EVALUATION OF TREATMENT OF PATIENTS WITH MECHANICAL INTESTINAL OBSTRUCTION AT KENYATTA NATIONAL HOSPITAL

A PROSPECTIVE STUDY

BY

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DECLARATION

This dissertation is my original work and has not been presented for a degree in any other university.

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DEDICATION

I dedicate this dissertation to my parents Philister Ligeyo and the late Nahory Ligeyo.

My wife Melab and son J.W.Odhiambo. All my brothers and sisters and the late C.L.B. Adhiambo.

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

ABBREVIATIONS

1. C.T SCAN.....Computerized Tomography Scan

2. I.C.U.....Intensive Care Unit

3. K.N.H.....Kenyatta National Hospital

4. W.B.C.....White Blood Cell

5. S.B.O.....Small Bowel Obstruction

6. S.B.F.T.....Small Bowel Follow Through Studies

7. H.I.V.....Human Immunodeficiency Virus

SUMMARY

The choice between initial surgical or non-operative management of mechanical bowel obstruction still remains a challenge. This was a prospective study carried out over a period of ten months from 1st September 2005 to 30th June 2006. The broad objective was to evaluate the pattern and treatment of patients with mechanical intestinal obstruction at Kenyatta National Hospital.

Methodology: Data on demographic characteristics, management, and outcome were collected using questionnaires. The main outcome measures were duration of hospital stay, the need of operative treatment, and the incidence of bowel strangulation, complications and death. This data was analyzed and presented in tables, charts and graphs.

Results: A total of 120 patients with intestinal obstruction were recruited into the study. The ages ranged from 13 to 84 years with a mean of 38 years. The male to female ratio was 2:1.Thirty six percent of the patients [43] had previous laparotomies. The small-gut was involved in 65% of the cases while the large gut was involved in 35% of the cases. The underlying lesions were: adhesions and bands [44%], volvulus [20%], faecal impaction [17%], tumours [8%], helminthiasis [4%], hernia [4%] and intussusception [3%]. Fifty two percent of the patients were managed conservatively, 29% were managed by early operation and 19% were managed by late operation. The main indications for early operative management were signs of peritonitis [49%], intractable pain [20%], leukocytosis [17%], and hernia [14%]. The indications for late operation were failure of resolution [49%], peritonitis [38%], and worsening of the general condition [13%]. Intra-operatively the definitive surgical procedures included: resection and primary anastomosis [49%], adhesiolysis [22%], resection and colostomy [18%], derotation and decompression [11%]. The resection rate in the early operation group due to non-viable strangulation was 22/35 [63%] and 15/20 [75%]

in the late operative group. The significant post-operative complications were; wound infection and dehiscence, atelectasis, shock, electrolyte-imbalance, septicaemia and peritonitis. The mean duration of Hospital stay was 10days for all the patients. The mortality for the duration of this study was 4%.

Conclusions: In the past 20 years the pattern of mechanical obstruction has changed with adhesions being the most common lesion. The pathology is more common in men of 21 to 40 year age brackets. Most patients with adhesive mechanical bowel obstruction will benefit from trial of conservative management as the resolution rate is high. Resolution occurred after five days in most of the patients who were managed conservatively. Patients with complete obstruction should be operated on immediately after resuscitation as this may reduce the resection rates. The strangulation rate was higher in the patients under delayed operative management than in those who were operated on earlier. The main indications for early operation were signs of peritonism, intractable pain, leukocytosis and hernia. The main indications for delayed operation were failure of resolution, signs of peritonism and worsening of general condition of the patient. Though the mortality is low, the morbidity is still high in the post-operative patients seen at K.N.H.

Recommendations: Surgeons should be cautious in postponing surgery beyond 24 hours in patients with unresponsive symptoms from complete obstruction as the risk of resection rises dramatically within 72hours. The monitoring of fluid and electrolytes administration for patients who are on trial of conservative management should be improved. It is imperative that a standardized protocol with a scoring system for management of patients with covert signs of strangulation should be set up. This can be boosted by radiological investigations like contrast C.T scan in emergent situations. Similar studies should be carried out in different localities in the country. The results can be compared and used in assessment of the level of medical care.

INTRODUCTION

Small bowel obstruction is responsible for about 20% of acute surgical admissions in most surgical units [1]. Adhesions are the leading cause in most centres accounting for 60 to 80% of the cases. [2]

The natural course of this problem is still unclear. Patients with this condition are often difficult to assess and require careful evaluation and management. Immediate surgery is recommended when strangulation is suspected or in complete bowel obstruction. [3] A trial of conservative treatment is acceptable if the obstruction is incomplete. [4] However, the optimal duration of this trial of conservative treatment has not been well defined.

Some authors suggest immediate surgery for any patient with intestinal obstruction but other schools of thought recommend a period of conservative management from two to ten days so long as the patient is physiologically stable. Published reports have indicated that small bowel obstruction can resolve on conservative management in up to 70% of the cases. [5]

As the morbidity and mortality are much higher after operative treatment, most patients benefit from a trial of non-operative treatment especially in partial obstruction. On the other hand a trial of conservative management may delay operative management and increase mortality and morbidity. [6]

The diagnosis may require a very high index of suspicion and early consideration for the need of surgical intervention may mean the difference between intestinal salvage and catastrophe.

LITERATURE REVIEW

HISTORICAL BACK-GROUND

Dr. Owen Wangensteen, who is considered by many to be the greatest surgical educator of the 20th century, is recognized for his revolutionary studies of intestinal obstruction. He transformed the treatment of intestinal obstruction from empiric craft to scientific discipline and defined the criteria for the early diagnosis of intestinal obstruction with the aid of a stethoscope and X-ray examination. Moreover, he discovered that suction through a nasal catheter extended to the stomach could relieve the distension by gas as effectively as enterostomy. In his innovative studies, he reduced the mortality from intestinal obstruction from more than 60% to 5 %.[7]

TREATMENT

In supportive care virtually all patients admitted to the hospital with a diagnosis of intestinal obstruction should have nasogastric tubes placed. These decrease nausea, vomiting, and abdominal pain, and prevent aspiration. The role of the long (nasoenteric) tube in the management of patients with intestinal obstruction is still controversial. Prospective randomized trials of nasogastric tubes versus nasoenteric tubes reported no differences between the two in regard to success of non-operative treatment, morbidity, and rates of surgical interventions.[8]

Octreotide therapy has being tried. It allows the bowel to rest by reducing the volume of intestinal secretions, thereby decreasing pain and simplifying fluid management. Octreotide administration results in net increased intestinal water and electrolyte absorption. The available literature suggests that Octreotide use may be associated with decreased bowel distension, lower rates of bowel ischemia, and increased rates of hospital discharge without surgical intervention in patients with intestinal obstruction due to either adhesions or malignancy.[9]

Musila G.G. in his dissertation retrospectively looked at 441 patients with intestinal obstruction at Kenyatta National Hospital and found that adhesions (36.7%) were the leading cause of small bowel obstruction followed by strangulated hernias (20%). Operative management was performed in 60% while 40% were managed conservatively. The most common investigation was plain abdominal x-ray (80%) while abdominal ultrasound done in 6% of the patients. No contrast follow through studies were done. The overall mortality rate was 17.7% mainly in the referred patients who presented late. [10]

Ngugi. J.K. retrospectively carried out a five-year descriptive study to establish the incidence of adhesive intestinal obstruction. Analysis of 177 patients was done. Forty three percent of the patients were managed conservatively. Mean hospital stay after surgery was 15days. Post-operative mortality was up to 23%. [11]

Dan. O. Raburu, in his dissertation found that intestinal obstruction was the commonest cause of acute abdomen contributing up to 41.5% of all cases .The major cause at that time was adhesions and bands (33.4%). Only 22.2% had previous surgery .No congenital bands were found. [12]

Seror et al, (at Department of Surgery, Hadassah University Hospital) looked at how conservatively could postoperative adhesive small bowel obstruction be treated. They retrospectively studied 297 patients over a period of 14 years to evaluate the conservative approach in managing adhesive intestinal obstruction. They found that non-operative therapy of up to 5 days' duration could be used safely for the majority of patients who present with postoperative intestinal obstruction, including those with complete obstruction. In those patients, who responded to conservative treatment, the obstruction resolved within a mean of 22 hours and a maximum of 5 days. A trial of more than 5 days duration proved ineffective. The conservative approach resulted in a 73% resolution of obstruction with no significant increase in mortality or in the rate of strangulated bowel. [13]

In a retrospective study by Tanphiphat et al on early versus delayed operative management. The patients were operated on early in 17% of the 321 admissions and they found that 30% of these patients had strangulated bowel Using the diagnostic tools given, the indication for early surgical treatment was good in the early operation group. Seventeen percent of the 53 patients in the late operation group had strangulated bowel, and one third of the patients had resections. As could be expected the median in-hospital delay was long (27 hours). Strangulation and resection might be, to some degree, the result of the delay in surgical treatment seen among many of these patients. [4]

Cox et al did a study to assess the safety of non-operative treatment and determine the optimal duration of non-operative treatment in adhesive small bowel obstruction. There were 123 admissions having an initial period of non-operative treatment. The small bowel obstruction resolved in 85, the remaining 38 required surgical intervention. Complete resolution occurred within 48hrs in 75 (88%) cases, the remaining 10 had resolved by 72hr. Thirty-one had surgical intervention for small bowel obstruction more than 48hrs duration after admission. Three (2.4%) patients, initially treated non-operatively, had small bowel strangulation. All three were operated on within 24 hours of admission when changes in clinical findings suggested small bowel strangulation might be present. There were no deaths in the group having an initial period of non-operative treatment. [14]

Brolin analyzed all patients with partial obstruction and found that 10% had strangulated bowel. He found that 88% of 91 patients with partial small bowel obstruction resolved on conservative treatment. This was confirmed in another group of patients with partial obstruction in the trial group among whom the incidence of non-operative resolution was 79%. None of these 91 patients died. For this group the outcome was good, and the risk related to a trial of conservative treatment seemed to be small. [15] The results contradict those

of Bass et al [16] who, in a review article claim that "patients with partial obstruction are at minimal risk of strangulation".

Mosley and Shoaib did a prospective controlled trial to resolve the controversy over whether intestinal obstruction due to postoperative adhesions should be managed by immediate operation or by conservative care. The patients were randomly allocated either to immediate conservative management and those who had not settled after 5 days were operated on. The data were analyzed by Student's t test and Fisher's exact test. There were 127 patients. The two groups were statistically identical regarding age, number of previous operations and time since last operation, and heart rate, blood pressure, haemoglobin concentration, white count and urea level on admission. Sixty-three patients were treated conservatively; 22 failed to settle and were operated on, of whom 11 required a bowel resection. There were two postoperative deaths. In 64 patients treated immediately by operation, the incidence of bowel resection was not significantly reduced (22 per cent; $P > 0.05$) but there were four postoperative deaths. [17]

Ha K. et al evaluated the CT scan findings of intestinal obstruction due to adhesions in 20 postoperative patients, with emphasis on early detection of strangulation. Ten patients with surgically proven strangulated obstruction (strangulation group) were compared with another ten patients (non-strangulation group) in whom seven improved with conservative management and three had confirmed simple obstruction on surgical exploration. Beak-like luminal narrowing ("beak") was the most common CT finding at the obstructed site in both groups. [18] The CT findings that suggested strangulated obstruction were serrated beaks, mesenteric oedema or vascular engorgement, and moderate to severe bowel wall thickening. In contrast, simple obstruction could be assumed when the beak was smooth, there were no mesenteric changes, and the bowel wall was normal or mildly thickened. Computed

tomography is a useful tool for detecting strangulation in patients with postoperative adhesive intestinal obstruction.[19]

Early surgery has been the treatment of choice, for in a study by Sosa et al [20] on complete SBO, 18% were operated on early. Of the patients left to a trial of non-operative treatment, in 65% (of the 116 admissions) it was successful. Shrake et al [21] found a resolution rate of 25% in 118 patients with complete obstruction so even patients with complete obstruction have a fair chance of settling on conservative treatment. Nevertheless, 56% of patients with complete obstruction who had initial conservative on late had a median preoperative delay in hospital of 27 hours and the rates of strangulation, complications and death were high. For patients with complete obstruction who were not in need of urgent surgery, the use of additional diagnostic methods would be advisable to detect those who need surgical treatment at an earlier stage. [20]

DEFINATION

Intestinal obstruction occurs when there is a failure, reversal, or impairment of the normal transit of intestinal contents. [22]

CLASSIFICATIONS

Several forms of classifications can be used, namely [22]

DYNAMIC (mechanical) or ADYNAMIC

In dynamic obstruction the peristaltic waves work against a mechanical lesion, while in adynamic obstruction peristalsis is absent or may be present in a non propulsive form (pseudo-obstruction).

