - Proteinuria or mild acetonuria may be present.

- **Serum amylase**
  - Levels may increase due to peritoneal absorption after leakage from dying bowel or due to regurgitation into blood stream from the pancreas due to back pressure in the duodenum.

- Elevation of diaphragm due to abdominal distension may embarrass respiration leading to respiratory acidosis.

- Metabolic acidosis occurs due to dehydration, starvation, ketosis and loss of alkaline secretions.
**TREATMENT**

Intestinal decompression by nasogastric suction, intravenous replacement and maintenance of fluid and electrolyte balance are essential components of management of all cases of intestinal obstruction\(^{(26)}\). Treatment of intestinal obstruction can be conservative or surgical depending on the underlying pathophysiology \(^{(3)}\). Resuscitation is of crucial importance in intestinal obstruction.

**RESUSCITATION**

This is quite crucial and is guided by physiological and biochemical parameters that include:

(i) **Physiological parameters**
- Pulse
- Blood pressure
- Hourly urine output
- Central venous pressure

(ii) **Biochemical parameters**
- Heamatocrit
- Serum electrolytes
- Arterial blood gases

Fluid losses should be replaced with normal saline, Ringer’s lactate or Hartman’s solution. Potassium replacement over and above the normal daily requirement (60-80mmol) is required \(^{(19)}\). Patients with significant electrolyte disturbances should undergo repeat biochemical profile before surgery. The anaesthetist should be involved in the timing of surgery.
NON-OPERATIVE TREATMENT

The initial non-operative supportive treatment include: (26,30)
- Nasogastric suction
- Intestinal rest (nil by mouth)
- Intravenous fluids

These measures are essential and may suffice alone in some cases (30) e.g. uncomplicated paralytic ileus.
- Nasogastric suction decompresses the stomach but not the intestines reducing the risk of aspiration of gastric contents.
- It is essential to keep the stomach empty to reduce the hazard of aspiration especially in ill patients during induction of anaesthesia and following extubation.
- Electrolyte replacement is essential also. It is important to establish:
  (i) The likely cause of obstruction
  (ii) The likely electrolyte imbalance
  (iii) The estimated fluid deficit

The amounts of fluid and electrolytes required vary from patient to patient and is influenced by the clinical findings and biochemical and heamatological parameters.

Once the fluid and electrolyte deficit has been corrected, maintenance therapy is continued until the return to normal bowel function and motility occurs. Resuscitation is essential whether surgical intervention is anticipated or not (26).

Adynamic paralytic ileus is mainly managed conservatively unless secondary to a life threatening disorder e.g. peritonitis, mesenteric vascular occlusion. Intestinal decompression, intravenous fluid therapy and correction of metabolic disorders particularly hypokalaemia which may be a major contributory factor may suffice.
OPERATIVE TREATMENT

Surgical treatment is necessary in all patients with mechanical obstruction but operative intervention is delayed while adequate resuscitation is performed provided there are no signs of strangulation when early intervention is imperative \(^{(19,26)}\).

Closed loop obstruction is also an indication of early surgical intervention due to the risk of perforation \(^{(31,32,33)}\). The general aims of surgical treatment in intestinal obstruction are:

- Decompress obstructed bowel
- Correct the cause
- Maintain intestinal continuity
- Avoid iatrogenic damage to distended friable bowel.

The nature of surgical procedure necessary for the relief of obstruction will depend on the cause \(^{(18,24,34,35)}\).

It should be carried out at a time when the obstruction is simple, for lysis of adhesions, reduction of volvulus or other therapeutic measures, which are considered sufficient. A common problem is the determination of bowel viability, the most useful criteria for which are intestinal colour, motility and the presence of mesenteric arterial pulsation. Bowel of dubious viability should be warmed and oxygen delivery increased to restore effective tissue oxygenation \(^{(31,36,37,38)}\). Resection of the bowel is done if it fails to return to normal.

Anastomosis is done only if the two bowel ends are viable and there is no tension or peritoneal soiling with feaces or pus. Otherwise exteriorisation of both ends is safer rather than risk anastomotic disruption \(^{(31,39,40)}\).
POST-OPERATIVE CARE AND FOLLOW-UP

The principles of post-operative care are same as those of pre-operative preparation. Fluids and electrolytes, antibiotics, gastro-intestinal decompression and if postoperative ileus is prolonged, parenteral nutrition \(^{(1,34,35,41)}\).

Fluid and electrolyte management is more difficult than in other usual post-operative abdominal surgical patient due to the large third space of sequestered isotonic fluid. Loss of fluid into third space continues, but the rate slows down until reverse occurs by about the third post-operative day \(^{(43)}\).

Serum potassium, sodium and magnesium levels must be watched carefully and kept in normal range.

Prolonged deficits of these ions may lead to prolonged bowel paralysis \(^{(35,42)}\).

Decompression of the gut is also more difficult than in usual abdominal post-operative patient because restoration of normal propulsive intestinal motility is significantly delayed after release of intestinal obstruction \(^{(43,44)}\). Bowel function resumes in about three (3) days in normal abdominal operations but delays up to about 5-6 days before gastrointestinal decompression can be discontinued after intestinal obstruction \(^{(1)}\).

It is important to follow-up all patients who present with intestinal obstruction because there are high chances of recurrence.
COMPLICATIONS
As mentioned earlier intestinal obstruction is associated with high morbidity and mortality unless managed promptly.

Complications of intestinal obstruction include electrolyte imbalance, dehydration, bowel gangrene, peritonitis, septicaemia, fever and also death.