PROXIMAL (high) or DISTAL (low) gut obstruction

Proximal gut obstruction mainly involves the small intestine and distal gut obstruction involves the colon.

NATURE OF OBSTRUCTION

a) SIMPLE OBSTRUCTION- when there is no vascular compromise

b) STRANGULATION - When there is vascular compromise

DURATION OF OBSTRUCTION

a) ACUTE

b) SUB-ACUTE

c) CHRONIC

ETIOLOGY [22]

Luminal lesions

- Impactions.
- Gallstones.
- Meconium in newborns.
- Intussusception in infants.

Intrinsic lesions

- Congenital (e.g., atresia and stenosis, imperforate anus, duplications, Meckel's diverticulum's).
- Trauma (haematoma).
- Inflammatory (e.g., Crohn's disease, diverticulitis, ulcerative colitis, radiation, toxic Ingestions).
- Neoplastic (most common aetiology of colon obstruction).
- Miscellaneous (e.g., endometriosis).

Extrinsic lesions

- Adhesions (most common aetiology of small bowel obstruction)
- Hernia and wound dehiscence
- Volvulus
- Neuromuscular defect (e.g., megacolon, neuro/myopathic motility disorders)
- Masses (e.g., annular pancreas, anomalous vasculature, abscess and hematoma, neoplasms

PATHOPHYSIOLOGY

Intestinal obstruction may present in the early post-operative period or may occur months or years after the primary insult. The nature of obstruction may be, namely. [22]

SIMPLE MECHANICAL OBSTRUCTION

In this situation the bowel proximal to the obstruction increases in peristaltic activity in a bid to overcome the resistance ahead. This leads to progressive distension of the lumen with stimulation of the stretch receptors which causes the severe colicky abdominal pain .After sometime a reflex activity inhibits the peristaltic waves. This has a protective action in preventing vascular compromise from the increasing intraluminal pressure. [22]

The abdominal distension is due to accumulation of gas and fluid in the proximal point of obstruction. The gas is produced by

a) Swallowing

b) Products of digestion

c) Bacterial decomposition

Transudation of fluid occurs when the low pressure lymphatic and venous channels are occluded by the increasing intraluminal pressure. There is also sequestration of the fluid that is normally secreted by the salivary glands, gastric mucosa, biliary system, pancreatic system, and the intestinal mucosa. There is also poor reabsorption of the intra luminal fluid and electrolytes. This leads to third space accumulation that culminates into dehydration, hypovolaemia and biochemical derangements. Decreased oral intake and continued vomiting worsen these. If these are not corrected the patient may go in to multiple organ dysfunction or failure. The bowel distal to the obstruction continues exhibit normal peristalsis and absorption till it becomes empty, contracted and pale. [22]

CLINICAL FINDINGS

Acute intestinal obstruction usually begins with a sudden onset of abdominal pain. The distance from the ligament of treitz can be ascertained by: -

a) Determining how long after the on set of pain did vomiting take place, and what was its nature. The more distal the obstruction the more feculent its nature

b) The frequency of crampy abdominal pain .In proximal small intestine, the serial cramps may be three to five minutes apart, whereas more distally they may be at ten to fifteen minutes intervals.

The four cardinal symptoms of intestinal obstruction are: -

1] Crampy abdominal pain

2] Nausea and vomiting

3] Obstipation

4] Abdominal distension

PAIN

It may be the sole indicator of the need for surgery .Mechanical obstruction typically causes colicky pain whereas functional bowel obstruction causes vague discomfort.[18]

Small gut obstruction causes central abdominal pain while large gut obstruction causes pain in the hypogastric region. These colics are due to referred pain transmitted via autonomic nerves in association with superior and inferior mesenteric arteries.

The character of abdominal pain reflects the viability of the bowel .A change from colicky to constant persistent, steady abdominal pain is associated with development of ischemia or perforation and thus the reason to expedite surgery or stop conservative treatment.[22]

DISTENSION

Above the point of obstruction there is accumulation of succus entericus, poor rears option gas production and deranged motility. All these contribute to the distension that is more pronounced with obstruction at lower levels of the gastrointestinal tract.

VOMITING

It occurs early in proximal obstruction and late in distal obstruction. Initially typical of gastric or upper small intestine content but with stagnation and bacterial overgrowth it becomes feculent.

OBSTIPATION

This is the hallmark of absolute intestinal obstruction. Constipation occurs early in large gut obstruction but later in small bowel obstruction.

PHYSICAL FINDINGS

On general examination poor skin tugor and dry mucous membranes may reflect dehydration that is usually associated with tachycardia and hypotension. Fever and pallor suggests the possibility of strangulation. [22]

Peristaltic waves characteristic of small bowel obstruction are sometimes visible through the abdominal wall of thin patients with long-standing obstruction. Surgical scars may implicate previous operation-for example, the presence of adhesions or cancer. [23]

Incarcerated hernias may be obscure, particularly in obese patients. Examine for abdominal masses (neoplasm, intussusception, and abscess). [24]

In sub-acute intestinal obstruction abdominal distension may not be apparent, particularly in high obstruction. Tenderness is mild and there is usually little voluntary muscle guarding. However, localized tenderness, rebound tenderness, and guarding suggest peritonitis and the likelihood of strangulation.

The percussion note is usually tympanitic and on auscultation the bowel sounds are loud, high pitched with peristaltic rushes, the frequency of which depends on the site of obstruction.

Rectal examination should be done to seek luminal masses. The presence of faeces should be noted, and they should be examined for occult blood. Blood in the faeces suggests an alimentary mucosal lesion, as may occur with cancer, intussusception, or infarction. Sigmoidoscopic examination may help in locating distal recto sigmoid lesions.

RADIOLOGIC EXAMINATION

The American College of Radiology recommends that plain abdominal radiography be used as the initial step for imaging of patients with SBO [25].Small intestinal obstruction can be diagnosed on plain abdominal radiographs in 60 to 70 per cent of patients, and the supine abdominal view is the most reliable for making the diagnosis.

Typical features are gas-distended loops of jejunum and ileum arranged in transverse loops across the central portion of the abdomen with valvulae conniventes, which represent spasms of muscularis mucosa muscle. Little or no gas is seen in the colon in most patients with obstruction of the small intestine, but a moderate or normal amount of colonic gas may be present if the lumen of the small intestine is not completely occluded. If the obstructed loops are fluid-filled they are more difficult to identify. Abdominal radiographs may have a normal appearance in patients with small intestinal obstruction, due to vomiting in cases of high obstruction or because of the intermittent nature of the obstruction. [26]

Local adhesion of two small bowel loops may be manifest as stretched mucosal folds extending along the length of the intestine. Multiple large or small thorn like bulges indicate local adhesions between the intestinal wall and the surroundings. A crossing adhesive band may be manifest as a linear defect on the contrast-filled lumen. A long band may traverse several loops. [27]

LARGE INTESTINAL OBSTRUCTION

The plain radiographic appearance of obstruction of the large intestine will depend on whether or not the ileocaecal valve is competent. When the valve is competent there is usually considerable dilatation of the colon as far as the obstruction, including marked caecal dilatation, usually with no dilatation of the small intestine. The ileocaecal valve is incompetent in most patients and dilatation of the colon and the small intestine is seen, with the caecum only showing slight dilatation. Fluid-filled distension of the proximal colon is seen when the obstructive lesion is proximal to the splenic flexure.[28] The site of transition between dilated gas- or fluid-filled colon and collapsed empty colon normally identifies the site of the obstructing lesion. Colonic haustral markings occupy only a portion of the transverse diameter of the bowel.

If there is any doubt about the diagnosis instant single-contrast barium or water- soluble contrast enema, performed with the contrast medium passing as far as the dilated colonic segments, confirms the presence or absence of obstruction. When obstruction is confirmed the cause is frequently identified. Caecal Volvulus should be suspected when a haustrated and disproportionately enlarged air-filled viscus greater than 10cm is seen anywhere in the abdomen; the caecum is usually absent from the right iliac fossa and distended small intestine is seen to the right of the dilated caecum. Sigmoid volvulus can frequently also be diagnosed on plain abdominal radiographs: the characteristic appearance is that of a grossly enlarged, gas-filled sigmoid colon arising from the pelvis and deviating to the left or right flank. The apex of the loop is positioned high in the abdomen and may lie under and elevate the diaphragm. Three dense curved lines, representing the walls of the enlarged loop, converge towards the stenosis over the left part of the sacrum. [27, 29]

CT SCAN &ABDOMINAL ULTRA SOUND

In patients with equivocal findings of S.B.O, C.T scanning is the best diagnostic test. The diagnosis of small bowel obstruction is made when the calibre is greater than 2.5cm with a distinct point of transition and normal calibre bowel beyond. CT scans not only can establish the diagnosis of obstruction but also can determine the location and cause of obstruction. It can assess the presence of strangulation or ischaemia.Typical findings are poor or absent enhancement of the bowel wall,pneumatosis or a 'serrated' beak sigh,ascites ,and unusual

course or engorgement of mesenteric vessels. CT scans have a sensitivity approaching 100% in patients with high-grade or complete bowel obstruction. However, findings may be equivocal in patients with partial bowel obstruction in which the sensitivity and specificity may be as low as 63% and 78% respectively. [30]

Abdominal ultrasonography can help diagnose obstruction of the small bowel and its location and cause but its usefulness may be limited by gaseous distension. [31]

LABORATORY FINDINGS

Any patient with vomiting or evidence of intra-abdominal fluid loss who is suspected of having intestinal obstruction should have laboratory measurements of serum sodium, chloride, potassium, bicarbonate, and creatinine. The hematocrit, white blood cell count, and serum electrolytes should be measured serially to assess therapy and to detect the earliest evidence of tissue necrosis. Modest Leukocytosis with some left shift may occur in simple mechanical obstruction. WBC counts of 15-25,000/mm^3 with marked polymorphonuclear predominance and many immature forms strongly suggest that the obstruction is strangulated. Extremely High WBC counts of 40-60,000/mm^3 suggest primary mesenteric vascular occlusion Serum amylase levels may rise due to regurgitation from the pancreas into the blood stream by duodenal backpressure or leakage in to the peritoneum through the dying bowel.

MANAGEMENT

The optimal treatment of patients with sub-acute bowel obstruction should be predicated upon answering the following diagnostic questions in each patient:

1. Does the patient have mechanical bowel obstruction or an ileus? Causes of pseudo-obstruction or ileus should be excluded (previous radiation, concomitant infection or sepsis, narcotics).
2. Could the patient have colonic obstruction or a cause of obstruction other than adhesions (e.g. hernia, cancer, Crohn's disease)? The clinician should know what scars the patient has on his or her abdomen (if any), and what operations have been performed. Operations above the transverse colon (i.e. hepatobiliary and gastric procedures) rarely result in adhesive SBO.
3. Is the obstruction partial or complete?
4. Is strangulation present and hence immediate operation necessary, or is a period of observation appropriate.

The most efficient way to answer these questions in many patients is by performing a careful history and physical examination, laboratory tests, and CT scanning. Surgical intervention should occur within 48 hours of admission in the vast majority of patients with complete small bowel obstruction due to adhesions.

Because severe metabolic derangements may accompany the obstruction, the timing of the operation requires careful judgment. The overlapping sequence of events in managing patients with intestinal obstruction should be investigation, resuscitation, and operation. The timing of operation depends on three factors: duration of obstruction which will affect the severity of fluid, electrolyte, and acid-base abnormalities; the opportunity to improve vital organ function; and consideration of the risk of strangulation. Because no test reliably detects strangulation preoperatively, operation should be performed as soon as is reasonable.

Absence of fever, tachycardia, localized tenderness, and Leukocytosis indicates that non-operative management may be safe. However, the presence of any one or more of these findings mandates operation.

A patient with symptoms of short duration-24 to 30 hours-and with minimal metabolic disturbances and no pre-existing pulmonary, cardiac, or renal disease can undergo operation when the diagnosis is made. A patient in whom fluid and electrolyte imbalance develops after several days of illness may benefit from 18 to 24 hours of preoperative preparation.

SUPPORTIVE MANAGEMENT

Patients with obstruction of the bowel are likely to be depleted of water, sodium, chloride, and potassium, so intravenous therapy should usually begin with an intravenous isotonic sodium chloride solution Sufficient to elevate and maintain the central venous pressure to between 5 and 10 cm. of saline.

After the patient has formed adequate urine, potassium chloride should be added to the infusion. Administration of blood, plasma, or both should be considered if the patient is in shock and if strangulation is suspected.

If marked hemoconcetration and severe electrolyte imbalance were present initially, laboratory studies should be repeated; if the values return to normal, the patient can undergo operation.

In addition to fluid therapy, another important adjunct to the supportive care of patients with intestinal obstruction is nasogastric or intestinal suction. Nasogastric suction with a Levin tube empties the stomach, reducing the hazard of pulmonary aspiration of vomitus and minimizing further intestinal distension from swallowed air preoperatively. A nasogastric tube is not effective in decompressing distended intestine.[33]

Antibiotics should be given during resuscitation, particularly if strangulation is suspected.

OPERATIVE MANAGEMENT

Operation for intestinal obstruction requires general anaesthesia administered with an endotracheal tube. Aspiration is one of the risks during surgery but can be reduced by fixing a nasogastric tube when operating. The procedure requires the management of the segment of intestine at the site of obstruction, the distended proximal bowel and the underlying cause of obstruction.

If the patient has had a previous surgical incision that, with enlargement, will afford a portal for complete abdominal exploration, it should be used. This allows easy access to the most frequent site of obstruction by adhesions, which is the incision itself. It is usually wise to enter the abdomen through an extension into normal tissues to avoid injury to adherent loops. In patients with late obstruction and in the elderly, the distended segments should be handled with care as they may easily be torn. The object is to find the junction of dilated and collapsed bowel.

Decompression of dilated loops may be desirable to facilitate an anastomosis or closure of the abdominal wound. Methods of accomplishing this goal include;

a) Milking of contents back into the stomach with aspiration through a nasogastric tube.
b) A long tube may be advanced from the stomach by digital manipulation into the distended loops.
c) Sump suction device may be passed directly into the distended loops through an enterotomy.

When obstruction is due to adhesions, as a rule it is probably wise to divide only those adhesions involving the bowel at the site of obstruction and those that prevent restoration of the proximal and distal segments to their normal place of residence in the abdominal cavity Generally, adhesions can be expected to recur when there has been any trauma to serosal surfaces.

When indicated, a simple resection of small bowel and direct anastomosis, even when the proximal bowel is distended, is safe enough. Sometimes, as with carcinomatosis or extensive pelvic adhesions, a side-to-side bypass is the better choice.

Determination of the viability of a segment of intestine can be done by observing

a) Bowel colour after warming and oxygenation for 10-20minutes

b) Bowel motility

c) Mesenteric arterial pulsations

d) Fluorescein injections with illumination of the surface with a Wood's lamp

e) Detection of surface flow by Doppler devices.

Primary anastomosis should be avoided when [32]

1) Bowel ends are of dubious viability

2) There is peritoneal soiling with faeces and pus

3) There is considerable tension at the anastomotic site

4) There is hemodynamic instability with anaemia.

Exteriorization of the bowel ends is wiser followed by secondary anastomosis.

LAPARASCOPIC MANAGEMENT OF SMALL BOWEL OBSTRUCTION

Historically, laparotomy and open adhesiolysis have been the treatment for patients requiring surgery for small bowel obstruction. Unfortunately, this often leads to further formation of intra-abdominal adhesions with approximately 10% to 30% of patients requiring another laparotomy for recurrent bowel obstruction. [34, 35, 36, 37]

Laparoscopy has been shown to decrease the incidence, extent, and severity of intra-abdominal adhesions when compared with open surgery, thus potentially decreasing the recurrence rate for adhesive small bowel obstruction. [38]

Laparoscopic adhesiolysis for small bowel obstruction was first reported by Bastug et al [39] in 1991 in 1 patient with a single adhesive band. Since that time, there have been several single case reports and multiple series that attest to the success of laparoscopic adhesiolysis. [40, 41]

Suter et al [42] found that a bowel diameter exceeding 4 cm was associated with an increased rate of conversion: 55% versus 32% ($P = 0.02$).

The influence of dense adhesions and the number of previous operations on the success of laparoscopic adhesiolysis is controversial. Leo´n et al [43] state that a documented history of severe or extensive dense adhesions is a contraindication to laparoscopy. Navez et al [44] found that patients who had only a previous appendectomy were most likely to be successfully managed with laparoscopy. In contrast, Suter et al [42] found no correlation between the number and or type of previous surgeries and the chance of a successful laparoscopic surgery.

Other factors such as an elevated white blood cell count or a fever have not been demonstrated to correlate with an increased conversion rate. [42,44] One group of patients who are suited for laparoscopic adhesiolysis are those with a nonresolving, partial small bowel obstruction or a recurrent, chronic small bowel obstruction demonstrated on contrast study. Pekmezci et al [40] reported the successful management of all 15 patients treated by

enteroclysis-guided laparoscopic adhesiolysis with only 1 patient requiring conversion to a laparotomy.Leo´n et al[43] reported a 100% success rate in 10 patients with nonresolving small bowel obstruction.

Franklin Jr., et al, reviewed 167 patients who underwent laparoscopy for diagnosis and/or treatment of intestinal obstruction. Average patient age was 62 years (range, 21–98). The site of obstruction was the stomach in seven patients, small bowel in 116 patients, and colon in 44 patients. They found that Laparoscopy successfully diagnosed the site of obstruction in all patients. In addition, 154 patients (92.2%) were successfully treated laparoscopically without conversion to laparotomy. Both intraoperative and postoperative complication rates were low (3.5 and 18.6%, respectively) and compared favourably with those of published reports. There conclusion was that intestinal obstruction can be approached safely and effectively by laparoscopy with the intent not only to correctly diagnose the patient but also to render treatment.[45]

POST-OPERATIVE CARE [46]

THE IMMEDIATE POSTOPERATIVE PERIOD

The nursing team must also be advised of the nature of the operation and the patient's condition. Postoperative orders should cover the following:

1. Vital signs-Blood pressure, pulse, and respiration should be recorded every15-30 minutes until stable and then hourly until discharge from the recovery room. Continuous electrocardiographic monitoring is indicated in most patients in the recovery room.
2. Central venous pressure-Central venous pressure should be recorded periodically using a Swan-Ganz catheter in the early postoperative period if the operation has entailed large blood losses or fluid shifts.
3. A record is maintained of fluid balance, all blood loss and urine output during the operation.
4. Position in Bed and Mobilization: the patient should be turned from side to side every 30 minutes until conscious and then hourly for the first 8-12 hours to minimize atelectasis and reduce venous stasis, which may also be minimized by intermittent compression of the calf by a pneumatic device.
5. Diet: Patients undergoing abdominal surgery and critically ill patients should have nothing by mouth until normal gastrointestinal function has returned (usually within 4 days).
6. Medications entail antibiotics, analgesics, and sedatives. If appropriate, preoperative medications should be reinstituted

INTERMEDIATE POSTOPERATIVE PERIOD

This starts with complete recovery from anaesthesia and is mainly about care of the Wound [47] By 48 hours after closure, deeper structures are completely sealed off from the external environment as epidermal cells at the edges of the wound begin to divide and migrate across the wound surface. Sterile dressings applied in the operating room provide protection during this period. Dressings over closed wounds should be removed on the third or fourth postoperative day. If the wound is dry, dressings need not be reapplied. Any drainage from the wound should be examined by culture and Gram-stained smear. Medical personnel should wash their hands before and after caring for any surgical wound. [48]

Skin sutures may be removed by the fifth or sixth postoperative day and replaced by tapes. Sutures should be left in longer (e.g. for 2 weeks) with incisions across creases, incisions closed under tension, in some incisions in the extremities (e.g. the hand), and in debilitated patients. Sutures should be removed if suture tracts show signs of infection. [49]

Tensile strength is minimal for the first 5 days. It increases rapidly between the fifth and 20th postoperative days and more slowly thereafter. Wounds continue to gain tensile strength slowly for about 2 years. In otherwise healthy patients, the wound should be subjected only to minor stress for 6-8 weeks. [50]

POST-OPERATIVE COMPLICATIONS

Some complications may be unavoidable, particularly after emergency operations, when time does not permit optimal preoperative preparation and investigation. Good perioperative care of surgical patients is designed to minimize the incidence and severity of complications.[51]

WOUND COMPLICATIONS

Infection rate of 2% to 4% occurs in clean wounds. In emergency operations on unprepared bowel the rate of wound infection in reported series is as high as 50% to 60%. Wound infection may be primary, when the initial collection is pus, or secondary, when a sterile hematoma, seroma, or area of fat necrosis is subsequently colonized by bacteria from the blood (bacteremia). The judicious use of prophylactic antibiotics has been demonstrated to reduce the incidence of wound infection in contaminated and potentially contaminated wounds. The principle is to have a high concentration of an appropriate antibiotic in the tissues and blood at the time of operation in order to eliminate any bacteria released into the operative field or bloodstream during the procedure. A single dose of antibiotic is probably sufficient if given during induction or 30minutes before surgery evisceration (burst abdomen) occurs in approximately 1% of laparotomy wounds and is associated with a mortality of approximately 20%. Infection is associated with more than half of wounds that rupture.

Factors that appear to interfere with wound healing and are associated with wound failure include malnutrition, sepsis, anaemia, uraemia, liver failure, diabetes, and corticosteroid therapy. Obesity, heavy coughing or retching, and the accumulation of ascites, which strain the wound during the postoperative period, also predispose to failure.[52]

RESPIRATORY COMPLICATIONS

Factors that militate against normal respiratory function in the early postoperative period are; Effects of general anaesthesia, mechanical ventilation, and postoperative analgesia, which depress the respiratory system and suppress reflexes such as coughing, which clears secretions, and periodic deep breathing and yawning, which expand collapsed alveoli. The main complications include atelectasis, aspiration pneumonia, and pulmonary oedema.[52, 53]

CARDIAC COMPLICATIONS

HYPOVOLAEMIC SHOCK

Exteriorization of the viscera and extensive dissection of tissue planes are associated with loss of extra cellular fluid through evaporation. Postoperatively, there is a redistribution of tissue fluids due to interstitial oedema, and sequestration into the bowel. Primary and reactive haemorrhage may also contribute

SEPTIC SHOCK

Septicaemia may be a direct complication of anastomotic leak or it may also complicate the late stages of hypovolaemic shock due to intestinal ischemia.[51]This is accompanied by systemic manifestations of sepsis, including rigors, fever or hypothermia (characteristic of gram-negative septicaemia with endotoxemia), leucocytosis or leucopoenia (characteristic of profound septicaemia or viremia), and tachycardia or circulatory collapse.

DEEP VEIN THROMBOSIS AND PULMONARY EMBOLISM

The risk of DVT and pulmonary embolism is increased with age, obesity, oral contraception, cardiovascular disease, malignancy, leg trauma, and in patients undergoing pelvic surgery. Immobility preoperatively, during a lengthy operation, or postoperatively is an important contributory factor.

RENAL FAILURE

This is usually pre-renal failure due to an inadequate renal blood flow that is a direct result of diminished circulating blood volume. Acute parenchyma renal failure usually follows uncorrected pre-renal failure. The condition is frequently referred to as acute tubular necrosis. Cortical necrosis, which can be diagnosed only on biopsy, is more serious because it is irreversible.

FLUID AND ELECTROLYTE IMBALANCE

Several factors may contribute to a fluid deficit in patients with intestinal obstruction:

- Preoperative fluid depletion, especially in patients who are vomiting.
- Intraoperative fluid loss by evaporation during laparotomy because of the exposure of large areas of moist peritoneum.
- Postoperative fluid loss from nasogastric aspirates, drains, and fistulas. In addition, several litres of fluid may be sequestered into the third space, comprising the interstitial space, peritoneal and bowel lumen.
- Insensible fluid loss, principally via the respiratory tract, must also be considered and may contribute up to 1 litre per day in a hyper metabolic postoperative patient.

Fluid from drains, nasogastric aspirates and fistulas, and third-space losses contain electrolyte concentrations similar to plasma and should be replaced with a balanced electrolyte solution such as Ringer's lactate.

Urinary output must also be considered; a good, sustained urinary output of 40 to 60 ml. per hour is required for excretion of the solute load created by the catabolic state.

RATIONALE OF THE STUDY

Mechanical bowel obstruction is a very common problem not only in our local set up but also in this continent as a whole and worldwide. Despite this there is a very low turn over of local literature on this ever glaring problem.

Review of the local literature reveals that no specific prospective study has been done on the treatment of small and large-bowel intestinal obstruction. This could be due to complacency of us surgeons who solely handle this condition. There is still much emphasis on the results of studies done in the western countries and yet we know that even in our country there is a lot of regional variation in the pattern of presentation. [54]

Even with a good history and physical examination the accurate diagnosis and appropriate treatment of patients with mechanical intestinal obstruction still remains a big challenge even to the senior most surgeons especially when the cardinal symptoms of obstipation, vomiting and distension do not tie up. The mortality in these patients even in a good centre like Kenyatta National Hospital can still go up to 18%.[10] The difference in reported outcomes probably the result of differences in the selection of patients for the studies and in the treatment policy of each institution. This means that there is need to compare and contrast our outcomes with other centres world wide so that we can come up with recommendations that will help reduce these high rates.