Possible clinical conditions that can complicate operations are many the common ones being:- post-operative fever, wound sepsis, wound dehiscence, chest infections, feecal fistula, septicaemia, intra-abdominal abscesses, recurrent obstruction and incisional hernias (33,45,46,47,48).

Mortality remains the most challenging complication the rate of which can be determined by the aetiology of intestinal obstruction, age of the patient, duration before surgery, bowel gangrene, pre-operative resuscitative complications and the occurrence of other post-operative complications (6,8,18,19,44,46).
RATIONALE OF THE STUDY

Intestinal obstruction is a common problem encountered at KNH. It is associated with serious complications resulting to high morbidity and mortality unless promptly and properly managed.

Studies done in the west have shown that intestinal obstruction accounts for at least 20% of all admissions to a surgical service with more than 9000 deaths annually.\(^{(1)}\) This is quite significant. Commonest causes in the west have been found to be adhesions, hernias and neoplasms.

V.M. Muyembe (2000) at Nyeri Provincial Hospital found Sigmoid volvulus, external hernias and adhesions to be the leading causes in that set up \(^{(6)}\). The pattern may not be the same at KNH being the main referral and teaching hospital in the country.

The trends and patterns of intestinal obstruction have been shown to vary with time and therefore it was worthwhile to undertake this study.
OBJECTIVES

Main Objective
To determine by a study of homogenous group of patients the pattern of intestinal obstruction as seen at Kenyatta National Hospital.

Specific Objectives

1) To determine the main causes of intestinal obstruction as seen at K.N.H.

2) Establish associated complications, morbidity and mortality.
MATERIALS AND METHODS

The study was carried out at Kenyatta National Hospital, the country’s main referral and teaching hospital. It was a hospital based retrospective study covering five (5) years from January 1996 to December 2000. Files were retrieved from the Records Department and necessary data obtained and analysed. The study was carried out between December 2002 and March 2003.

Inclusion criteria.
All cases recorded as having intestinal obstruction during the period of study.

Exclusion criteria
Case files with incomplete or inadequate information for the purpose of analysis.
Information on post-operative ileus was deficient and therefore this category of ileus was excluded from the study.

Study Limitations
Intestinal obstruction was not a direct diagnosis in some cases and therefore a good number of files may have been missed. Several other files had inadequate information while others could not be traced at the records department.

Data collection and analysis
Information was collected as per age, sex, presenting symptoms and duration, clinical signs, investigations carried out, diagnosis, treatment instituted and outcome. Data analysis was done using SPSS (Statistical Package for Social Sciences) version 10.0 computer software, and presented in form of tables and figures. Chi-square test was used where comparison between variables was necessary. The level of significance was less than 0.05.

ETHICAL CONSIDERATIONS
Permission to carry out the study was obtained from the Ethical and Research Committee of Kenyatta National Hospital. Confidentiality of the information obtained has been maintained.
RESULTS

A total of 441 patients were included in this study. Overall, 407 (92.3%) came from within Nairobi while the rest 34 (7.7%) were referred from other health institutions.

Figure 1: Referred
**Annual distribution**

The annual distribution is presented in the figure below.

**Figure 2:** Annual distribution of intestinal obstruction in adults 1996-2000 (n=441)
**Age.**

The age range was between 13 years to 94 years with a mean of 37.50 years. Most of the patients were between 21-40 years accounting for 53.2% while the least group was above the age of 70 years (5.2%).

**Figure 3: Age distribution of study population (n=434)**

Age was not indicated in 7 (1.6%) patients
Sex.

There were 335 (76%) male patients and 106 (24%) female patients giving a male to female ratio of 3.2:1.

Figure 4: Ratio of male to female:
**Symptoms**

The pattern of frequencies of the common presenting symptoms was as follows. Abdominal pain 96.1%, vomiting 87.3%, constipation 77.3% and abdominal distension in 66.4% of cases. None of the symptoms was found in isolation, they co-existed.

**Figure 5: Symptoms**
**Duration of symptoms**

The duration of symptoms was as shown in the table and figure below. These were divided into intervals of 3 days for simplicity of presentation due to a wide range.

**Table 1: Duration of symptoms (n=441)**

<table>
<thead>
<tr>
<th>Duration of symptoms (Days)</th>
<th>Number of cases</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-3</td>
<td>251</td>
<td>56.9</td>
</tr>
<tr>
<td>4-6</td>
<td>83</td>
<td>18.8</td>
</tr>
<tr>
<td>7-9</td>
<td>52</td>
<td>11.8</td>
</tr>
<tr>
<td>&gt; 9</td>
<td>49</td>
<td>11.1</td>
</tr>
<tr>
<td>Unknown</td>
<td>6</td>
<td>1.4</td>
</tr>
</tbody>
</table>

**Figure 6: Duration of symptoms (days)**

Most 251 (56.9%) patients were seen within the first three days of symptoms. The duration of symptoms was not documented in 6 (1.4%) patients.
**Physical signs**

The frequencies of the main physical findings were as shown in the table below.