In view of this fact I as the author was exceptionally motivated to carry out this study so as to provide information on the level of care in this highly specialized institution in the hope that it will be beneficial to both the patients and those endowed with the responsibility of handling them.

AIMS AND OBJECTIVES

MAIN OBJECTIVE

To evaluate the pattern and treatment of mechanical bowel obstruction.

SPECIFIC OBJECTIVES

1. To determine the demographics of patients with intestinal obstruction.
2. To determine the proportion of patients with mechanical bowel obstruction who can resolve on conservative treatment.
3. To determine the indications of operative management.
4. To determine the incidences of strangulation, bowel resection, complications, and death among patients operated on early and in those operated on late.

MATERIALS AND METHODS

STUDY DESIGN

This was a prospective study that included a total of 120 patients and was carried out over a period of ten months from 1st September 2005 to 30th June 2006.

STUDY POPULATION AND SITE

This study was carried out on patients above 13yrs admitted to the general surgical wards at Kenyatta National Hospital. It is situated in Nairobi, with a population of approximately 2.5million.It is the referral hospital for all government provincial and district hospitals in Kenya. It is also the teaching hospital for the University of Nairobi. There are three surgical wards which admit an average of ten patients with intestinal obstruction per week on a rotational basis.

ELIGIBILITY CRITERIA

INCLUSION CRITERIA

1. All patients above 13yrs who present at the Kenyatta national hospital general surgical wards with confirmed mechanical intestinal obstruction.
2. All above consenting patients.

EXCLUSION CRITERIA

1. Patients who don't give consent for the study.
2. Patients with paralytic ileus.
3. Patients below 13years.

SAMPLE SIZE

This was estimated using the formula recommended by the social science Research. [55] The prevalence of patients with mechanical intestinal obstruction is 8.5% of all acute surgical admissions.

$$N = \frac{Z^2 P(1-P)}{D^2}$$

Where

Z = Standard normal variant corresponding to the 95% Confidence interval, which is 1.96.

P = Expected proportion of patients with intestinal obstruction i.e. 8.5%.

D = The required precision of the estimate (0.05).

Q = (100 - P) %

And therefore

$$N = \frac{1.96^2 \times 0.085(1-0.085)}{(0.05)^2}$$

$$= 120$$

METHODOLOGY

This was a hospital based prospective study that was carried out in three different surgical units. Each patient who met the inclusion criteria was first informed about the study and then consent was taken. No prior information about the study was given to the surgeon who made the decision to operate or not based on clinical judgment.

A thorough history taking, physical examination and radiological investigations were done to confirm the diagnosis. Each patient's data was then analysed placed in one of the two main groups based on the findings during the clinical examination.

The early operation group were those patients who were operated on within 24 hours because of suspected strangulation based on the following signs; continuous pain, fever, tachycardia, peritoneal irritation, leukocytosis and metabolic acidosis.

The other group of patients included those who are first given a trial of conservative management using nasogastric tube, intravenous fluids and serial enemas. They were divided into those who settled on conservative treatment and those who had to go for operation i.e. the delayed operation group.

The reasons for abandoning conservative management were the development of signs and symptoms of strangulation, worsening of the patient's general condition, or failure to resolve on conservative treatment.

The patients were observed while in the ward and followed up during the first few visits at the clinic.

DATA COLLECTION

Upon consenting, patients who met the inclusion criteria were reviewed as soon as possible after admission, making observations and evaluating clinical features, pre-operatively, intra-operatively and post-operatively.

Demographic and clinical data were obtained using a questionnaire designed for the study.

Follow up was made until discharge from the wards and during the first few visits at the clinic.

Data analysis was done using the SPSS/PC + windows version 11.5 computer soft ware with the advice of qualified statisticians.

Data presentation is in form of tables, bar charts, graphs and pie charts descriptive statistics like means and standard deviation for continuous data and categorical data was generated. Wilcoxon rank sum tests, Kruskal walis and chi-square tests were used for bivariate comparisons. Statistical significance was represented by P values less than 0.05.

STUDY LIMITATION

The study was limited to Kenyatta National Hospital and therefore may not be fully representative of the Kenyan population.

ETHICAL CONSIDERATIONS

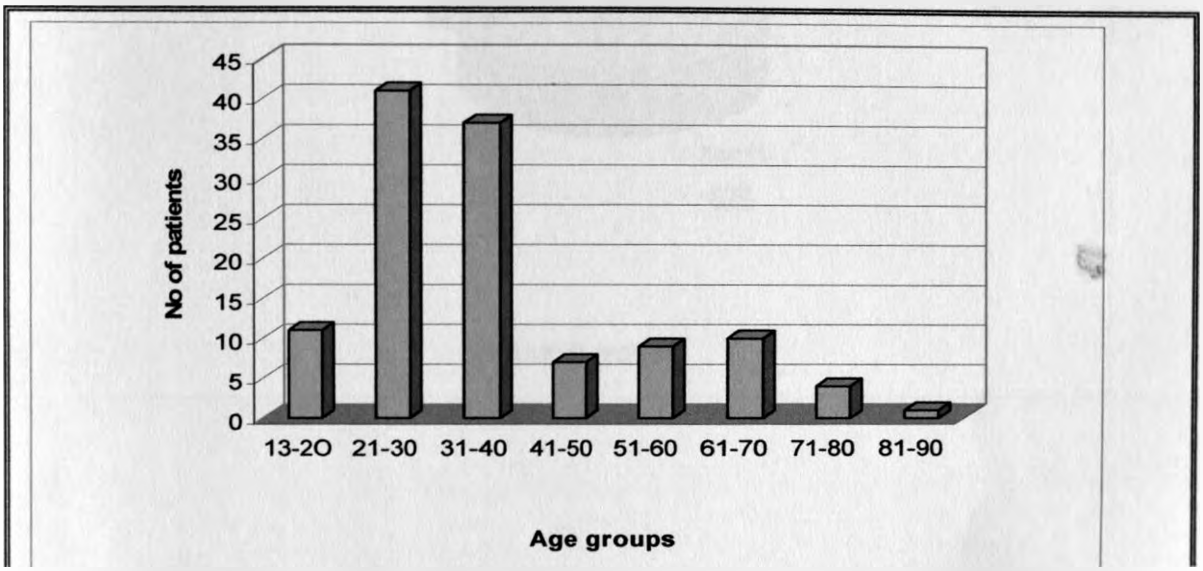
1. Application was be made to the ethical and research committee to permit the study to be carried out in the institution.
2. Patients recruited were explained to both verbally and through patient information booklet they signed an informed consent to participate in the study.
3. All patients' records were handled with confidentiality. Patients' names and numbers did not appear in the final text.
4. The information obtained was not be used for any other purpose but for the dissertation in part of fulfilment of masters of medicine degree in surgery.
5. The data collection started only after consent was given by the ethical committee.

RESULTS

This chapter presents the results of study on evaluation of treatment of 120 patients with intestinal obstruction at Kenyatta national hospital between 1st of October 2005 and 31st of June 2006.

DEMOGRAPHICS OF THE PATIENTS

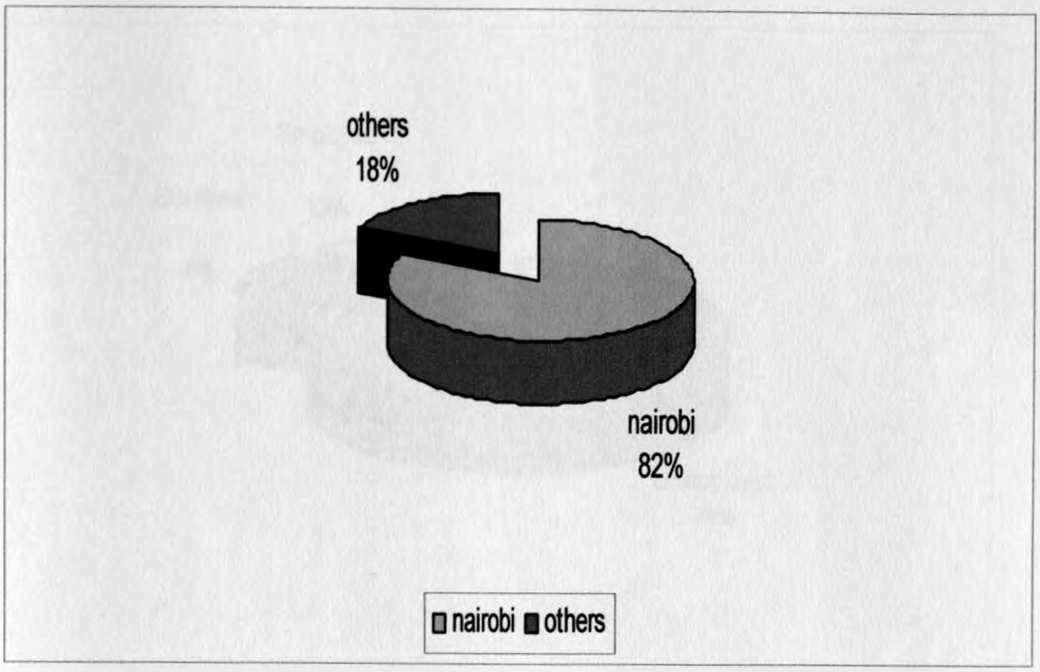
Figure 1: AGE DISTRIBUTION OF THE PATIENTS



The mean age of the patients was 38years with a range of 13years to 84years.

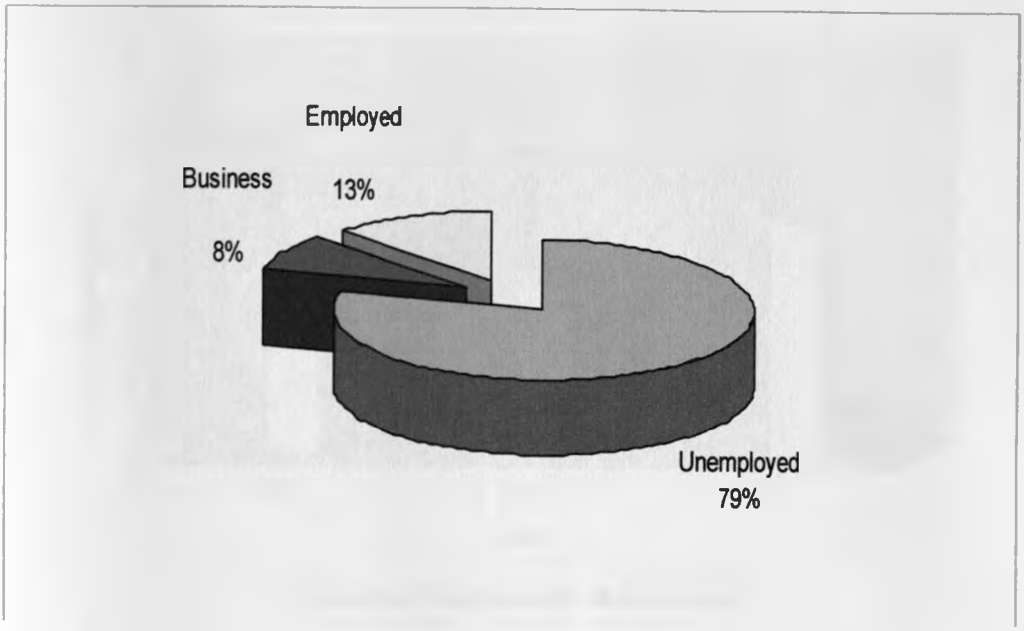
The age distribution was bimodal with two peaks in the 21-30 and 31-40 age-groups.