<table>
<thead>
<tr>
<th>Finding</th>
<th>Number</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abdominal distension</td>
<td>322</td>
<td>73.0</td>
</tr>
<tr>
<td>Abdominal tenderness</td>
<td>302</td>
<td>68.5</td>
</tr>
<tr>
<td>Bowel sounds (Elevated)</td>
<td>261</td>
<td>59.2</td>
</tr>
<tr>
<td>Abdominal scars</td>
<td>143</td>
<td>32.4</td>
</tr>
<tr>
<td>Bowel sounds (Diminished)</td>
<td>115</td>
<td>26.1</td>
</tr>
<tr>
<td>Hernias (external abdominal hernias)</td>
<td>90</td>
<td>20.4</td>
</tr>
<tr>
<td>Dehydration</td>
<td>68</td>
<td>15.4</td>
</tr>
<tr>
<td>Tachycardia</td>
<td>48</td>
<td>10.9</td>
</tr>
<tr>
<td>Visible peristaltic waves</td>
<td>39</td>
<td>8.8</td>
</tr>
<tr>
<td>Hypotension</td>
<td>27</td>
<td>6.1</td>
</tr>
<tr>
<td>Abdominal masses</td>
<td>22</td>
<td>5.0</td>
</tr>
<tr>
<td>Fever</td>
<td>11</td>
<td>2.5</td>
</tr>
</tbody>
</table>

Abdominal distension was the commonest finding 73.0%, abdominal tenderness 68.5% and elevated bowel sounds 59.2%. Previous abdominal scars were found in 32.4% while reduced bowel sounds were recorded in 26.1%. Other less frequent signs were as shown in the table.
Investigations

The commonest investigation performed was plain abdominal x-rays in 354 (80.3%) patients, haemogram, urea and electrolytes were done in 56.5% while abdominal ultrasound was taken in 6.3% of the cases.

Figure 7: Investigations

It was difficult to determine how many patients had blood taken for group and cross-matching and if so how many were actually transfused due to lack of that information from the files.
Type of intestinal obstruction

Mechanical obstruction was recorded in 407 (92.3%) cases, paralytic ileus in 27 (6.1%), while in 7 (1.6%) the type was not determined.

Figure 8: Type of intestinal obstruction

Table 3: Type of intestinal obstruction (n=441)

The table below further gives the distribution of the various types of intestinal obstruction.

<table>
<thead>
<tr>
<th>Type of intestinal obstruction</th>
<th>Number</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mechanical</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- SBO</td>
<td>287</td>
<td>65.1</td>
</tr>
<tr>
<td>- LBO</td>
<td>112</td>
<td>25.4</td>
</tr>
<tr>
<td>- SBO/LBO</td>
<td>8</td>
<td>1.8</td>
</tr>
<tr>
<td>Paralytic ileus</td>
<td>27</td>
<td>6.1</td>
</tr>
<tr>
<td>Undetermined</td>
<td>7</td>
<td>1.6</td>
</tr>
</tbody>
</table>

Overall, mechanical SBO accounted for 65.1% while mechanical LBO accounted for 25.4%. Other types of obstruction were minimal as shown in the table above.
Causes

These are summarised in the table below for the different types of intestinal obstruction

**Table 4(a): Causes (n=441)**

<table>
<thead>
<tr>
<th>Type of intestinal obstruction</th>
<th>Number</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mechanical SBO</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adhesions and bands</td>
<td>162</td>
<td>36.7%</td>
</tr>
<tr>
<td>Strangulated/obstructed hernias</td>
<td>88</td>
<td>20.0%</td>
</tr>
<tr>
<td>Volvulus</td>
<td>18</td>
<td>4.1%</td>
</tr>
<tr>
<td>Worms (<em>Ascaris lumbricoides</em>)</td>
<td>11</td>
<td>2.5%</td>
</tr>
<tr>
<td>Intussusception</td>
<td>5</td>
<td>1.1%</td>
</tr>
<tr>
<td>Tumours</td>
<td>3</td>
<td>0.7%</td>
</tr>
<tr>
<td><strong>Mechanical LBO</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Volvulus</td>
<td>56</td>
<td>12.7%</td>
</tr>
<tr>
<td>Faecal impaction</td>
<td>30</td>
<td>6.8%</td>
</tr>
<tr>
<td>Neoplasms</td>
<td>20</td>
<td>4.5%</td>
</tr>
<tr>
<td>Inflammatory strictures</td>
<td>5</td>
<td>1.1%</td>
</tr>
<tr>
<td>Intussusception</td>
<td>1</td>
<td>0.2%</td>
</tr>
<tr>
<td><strong>Mechanical SBO/LBO</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Compound volvulus</td>
<td>8</td>
<td>1.8%</td>
</tr>
<tr>
<td><strong>Paralytic ileus</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TB Peritonitis</td>
<td>22</td>
<td>5.0%</td>
</tr>
<tr>
<td>Ischaemia (mesenteric thrombosis)</td>
<td>5</td>
<td>1.1%</td>
</tr>
<tr>
<td><strong>Undetermined</strong></td>
<td>7</td>
<td>1.6%</td>
</tr>
</tbody>
</table>

Overall, adhesions and bands were the commonest, 36.7%, cause of obstruction followed by strangulated hernias, 20.0%, and volvulus 16.8% (large gut 12.7% and small gut 4.1%). TB peritonitis, 5.0%, was the main cause of paralytic ileus.
Distribution

Distribution of hernias, large bowel volvulus and neoplasms is shown in the tables below:

**Table 4(b)  Hernia distribution (n=88)**

<table>
<thead>
<tr>
<th>Type of hernia</th>
<th>Number</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Right inguinal (RIH)</td>
<td>52</td>
<td>59</td>
</tr>
<tr>
<td>Left inguinal (LIH)</td>
<td>24</td>
<td>27.3</td>
</tr>
<tr>
<td>Umbilical</td>
<td>10</td>
<td>11.4</td>
</tr>
<tr>
<td>Femoral</td>
<td>2</td>
<td>2.3</td>
</tr>
</tbody>
</table>

Of all strangulated hernias, inguinal hernias were commonest 86.3% (RIH 59.0% plus LIH 27.3%), umbilical hernias accounted for 11.4%, while femoral hernias were very rare, 2.3%, overall.