Figure 2: RESIDENCE



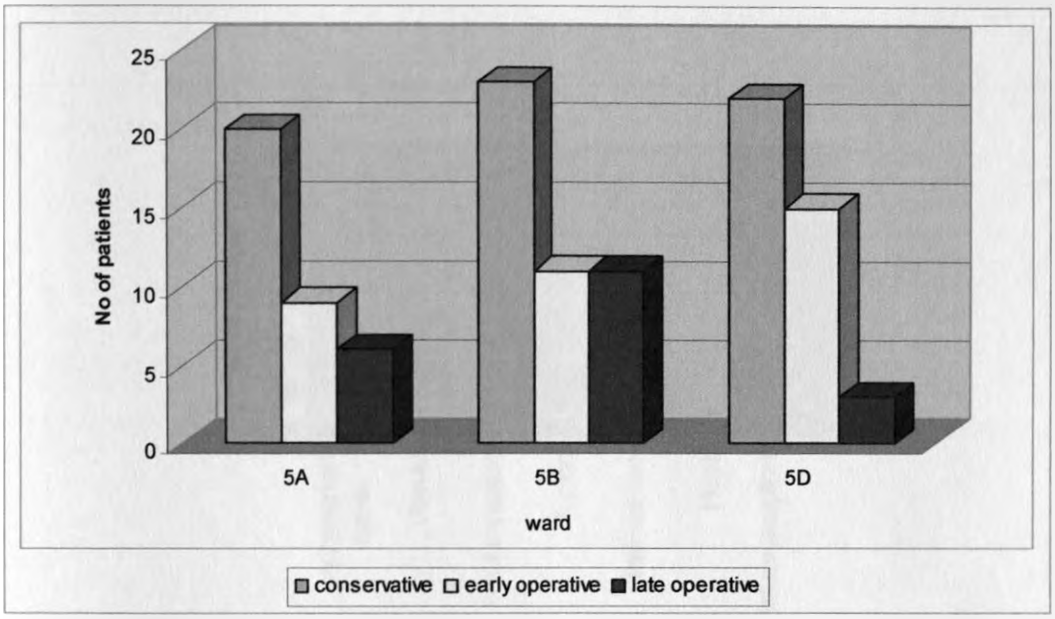
Most of the patients (98) were from within Nairobi while only 22 patients were from the outskirts of the city.

Figure 3: EMPLOYMENT STATUS OF THE PATIENTS



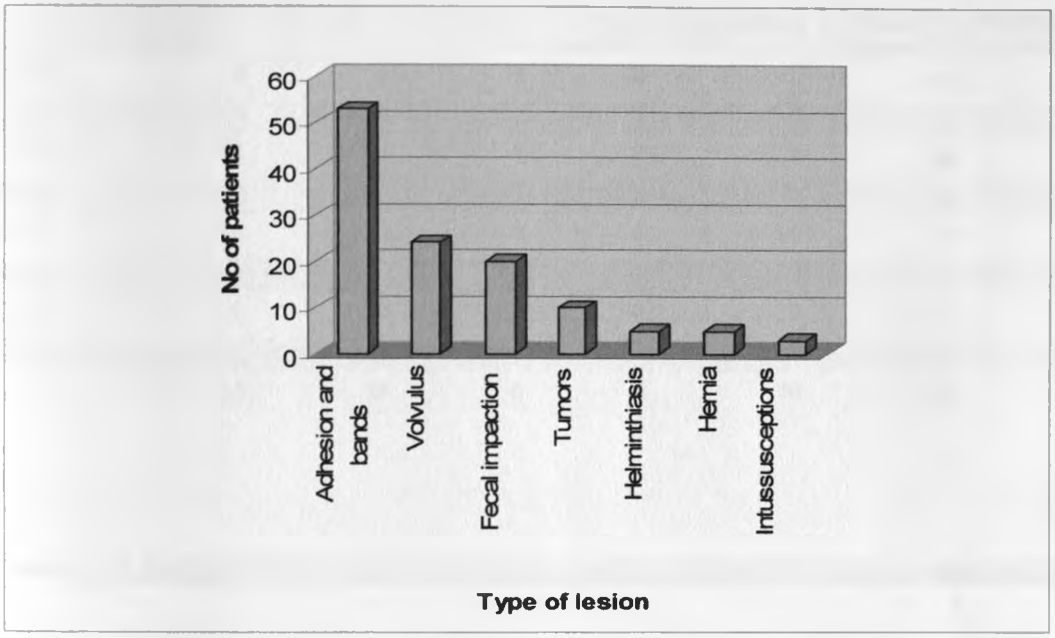
Most of the patients were of low socio-economic status as depicted by the high unemployment rate (79%).Only 13% of them were employed while 8% were doing business.

Figure 4: MANAGEMENT AS PER WARD



Though there was slight variation in management in each ward but this was not statistically significant (P = 0.240).

Figure 5: TYPE OF LESION CAUSING INTESTINAL OBSTRUCTION LESION



The most common lesion in patients who had previous scars was adhesions and bands (44%) whereas in those who did not have previous scar the most common lesions were volvulus (20%) and faecal impaction (16%).

Table 1: AGE DISTRIBUTION VERSUS TYPE OF LESION CAUSING INTESTINAL OBSTRUCTION

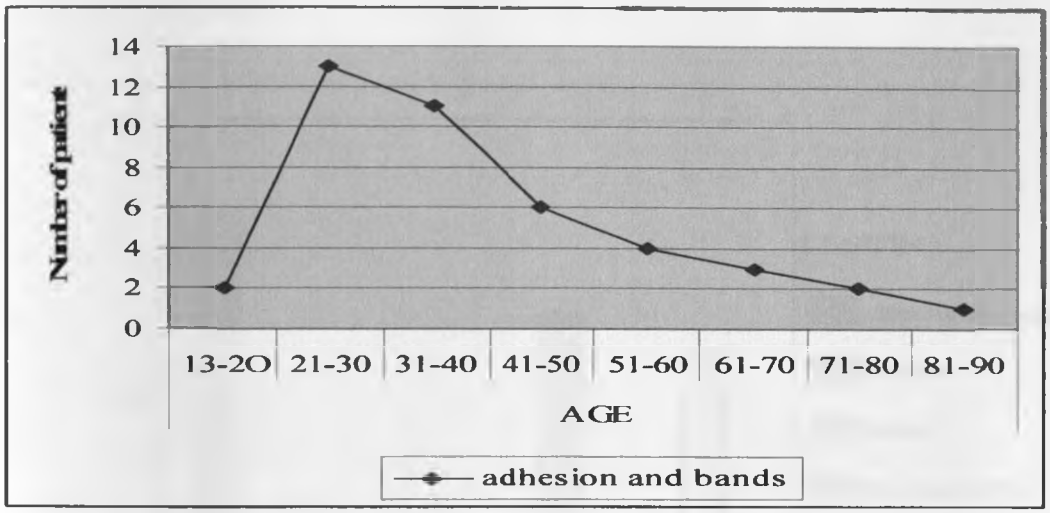
AGE	LESION							Total
	Adhesion and bands	Volvulus	Hernia	Intussusception	Tumour	Faecal impaction	Helminthiasis	
13-2O	2	4	0	2	0	2	1	11
21-30	11	18	1	0	3	8	0	41
31-40	10	8	3	0	1	12	3	37
41-50	6	0	0	0	1	0	0	7
51-60	4	0	1	0	0	3	1	9
61-70	3	0	1	1	3	2	0	10
71-80	2	0	0	0	2	0	0	4
81-90	1	0	0	0	0	0	0	1
Total	53	24	5	3	10	20	5	120

Table 2: SEX DISTRIBUTION VERSUS TYPE OF LESION CAUSING INTESTINAL OBSTRUCTION

SEX	LESION							Total
	Adhesion and bands	Volvulus	Hernia	Intussusception	Tumour	Faecal impaction	Helminthiasis	
Male	30	18	5	3	7	17	2	78
Female	23	6	0	0	3	10	3	42
Total	53	24	5	3	10	20	5	120

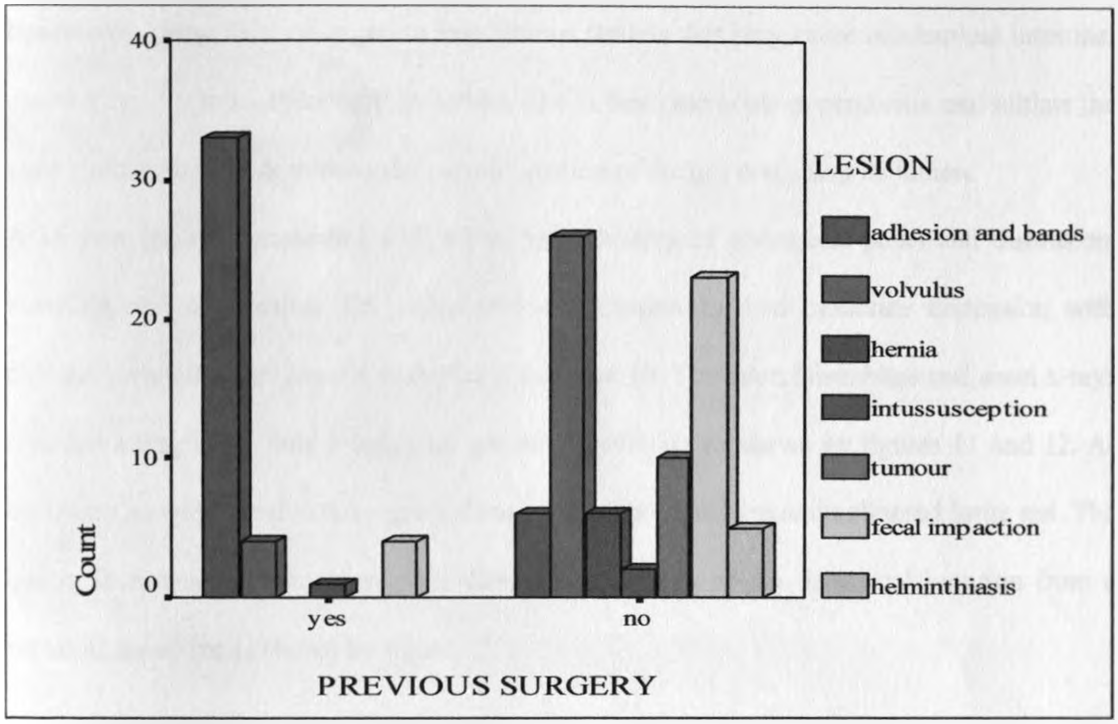
The most common lesions were adhesions and bands and volvulus in the 21-30 and 31-40 age brackets while the least common lesion was intussusception. The lesions were almost equally common among the male and the females except for hernia.

Figure 6: AGE DISTRIBUTION OF PATIENTS WITH ADHESIONS



Most of the patients with adhesions were in the 21-40 age group.

Figure 7: TYPE OF LESIONS CAUSING OBSTRUCTION IN PATIENTS WITH AND WITHOUT SCARS



The most common lesion that caused mechanical bowel obstruction in patients with previous scar was adhesion and bands while in patients who had no scars the common lesions were volvulus, faecal impaction and tumours.

Of interest are the patients who had no previous abdominal surgery but were found adhesions due intra-abdominal infection like appendicular or pelvic abscesses, abdominal tuberculosis, and e.t.c.

CASE REPORT

INTRA-ABDOMINAL INFLAMATORY ADHESIONS CAUSING MECHANICAL OBSTRUCTION IN A PATIENT WITH NO PREVIOUS ABDOMINAL LAPAROTOMY

Operational trauma leads to formation of fibrinous adhesions within hours after laparotomy.These later on organize into fibrous strands that may cause mechanical intestinal obstruction. An intra-abdominal infection, like in this case acute appendicitis can initiate the same process that leads to constriction and matting of the gut occluding its lumen.

A 36 year old man presented with a two week history of abdominal pains and distension, vomiting and obstipation. On abdominal examination he had moderate distension with obvious peristaltic movements as depicted in figure 10. The lateral decubitus and erect x-rays revealed multiple air fluid levels with gaseous distension as shown by figures 11 and 12. At operation he was found to have gross distension of the small gut and collapsed large gut. The lesion causing was obstruction were fibrinous adhesions at the ileocaecal junction from a ruptured appendix as shown by figure

Figure 8: THE CHARACTERISTIC APPEARANCE OF PERISTALTIC WAVES

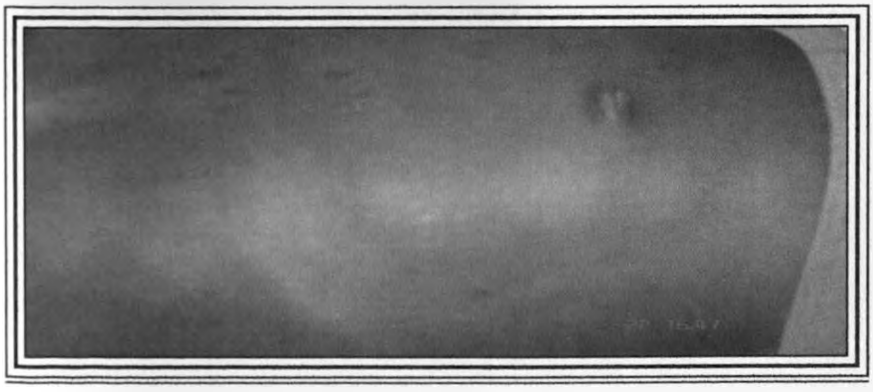


Figure 9: LATERAL DECUBITUS RADOGRAGH; GASEOUS DISTENSION WITH MULTIPLE AIR FLUID LEVELS

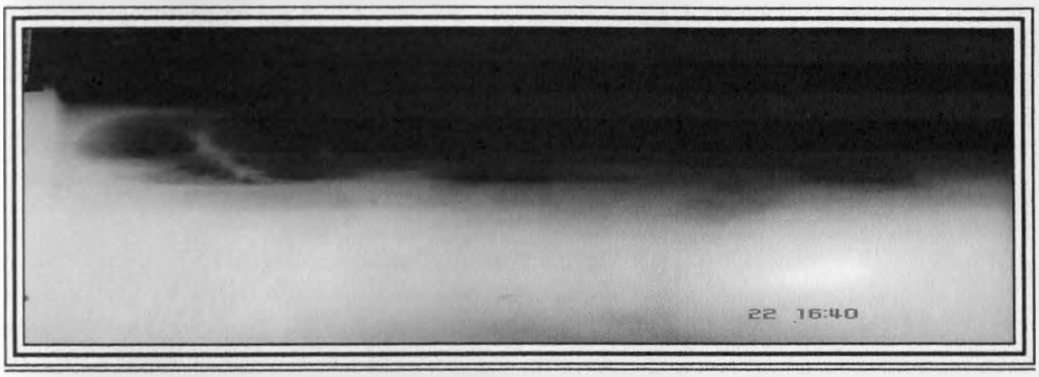


Figure 10: ERECT RADIOGRAGH; GASEOUS DISTENSION WITH MULTIPLE AIR FLUID LEVELS.