**Table 4 (c)  Large gut volvulus distribution (n=56)**

<table>
<thead>
<tr>
<th>Level (site)</th>
<th>Number</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sigmoid colon</td>
<td>54</td>
<td>96.4</td>
</tr>
<tr>
<td>Caecum</td>
<td>2</td>
<td>3.6</td>
</tr>
</tbody>
</table>

Sigmoid volvulus was commonest, 96.4%, while caecal volvulus was rare at 3.6%.
**Table 4 (d) Distribution of large gut neoplasms (n=20).**

<table>
<thead>
<tr>
<th>Site</th>
<th>Number</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recto-sigmoid</td>
<td>8</td>
<td>40</td>
</tr>
<tr>
<td>Rectal</td>
<td>4</td>
<td>20</td>
</tr>
<tr>
<td>Ano-rectal</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>Sigmoid</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>Others</td>
<td>6</td>
<td>30</td>
</tr>
</tbody>
</table>

This shows that most 70% of the neoplasms arose from the sigmoid and the distal gastrointestinal tract.
Management

Overall, operative management was instituted in 266 (60.3%) patients while the rest 175 (39.7%) were managed conservatively.

Figure 9: Management
Operative management

Of the 266 patients managed operatively, 23.3% had gut resection and anastomosis, 18.8% had gut exteriorization while 57.9% underwent operations which did not require gut opening or resection as shown in the table below.

Table 5: Operative management (n=266)

<table>
<thead>
<tr>
<th>Operative type</th>
<th>Number</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resection and anastomosis</td>
<td>62</td>
<td>23.3</td>
</tr>
<tr>
<td>Gut exteriorized</td>
<td>50</td>
<td>18.8</td>
</tr>
<tr>
<td>Gut intact</td>
<td>154</td>
<td>57.9</td>
</tr>
</tbody>
</table>
Complications

Overall, 157 (35.6%) patients had complications while 284 (64.4%) had none.

Complications were observed either pre-operatively or post-operatively as shown in the tables below. These did not occur in isolation since at least two could be found in one case.

Table 6 (a): Pre-operative complications

<table>
<thead>
<tr>
<th>Complication</th>
<th>Number</th>
<th>% of total population</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peritonitis</td>
<td>58</td>
<td>13.2</td>
</tr>
<tr>
<td>Gangrene (Gut)</td>
<td>47</td>
<td>10.7</td>
</tr>
<tr>
<td>Electrolyte imbalance</td>
<td>25</td>
<td>5.7</td>
</tr>
<tr>
<td>Sepsis (excluding peritonitis)</td>
<td>22</td>
<td>5.0</td>
</tr>
<tr>
<td>Gut perforation</td>
<td>7</td>
<td>1.6</td>
</tr>
<tr>
<td>Renal failure</td>
<td>4</td>
<td>0.9</td>
</tr>
</tbody>
</table>
Associations

There was a significant association between

i. Pre-operative gut gangrene and gut perforation

ii. Dehydration before treatment and electrolyte imbalance

Table 6a(i)  Gut gangrene versus gut perforation

<table>
<thead>
<tr>
<th>Gut Gangrene (Pre-operative)</th>
<th>Gut perforation (Pre-operative)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>5 (10.6%)</td>
<td>47</td>
</tr>
<tr>
<td>No</td>
<td>2 (0.5%)</td>
<td>394</td>
</tr>
<tr>
<td>Total</td>
<td>7</td>
<td>441</td>
</tr>
</tbody>
</table>

Level of significance < 0.05
Fisher’s Exact Test=0.000

This shows a significant association between gut gangrene and gut perforation. Five (71.4%) of the 7 patients who developed gut perforation had gut gangrene.

Table 6a(ii)  Dehydration versus electrolyte imbalance

<table>
<thead>
<tr>
<th>Dehydration (Before treatment)</th>
<th>Electrolyte imbalance</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>16 (23.5%)</td>
<td>68</td>
</tr>
<tr>
<td>No</td>
<td>9 (2.4%)</td>
<td>373</td>
</tr>
<tr>
<td>Total</td>
<td>25</td>
<td>441</td>
</tr>
</tbody>
</table>

Level of significance < 0.05
Fisher’s Exact Test=0.00

The table above shows a significant association between dehydration and electrolyte imbalance. Out of 25 patients with electrolyte imbalance 16 (64%) had dehydration.
Table 6(b) Post-operative complications (frequency)

<table>
<thead>
<tr>
<th>Complication</th>
<th>Number</th>
<th>% of total population</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recurrences</td>
<td>16</td>
<td>3.6</td>
</tr>
<tr>
<td>Wound infection</td>
<td>12</td>
<td>2.7</td>
</tr>
<tr>
<td>Fistula formation with peritonitis</td>
<td>6</td>
<td>1.4</td>
</tr>
<tr>
<td>Burst abdomen</td>
<td>4</td>
<td>0.9</td>
</tr>
<tr>
<td>DVT</td>
<td>2</td>
<td>0.5</td>
</tr>
</tbody>
</table>

Complications were relatively fewer post-operatively. There was however a significant association between:

i. pre-operative peritonitis and post-operative fistula formation

ii. pre-operative gut gangrene and post-operative wound infection

Table 6 b (i) Pre-operative versus post-operative fistula formation

<table>
<thead>
<tr>
<th>Fistula (post-operative)</th>
<th>Yes</th>
<th>No</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peritonitis (pre-operative)</td>
<td>Yes</td>
<td>4 (6.9%)</td>
<td>54 (93.1%)</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>2 (0.5%)</td>
<td>381 (99.5%)</td>
</tr>
<tr>
<td>Total</td>
<td>6</td>
<td>435</td>
<td>441</td>
</tr>
</tbody>
</table>

Level of significance < 0.05

Fisher’s Exact Test=0.003

Four (66.7%) of the 6 patients who had fistula formation post-operatively had peritonitis pre-operatively which was significant.
Table 6 b (ii) Pre-operative gut gangrene versus post-operative wound infection

<table>
<thead>
<tr>
<th>Gut gangrene (pre-operative)</th>
<th>Wound infection(post-operative)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Yes</td>
<td>7 (14.9%)</td>
<td>40 (85.1%)</td>
</tr>
<tr>
<td>No</td>
<td>5 (1.3%)</td>
<td>389 (98.7%)</td>
</tr>
<tr>
<td>Total</td>
<td>12</td>
<td>429</td>
</tr>
</tbody>
</table>

Level of significance < 0.05

Fisher’s Exact Test=0.000

Of the 12 patients with post-operative wound infection, 7 (58.3%) had pre-operative gut gangrene which was significant.
Hospital stay

The figure below shows the number of days taken in hospital with a mean hospital stay of 7.39 days.

Majority 277 (62.8%) were discharged within the first one week, 127 (28.8%) were discharged within the second week while 37 (8.4%) stayed in hospital for more than two weeks (figure 10, table 7 below).

Table 7: Duration of hospital stay (n=441)

<table>
<thead>
<tr>
<th>Hospital stay (days)</th>
<th>Number</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-7</td>
<td>277</td>
<td>62.8</td>
</tr>
<tr>
<td>8-14</td>
<td>127</td>
<td>28.8</td>
</tr>
<tr>
<td>15-21</td>
<td>18</td>
<td>4.1</td>
</tr>
<tr>
<td>&gt;21</td>
<td>19</td>
<td>4.3</td>
</tr>
</tbody>
</table>

Figure 10: Duration of hospital stay.
Mortality

The mortality rate was 17.7% (78) patients of the 441 reviewed cases

Figure 11: Mortality

Mortality/duration of symptoms.

The mortality rate increased with increased duration of symptoms as shown in the tables below.

Table 8(a) Overall mortality/duration of symptoms (n=78)

<table>
<thead>
<tr>
<th>Duration (days)</th>
<th>Number</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-2</td>
<td>10</td>
<td>12.8</td>
</tr>
<tr>
<td>3-4</td>
<td>20</td>
<td>25.6</td>
</tr>
<tr>
<td>≥ 5</td>
<td>47</td>
<td>60.3</td>
</tr>
<tr>
<td>Unknown</td>
<td>1</td>
<td>1.3</td>
</tr>
</tbody>
</table>
**Association**

Table 8 (b) Mortality versus duration of symptoms

<table>
<thead>
<tr>
<th>Duration of symptoms (days)</th>
<th>Mortality</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>1-2</td>
<td>10 (6.2%)</td>
<td>152 (93.8%)</td>
</tr>
<tr>
<td>3-4</td>
<td>20 (15.3%)</td>
<td>111 (84.7%)</td>
</tr>
<tr>
<td>≥ 5</td>
<td>47 (33.1%)</td>
<td>95 (66.9%)</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>77</strong></td>
<td><strong>358</strong></td>
</tr>
</tbody>
</table>

Level of significance $P < 0.05$

Pearson Chi-square = 0.000

This shows a significant association between duration of symptoms and mortality. There is an increase in mortality rate compared to increase in duration of symptoms.
Table 8 (c)   Referral mortality/duration of symptoms (n=14)

<table>
<thead>
<tr>
<th>Duration (days)</th>
<th>Number</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-2</td>
<td>2</td>
<td>14.3</td>
</tr>
<tr>
<td>3-4</td>
<td>2</td>
<td>14.3</td>
</tr>
<tr>
<td>≥ 5</td>
<td>10</td>
<td>71.4</td>
</tr>
</tbody>
</table>

The mortality rate was higher, 41.2%, in the category of referred patients (14 out of 34) compared to 15.7% (64) of the 407 local patients. Of the 14 referrals who died, majority, 71.4% (10), presented at KNH after 5 or more days of symptoms. Late presentation and inadequate resuscitation could have been the reason for the high mortality.
Follow up

Majority of patients 343 (77.8%) were followed up while 78 (17.7%) were not. There was no record of what happened to the rest 20 (4.5%).

Figure 12: Follow up.
DISCUSSION

Intestinal obstruction is a leading cause of acute abdomen at KNH\textsuperscript{(13)}. In the west it accounts for at least 20\% of all admissions to a surgical service\textsuperscript{(1)}.

A total of 441 cases were included in this study for the 5 years period between January 1996 and December 2000.

The study attempted to look at the pattern of intestinal obstruction during the period of study compared to some other previous studies locally and elsewhere.

The study showed that most, 92.3\%, of the patients were from within Nairobi while a small proportion, 7.7\%, were referral cases. This was expected since most cases of intestinal obstruction can be handled at district and provincial hospitals apart from isolated cases.