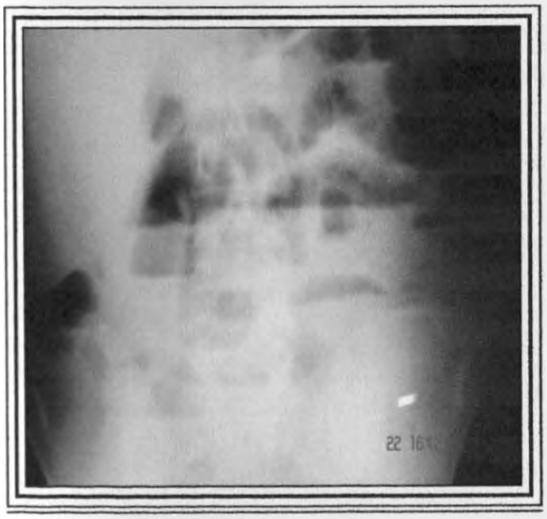


Figure 21: DISTENDED PROXIMAL SMALL GUT

Figure 32: APPENDICULAR PATHOLOGY WITH MATTING AT THE ILEACECAL JUNCTION CAUSING BOWEL OBSTRUCTION

Table 3 : SITE OF OBSTRUCTION

Site	Number of patients	Percent
Small gut	78	65.0
Large gut	42	35.0
Total	120	100.0

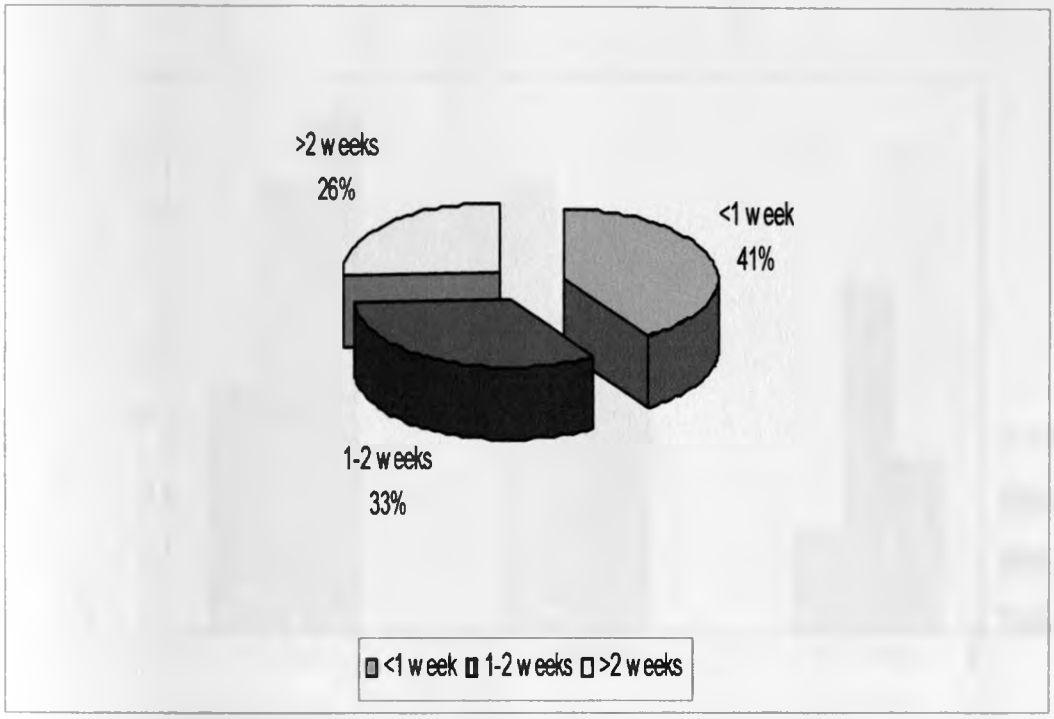
The small and the large gut were involved in 65% and 35% of the patients respectively.

Table4: DURATION OF HOSPITAL STAY

Number days in the ward	Number of patients	Percent
1	0	O
2	0	0
3	8	8
4	12	10
5	9	8
6	11	9
7	15	13
8	10	8
9	7	6
10	7	6
11	4	3
12	4	3
14	7	6
15	7	6
16	4	3
17	3	3
18	3	3
20	2	2
21	3	3
22	2	2
24	1	1
26	1	1
Total	120	100.0

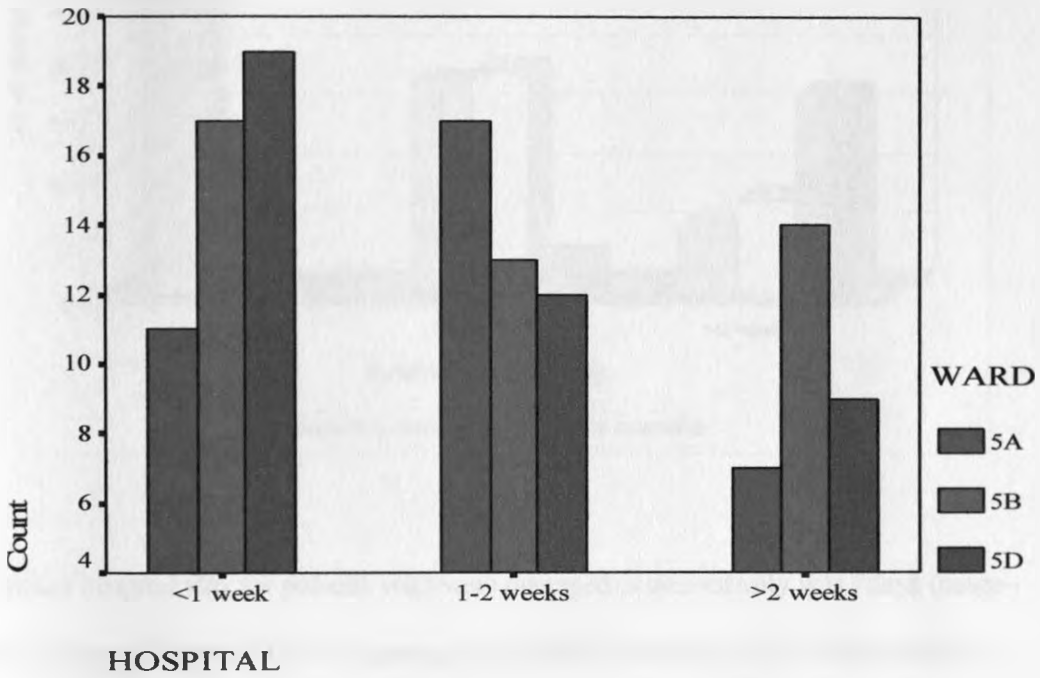
The duration of hospital stay ranged from 3days to 26 days with a mean of 10 days for all the patients.

Figure 43: DURATION OF HOSPITAL STAY



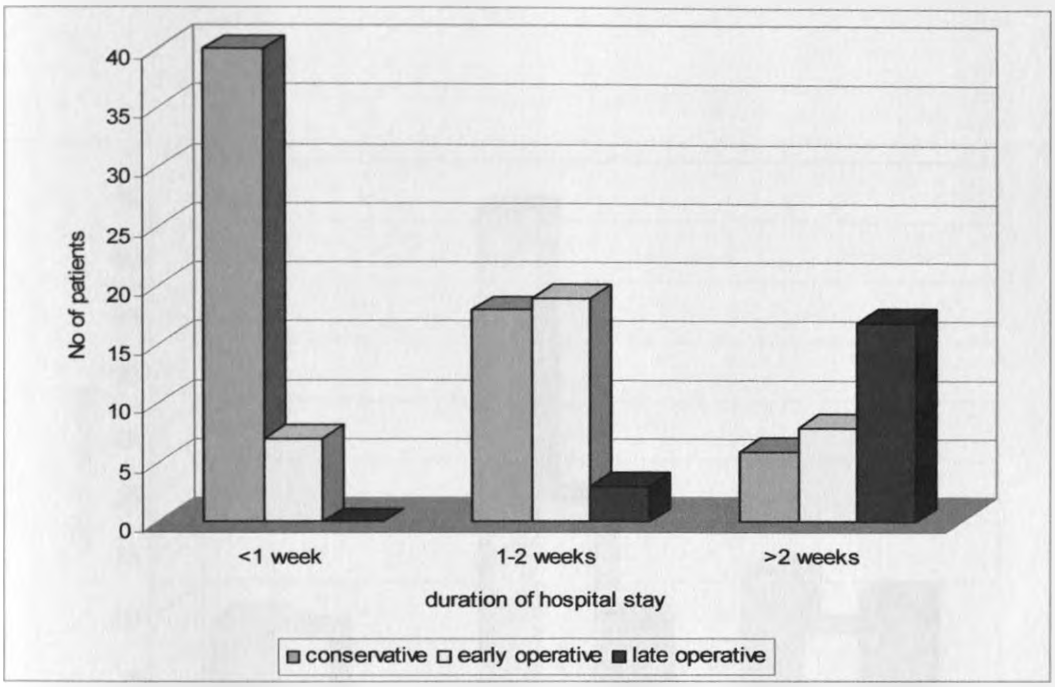
Majority of the patients (41%,n = 49) stayed for one week or less,33% stayed for up to 14 days and 26% stayed for more than two weeks.

Figure 54: DURATION OF HOSPITAL STAYING IN EACH WARD



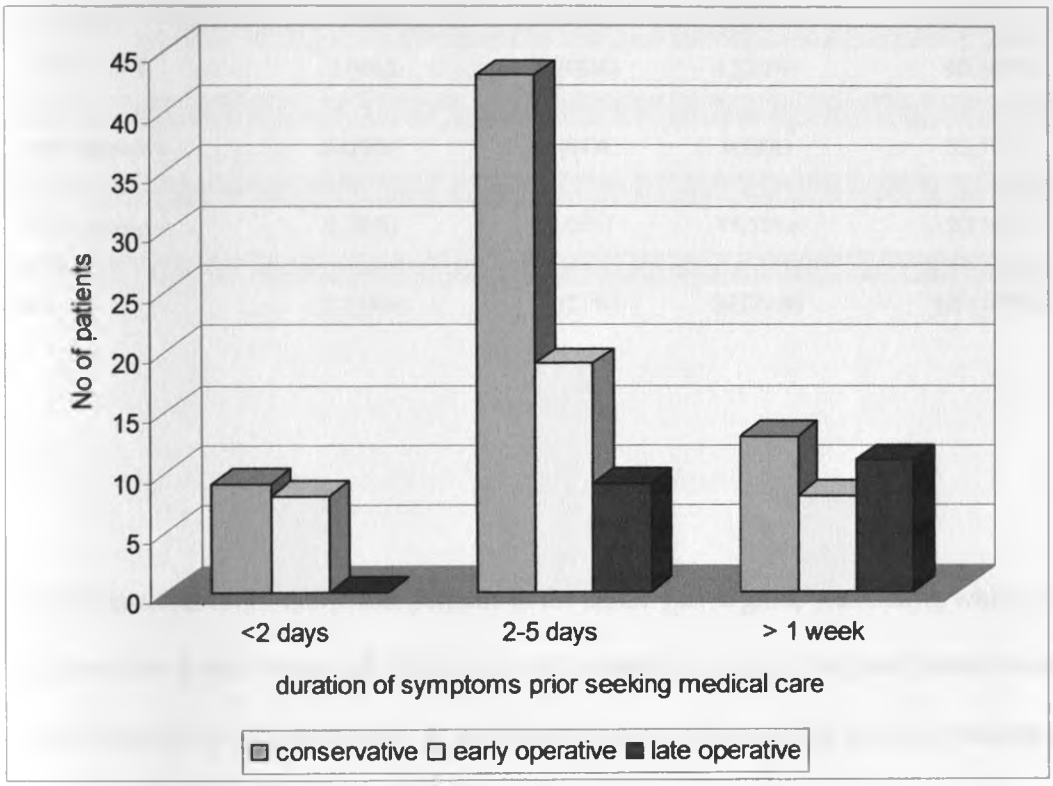
There was no statistical significant difference in the duration of hospital stay in the different wards. (P = 0.291)

Figure 65: DURATION OF HOSPITAL STAY ACCORDING TO MANAGEMENT



The median hospital stay for patients who were managed conservatively was 7days (range--3days to 21days) Those who were operated on early had a median stay of 10days (range-4days to 22days), while those late operative group stayed longest in the hospital (median-16days, range-7days to 26days) (P = 0.000)

Figure 76: **DURATION OF SYMPTOMS PRIOR TO SEEKING MEDICAL ATTENTION**



Majority of the patients were seen between two and five days after the onset of symptoms.

Very few patients (29) sought medical attention within two days of the symptoms onset.

Table5: **MANAGEMENT VERSUS DURATION OF SYMPTOMS PRIOR SEEKING MEDICAL CARE**

	Duration of symptoms prior seeking medical care			Total
Management	<2 days	2-5 days	> 1 week	
conservative	9 (4%)	43 (66%)	13(20%)	65(100%)
early operative	8 (23%)	19 (54%)	8(23%)	35(100%)
late operative	0. (0%)	9 (45%)	11(55%)	20(100%)
Total	17 (14%)	71 (51%)	32 (27%)	120(100%)

The median duration of symptoms patients in the conservative group was 3days, while in the early operative it was 4days and 7days in the late operative group. Using the Kruskal walis test, the duration of symptoms prior to admission had no relationship to how the patients were managed in this study. (P = 9.256)

Figure 87: NATURE OF ABDOMINAL PAIN

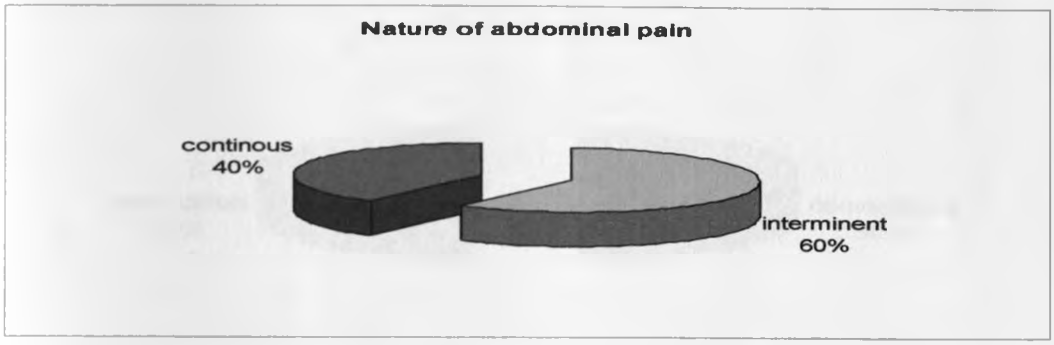


Table6: MANAGEMENT VERSUS NATURE OF ABDOMINAL PAIN

	Nature of abdominal pain		Total
Management	interminent	continuous	
conservative	55 (85%)	101 (15%)	65(100%)
early operative	0 (0%)	35 (100%)	35(100%)
late operative	17 (85%)	3 (15%)	20(100%)
Total	72 (60%)	48 (40%)	120(100%)

Majority (85%) of the patients in the conservative and late operative groups had intermittent abdominal pains while all the patients who were operated on early had continuous abdominal pain due to either perforation or strangulation. The difference was statistically significant. (P = 0.000)

Figure18: BOWEL MOTION

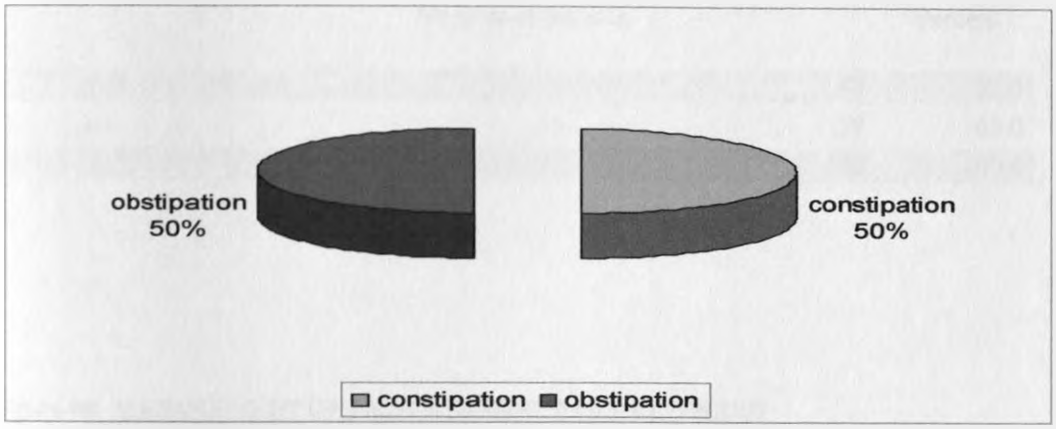
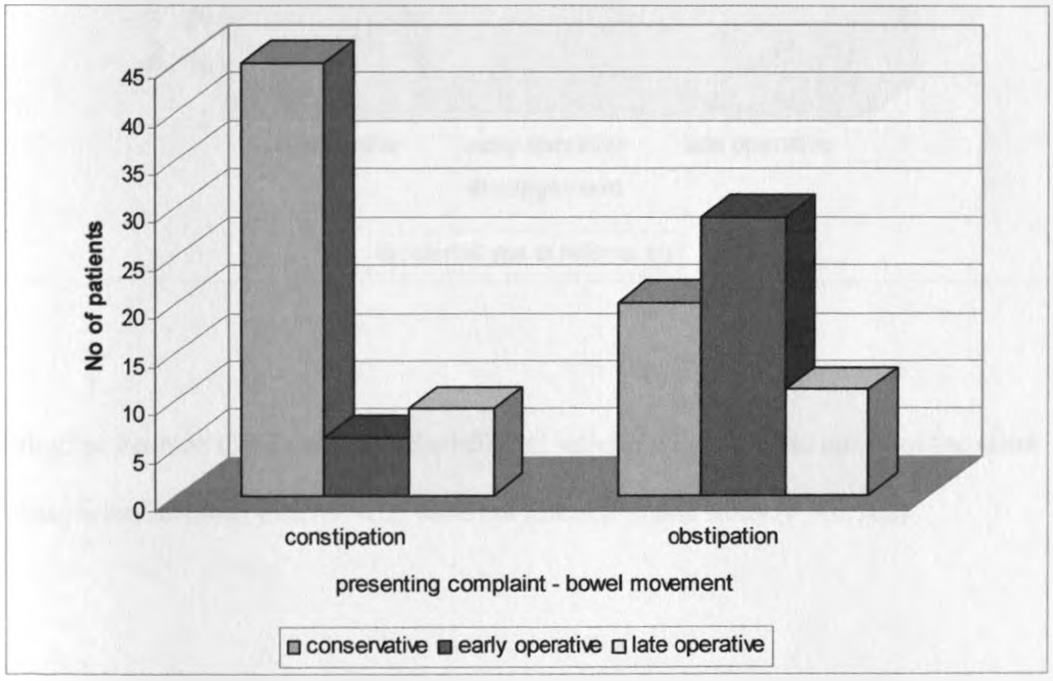


Figure 19: BOWEL MOTION VERSUS MANAGEMENT

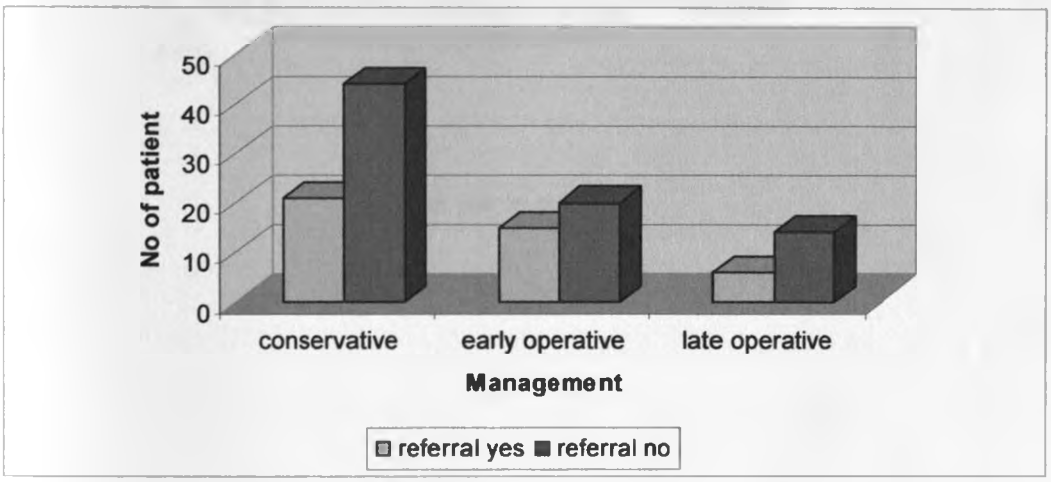


Patients who passed flatus were more likely to recover on conservative management as opposed to those who had obstipation, 80% of whom were operated early.

Table 7: **REFERRAL**

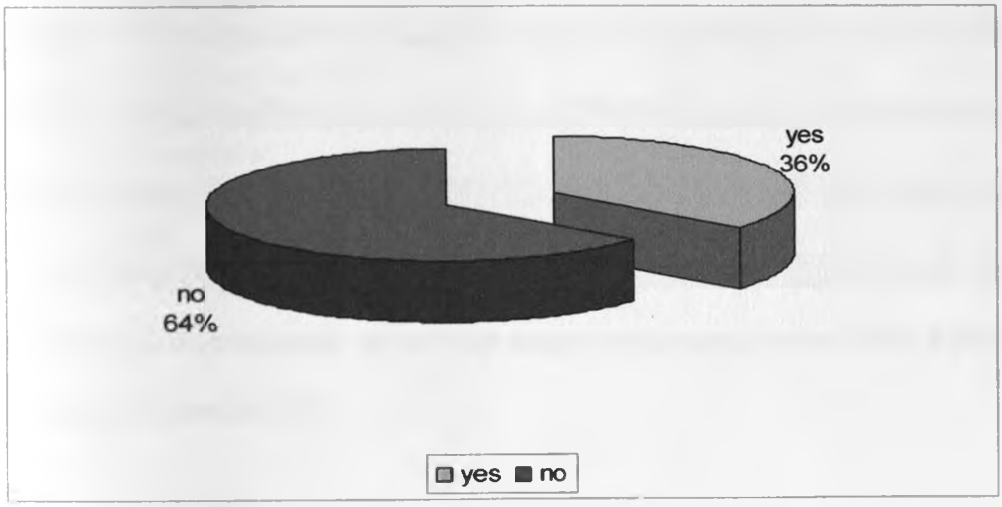
		Number of patients	Percent
	yes	42	35.0
	no	78	65.0
	Total	120	100.0

Figure 90: **MANAGEMENT OF PATIENTS WHO WERE REFERRED**



Using the Pearson Chi-Square test the referred patients were likely to under go the same management as those patients who were not referred in this study.(P = 0.502)

Figure 101: PREVIOUS ABDOMINAL SURGERY



Only 43 (35.8%) patients had undergone previous abdominal operation while 77 (64%) had no previous abdominal surgeries.

Table 8: REASON FOR PREVIOUS SURGERY

Indications of previous surgery	Number of patients	Percent
Gynaecological	15	34
Intestinal obstruction	10	23
Peritonitis	4	10
Colonic tumour	4	10
Penetrating abdominal injury	4	10
Blunt abdominal injury	2	5
Hirshsprung disease	1	2
Appendicitis	1	2
Gastric tumour	1	2
Arm	1	2
Total	43	100.0

The most common indication for previous surgery was gynaecological (34%) followed by intestinal obstruction (23%).