In this study, 335 (76\%) cases were male while 106 (24\%), were female giving a male female ratio of 3.2:1 which showed a male preponderance (figure 4). This compares to an earlier study by Ngugi J.K.; 1999 on intestinal obstruction from adhesions at KNH where the ratio was 3:1\textsuperscript{(41)}. It is important to point out that most of the previous investigators quoted in this study looked at different isolated aspects of intestinal obstruction and not intestinal obstruction in general as was the case in this study and thus some of their findings can only be deduced when comparing.

The mean age was 37.50 years with a range of 13-94 years (figure 3). The peak age group was in the third and fourth decades accounting for 53.2\% compared to the fifth decade in the United Kingdom\textsuperscript{(17)}. This group comprise the most productive work force of any country. Most of these patients had had a previous laparatomy for a different pathology ranging from appendicitis to trauma with subsequent development of adhesions and bands. This group is vulnerable to abdominal trauma through violence, stab wounds, bullet injuries, sports and even road traffic accidents especially in the male
population which explains the male preponderance. The incidence of strangulated hernias in the general population is also commoner in this age group especially in the male sex.

Inflammatory diseases like pelvic inflammatory disease in females and appendicitis which are also common in this age bracket lead to increased number of laparatomies and therefore increased chances of adhesions formation.

In this study, mechanical obstruction accounted for 92.3% of all cases. Mechanical SBO was the commonest type, 65.1%, followed by mechanical LBO, 25.4%, while mechanical SBO/LBO was found in 1.8%, as compound volvulus. Paralytic ileus was found in 6.1% of the cases. The type of obstruction was not determined in 1.6% of the cases due to missing of this information from the patients’ files (table 3). Mechanical SBO occurrence is more frequent since the main causes of mechanical obstruction (adhesive obstruction and hernia strangulation) mainly occur at the level of small bowel (table 4a).

The pattern of intestinal obstruction at KNH compares to that in the western advanced countries which contrasts earlier reports by McAdam W.J. and Paul Ivo Garrido where strangulated hernias were found to be the commonest cause in developing countries. The main cause of intestinal obstruction at KNH is due to adhesions and bands, 36.7%, mainly associated with previous laparatomies. A small group may occur due to peritoneal infections or inflammatory conditions for which laparotomy has not been done. This pattern differs with other developing countries contrary to literature.

A single adhesive band may be causative although multiple adhesions may be found at laparotomy. It should be divided and the rest left in situ since division of the other adhesions would only cause further adhesion formation. When obstruction is due to many adhesions, they should be freed by sharp dissection and the bare area covered with omental grafts to prevent recurrence.
Factors that limit adhesion formation in abdominal surgery include good surgical technique, minimisation of contact with gauze, cover of anastomosis sites and peritoneal surfaces as well as washing of the peritoneal cavity with saline to remove clots (18).

McEntrie et al 1987 found that the commonest cause of intestinal obstruction in United Kingdom was adhesions followed by neoplasms, strangulated hernias, volvulus and faecal impaction in that order (17).

Akcakaya A. in Turkey October 2000 noted that the most frequent cause of intestinal obstruction in the developed countries is adhesions while strangulated hernias are more common in developing countries (49), which does not appear to be the case at KNH.

In India, Tamijmarare et al in 2000 showed that in a study of 572 patients admitted with intestinal obstruction between 1984 and 1992, 219 patients had obstructed external hernias as the leading cause while adhesive obstruction was second in 176 patients (50).

Studies in other parts of Africa have also shown hernias to be the main cause of intestinal obstruction. McAdam (1969) found hernias followed by volvulus to be the commonest cause in Kampala Uganda (37).

Paul Garrido (1992) also found obstructed hernias to be the commonest cause of intestinal obstruction in Maputo Mozambique (38) and so were Ajoo (1981) in Nigeria (16) and Solanke (1968) in Ibadan, Nigeria (51). Dewulf, 1986 in Rwanda also had a similar observation (52).

Kenya is a developing country but the pattern of intestinal obstruction compares to that of developed countries due to the fact that the health delivery in urban centers tends to simulate that of developed countries (41,44). With hernias being electively repaired and obstructive hernias becoming less common, adhesive obstruction has emerged as the leading cause of intestinal obstruction in the west (50) which could possibly to be the case at KNH.
The second commonest cause of mechanical small bowel obstruction according to this study was strangulated external hernias 20% (table 4a). Inguinal hernias were the most frequent 86.3% (59% RIH and 27.3% LIH) of all the strangulated hernias followed by umbilical hernias 11.4% and femoral hernias 2.3% (table 4b). In the general population, the approximate frequencies of external abdominal hernias are inguinal 75%, femoral 8.5% and umbilical 15%, while rarer forms comprise 1.5%, excluding incisional hernias. In adult males, 65% of inguinal hernias are direct and 55% are right sided (18).

In this study, 59% of the hernias were right sided inguinal hernias which agrees with literature. A hernia strangulates due to a narrow neck and therefore becomes a surgical emergency since the gut viability is threatened and any delay to treatment would only increase risk of gangrene formation and related complications (53). Rarer causes of mechanical SBO were ileal volvulus, worms (Ascaris lumbricoides), intussusception and non-specified tumours. Histology report missed for all the 3 patients with ileal tumours.

The third common cause of intestinal obstruction was sigmoid volvulus 12.3% which was the main cause of large bowel mechanical obstruction. This pattern is comparable to studies by Raburu (1990) and Nganga (1998) but contrasts earlier studies by Warambo (1971) and Ojara (1983) where volvulus and external hernias led overall respectively. Sigmoid volvulus in this study was predominant in the male gender which compares to earlier local studies by Wambwa (1974) and Pankaj Jani (1984). It is a common problem in Africans where predisposing factors include high residue diet and chronic constipation. Idiopathic megacolon usually precedes the volvulus in Africans. Predisposing factors can broadly be classified as narrow attachment of pelvic mesocolon, long pelvic mesocolon, overloaded pelvic colon and band of adhesions. Of the 56 patients who had large bowel volvulus, 54 (96.4%) involved the sigmoid colon while only 2 (3.6%) had volvulus of the caecum (table 4c). The other causes of mechanical colonic obstruction were faecal impaction 6.8% and neoplasms 4.5%. There were 20 patients with large gut neoplasms with majority (70%) of them arising from the sigmoid and distal bowel which is slightly higher than what is seen in the western countries (approximately 60-65%) (18) (table 4d). Miscellaneous causes included inflammatory conditions in five cases while one case was found to have intussusception. Compound volvulus was found in 8 (1.8%) patients.
Overall, adhesions and bands were the most common cause 36.7% of mechanical intestinal obstruction followed by strangulated hernias 20%, colonic volvulus 12.7%, fecal impaction 6.8%, large gut neoplasms 4.5%, ileal volvulus 4.1% in that order. Rarer causes included worms (*Ascaris lumbricoides*), compound volvulus, inflammatory conditions, intussusception and non-specified ileal tumours (table 4a). This pattern is comparable to that of developed countries except for neoplasms which seem to be commoner in the west probably due to increase in life expectancy and therefore the elderly population.

Tuberculous peritonitis was the main cause 5.0% of paralytic ileus while ileus due to ischaemia from mesenteric thrombosis occurred in 1.1% overall. Tuberculosis therefore appears to be an important cause of functional intestinal obstruction resulting from ileus due to peritonitis especially with the increasing incidence of TB cases.

The majority of patients with mechanical obstruction presented with abdominal pain and vomiting with frequencies of 96.1% and 87.3% respectively. Constipation had a frequency of 77.3% and abdominal distension 66.4% (Figure 5). These symptoms were not found in isolation but co-existed. Pain is an early and usually first symptom which is colicky in nature. It coincides with increased peristaltic activity in an attempt to overcome the obstruction. If severe and continuous, then it is an indication of ischaemia and/or inflammation. Vomiting occurs early when obstruction is proximal but delays in distal obstruction. It becomes feculent as the process progresses. Constipation and abdominal distension are more marked in distal obstruction e.g. sigmoid volvulus. Visible peristalsis of bowel loops can be a common feature while constipation can be relative or absolute depending on duration from onset. Initially there is relative constipation as evacuation of distal gut continues which later becomes absolute as the distal gut collapses empty. Most patients, 56.9% presented within the first 3 days of symptoms.
The commonest physical findings were abdominal distension, 73.0%, abdominal
tenderness, 68.5%, and increased bowel sounds, 59.2%. Increased bowel sounds were
found in patients with early presentation. Initially, there is increased peristaltic activity
with associated high pitched obstructed bowel sounds but this diminishes with time as the
gut later becomes paralytic and the bowel sounds diminish too. Evidence of previous
laparotomy signified by presence of an abdominal surgical scar was found in 32.4%.
Hernia orifices were examined while digital rectal exam (DRE) was performed in 50.8%
of the cases to evaluate whether empty, fecal loading or presence of tumour as this adds
useful information to diagnosis (table 2).

In evaluation of the patients, the most useful guide to diagnosis was plain abdominal x-
rays, 80.3%, where in combination with history and physical findings, distended bowel
loops with air-fluid levels was diagnostic. Although air-fluid levels were recorded as
present, the numbers of levels could not be determined from the files as the available
information either commented their presence without indicating the actual number, or just
indicated that there were radiological features of intestinal obstruction while in others
there was no comment at all about the x-ray findings.

The severity of obstruction can be determined from the number of air-fluid levels as it
increases with the number of levels. It should however, be noted that in adults, two
inconstant fluid levels may be regarded as normal one at the duodenal cap and the other
in the terminal ileum \(^{18}\).

Erect abdominal films are no longer routine since radiological diagnosis is based on
supine films \(^{18,54}\). Jejunum is characterized by volvulae conventes while ileum is
relatively featureless. Obstructed colon is characterized by haustriations and peripheral
location within the abdominal cavity. Water-soluble contrast is useful to differentiate
between complete and pseudo-obstruction but it is not a common radiological imaging
study at KNH. The other imaging study used was abdominal ultrasound performed in
6.3% of cases especially those suspected to have abdominal tumours.
The laboratory evaluation included haemogram or haematocrit and biochemistry performed in equal frequencies of 56.5% (figure 7). These tests were not done routinely which should not be the case.

It was difficult to determine how many patients were transfused in this study as such information was either inadequate or missing.

The mode of treatment was determined by the underlying condition. Overall, surgery was performed in 60.3% of all the patients the type of which depended on cause and intra-operative findings. The rest of the patients, 39.7%, were managed conservatively (figure 9).

Of all the patients managed operatively, 42.1% had gut lumen opened either for resection and anastomosis or for exteriorisation (table 5). Prophylactic use of antibiotics is therefore recommended since the risk of contamination and sepsis is quite high in such patients.

Dehydration was found in 15.4% of the cases at presentation. This can be attributed to the large volumes of fluid lost through vomiting and sequestration into the lumen of the obstructed bowel. It should be corrected earliest possible. However, this could have been underestimated since assessment of dehydration is subjective. It is also important to note that data on hydration status was not adequately documented or missed in most files and therefore this may not have been a true picture. Other common pre-operative complications were peritonitis, 13.2%, bowel gangrene, 10.7% and electrolyte imbalance 5.7%. Rare complications were sepsis (excluding peritonitis) 5.0%, gut perforation and renal failure in seven and four patients respectively (table 6a). There was a significant association between gut gangrene and perforation as well as between dehydration and electrolyte imbalance (tables 6ai and aii).

The common post-operative complications were recurrences of adhesive obstruction 3.6% and wound infection 2.7% of all cases. Rare post-operative complications included
fistula formation with peritonitis in 6 patients, burst abdomen in 4 patients and DVT in 2 cases. There was a significant association between pre-operative peritonitis and post-operative fistula formation as well as between pre-operative gut gangrene and post-operative wound infection (tables 6bi, 6bii).

Mortality rate was found to be 17.7%. It was higher in patients who were referred from other hospitals 41.2% (14 of the 34 referrals) compared to 15.7% of the local patients. Majority 85.9% of the overall mortality were patients treated after 2 days (48 hours) of symptoms (table 8a). In the category of referrals, 71.4% of those who died were treated after five or more days (table 8c) which explains the high mortality rate in that group. There was a significant association between duration of symptoms and morbidity (table 8b). Early diagnosis and prompt management is quite essential in order to reduce morbidity and mortality.

Majority 277 (62.8%) of the patients were discharged from hospital within the first week (table 7, figure 10). Hospital stay was determined by severity and outcome. The mean duration was 7.39 days. Most of the patients 77.8% were followed up at the surgical outpatient clinic, 17.7% were not while there was no record of what happened to the rest 4.5% (figure 12). Patients’ follow up was determined by the cause and outcome. Patients managed operatively were booked for follow up while those with mild conditions like faecal impaction and worms were not. Some patients booked for follow up did not attend the clinic for reasons that could not be established in this study. It could not be ascertained for how long individual cases were followed up since that information was lacking in most files. This could be due to the fact that some of the review notes were on the discharge summary sheets with the patients and not in the files as it should be.
CONCLUSIONS

1. Majority (92.3%) of the patients seen at KNH with intestinal obstruction came from within Nairobi with a small proportion of referrals (7.7%).

2. The commonly affected age group is 21-40 years predominantly in the males with a male female ratio of 3.2:1.

3. The pattern at KNH compares to that of developed countries.

4. The main cause of intestinal obstruction is adhesions from previous laparatomies, followed by strangulated hernias and sigmoid volvulus.

5. Plain abdominal X-rays was the main imaging investigation carried out.

6. Operative management is commoner than non-operative management while resuscitation is essential to all cases of intestinal obstruction.

7. Mortality rate was higher in patients who presented late.
RECOMMENDATIONS

1. Proper documentation of medical information and filing should be observed as this would reduce the study limitations encountered during this study.

2. Laboratory evaluation especially hematological and biochemical profile should improve as this provides a baseline and a better understanding of biochemical derangements and therefore replacement therapy.

3. All effort should be made to document the hydration status in all patients with intestinal obstruction as this provides a guide towards fluid replacement therapy.

4. Careful evaluation of patients is important so as to avoid unnecessary laparotomies which would effectively reduce the number of laparotomies in the general population and therefore lower occurrence of adhesive intestinal obstruction.

5. Public awareness of the need for elective repair of hernias would reduce the occurrence of hernial obstruction in the general population.

6. Improved medical care at all levels is necessary so that speedy and prompt treatment can be offered earliest possible and reduces mortality.
APPENDIX I

**Proforma Questionnaire**

A five year retrospective study on the presentation, management and outcome of intestinal obstruction in Kenyatta National Hospital (1996-2000)

1. Study number………………………………………………………………………………
2. I.P.No.:…………………………………………………………………………………
3. Age:…………………………………………………………………………………….
4. Sex:……………………………………………………………………………………
5. Date of Admission:……………………………………………………………………
6. Date of Discharge/Death………………………………………………………………

7. **Symptoms:-**

   - Abdominal Pain □
   - Nausea/Vomiting □
   - Abdominal Distension □
   - Constipation □
   - Others (Specify)……………………………………………………………………
8. **Relevant Past Medical History:**

- Previous Abdominal Surgery
- Hernias
- Neoplasms
- Inflammatory masses
- Radiation
- Others (Specify) ..............................................................

9. **Physical findings (signs):**

- Tachycardia
- Hypotension
- Dehydration
- Fever
- Abdominal distension
- Abdominal tenderness
- Abdominal scars
- Evidence of hernias
- Visible peristalsis
- Bowel sounds-high pitched
- Bowel sounds-Diminished
- Abdominal masses
- Others (specify)

10. **Investigations:-**

- Plain abdominal X-ray
- Ultrasound
- Haemogram
- Biochemistry
- Others (specify)
11. Type of obstruction

- Mechanical small bowel obstruction □
- Mechanical large bowel obstruction □
- Functional Obstruction □

Cause: .................................................................
.................................................................

12. Treatment:-

- Non-operative □
- Operative □

13. Outcome

- Satisfactory □

- Complications (specify)

(i) .................................................................
(ii) .................................................................
(iii) .................................................................
(iv) .................................................................

14. Follow-up:- Yes □ No □
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