Table 9: DURATION OF PREVIOUS SCAR

Number of years ago when surgery was done	Number of patients	Percent
1	2	5
2	5	12
3	2	5
4	6	14
5	12	28
6	1	2
7	2	5
9	2	5
10	2	5
12	4	9
18	1	2
20	1	2
30	1	2
Total	43	100.0

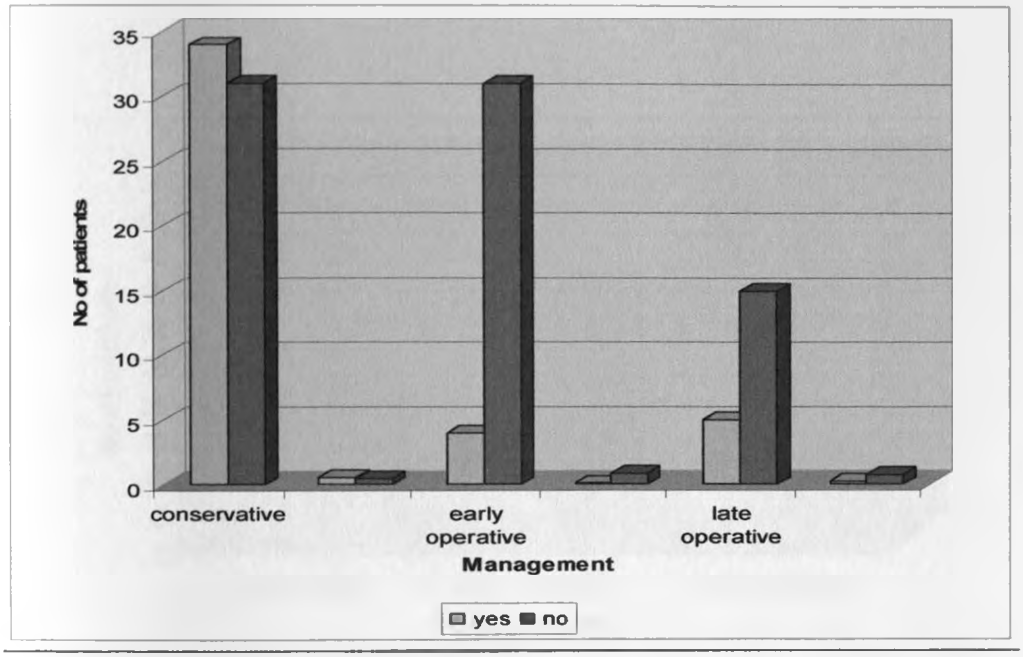
The shortest duration of a non-obstructive scar was one year while the longest duration was 30years.

Table 10: FREQUENCY OF PREVIOUS ABDOMINAL SURGERIES

Number of previous operations	Number of patients	Percent
1	30	70
2	9	21
3	4	9
Total	43	100

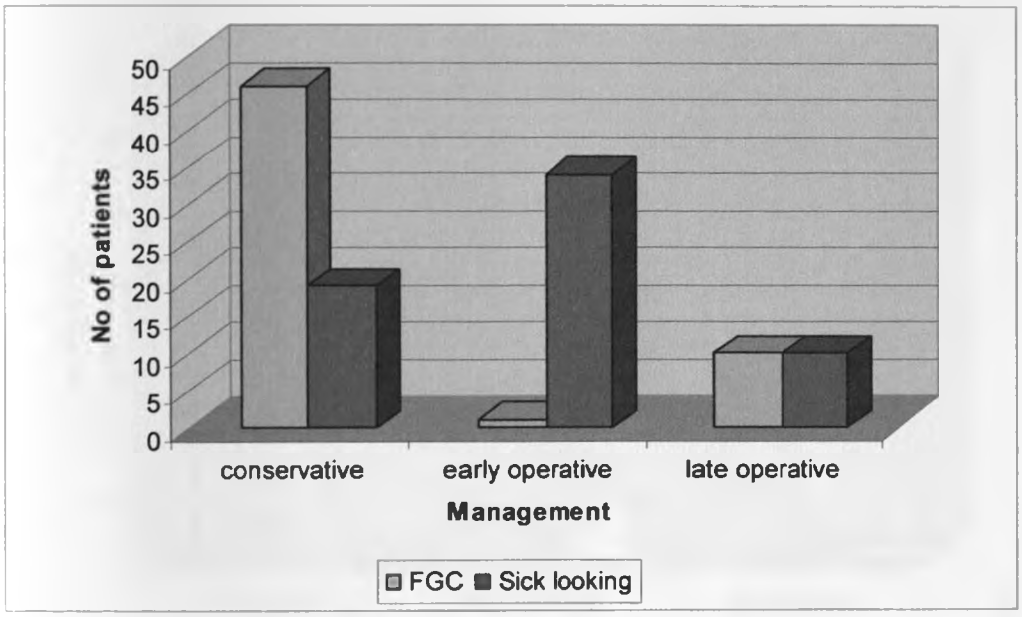
Almost 70% of the patients with previous scar had been operated once.

Figure 112: MANAGEMENT OF PATIENTS WITH ADHESIVE INTESTINAL OBSTRUCTION



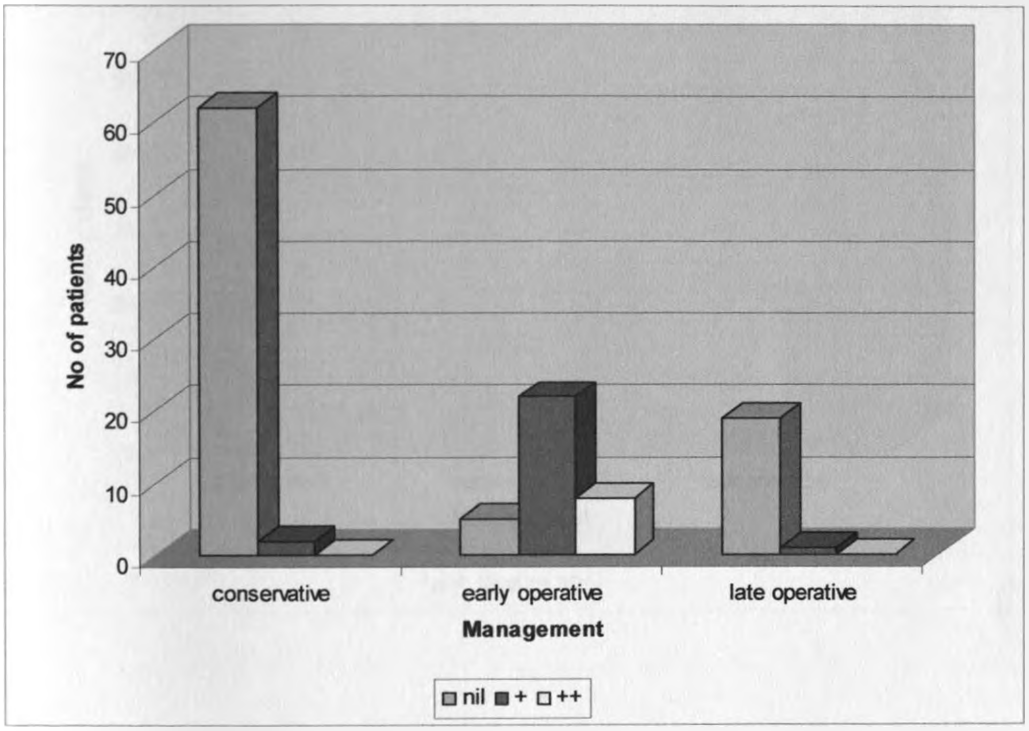
Seventy nine percent of the patients who had previous scar and 40% of the patients had no previous were managed conservatively.

Figure 123: MANAGEMENT ACCORDING TO THE GENERAL CONDITION OF THE PATIENT



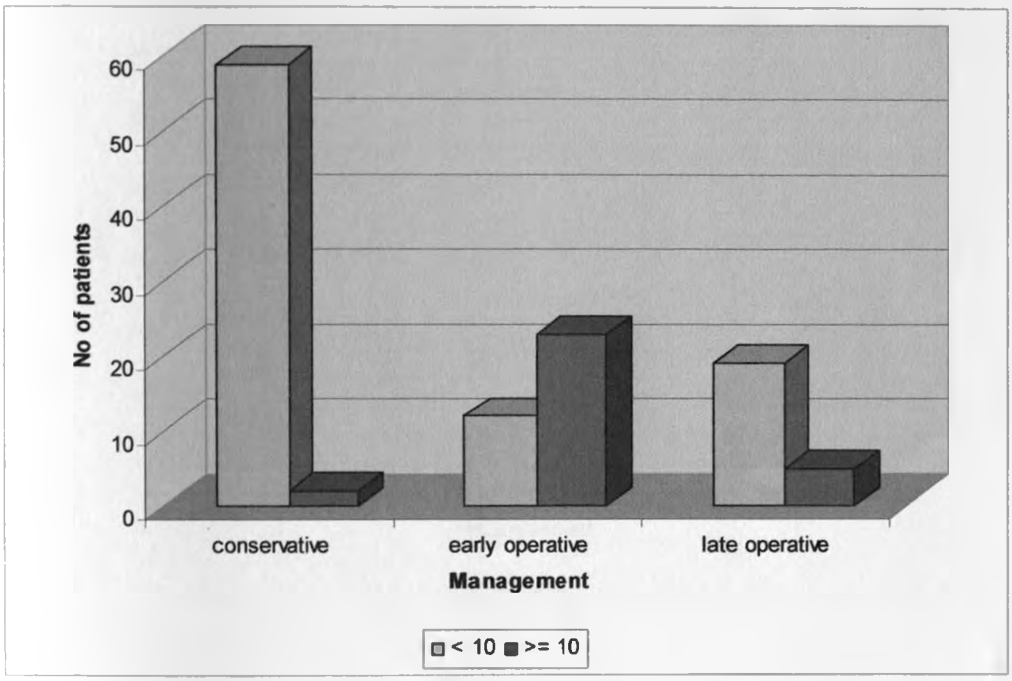
The general condition of the patients in the early operative group was worse than for those in the trial of conservative management group. (P = 0.000).

Figure 134: MANAGEMENT VERSUS PRESENCE OF ABDOMINAL GUARDING



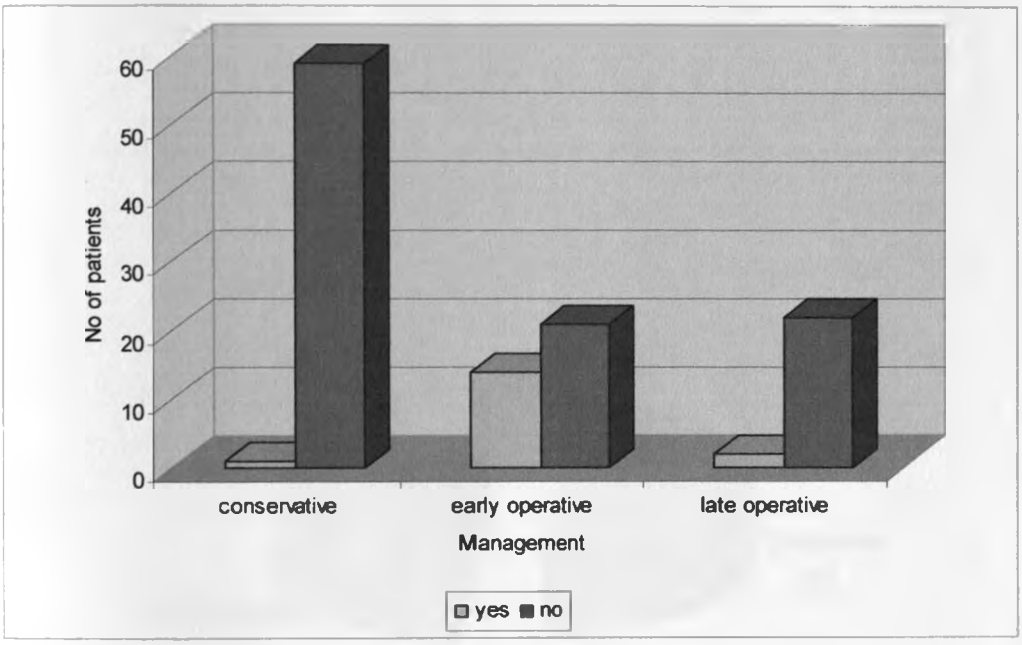
Patients who had abdominal guarding were likely to be managed by early operation. (P =0.000)

Figure 145: MANAGEMENT VERSUS WBC



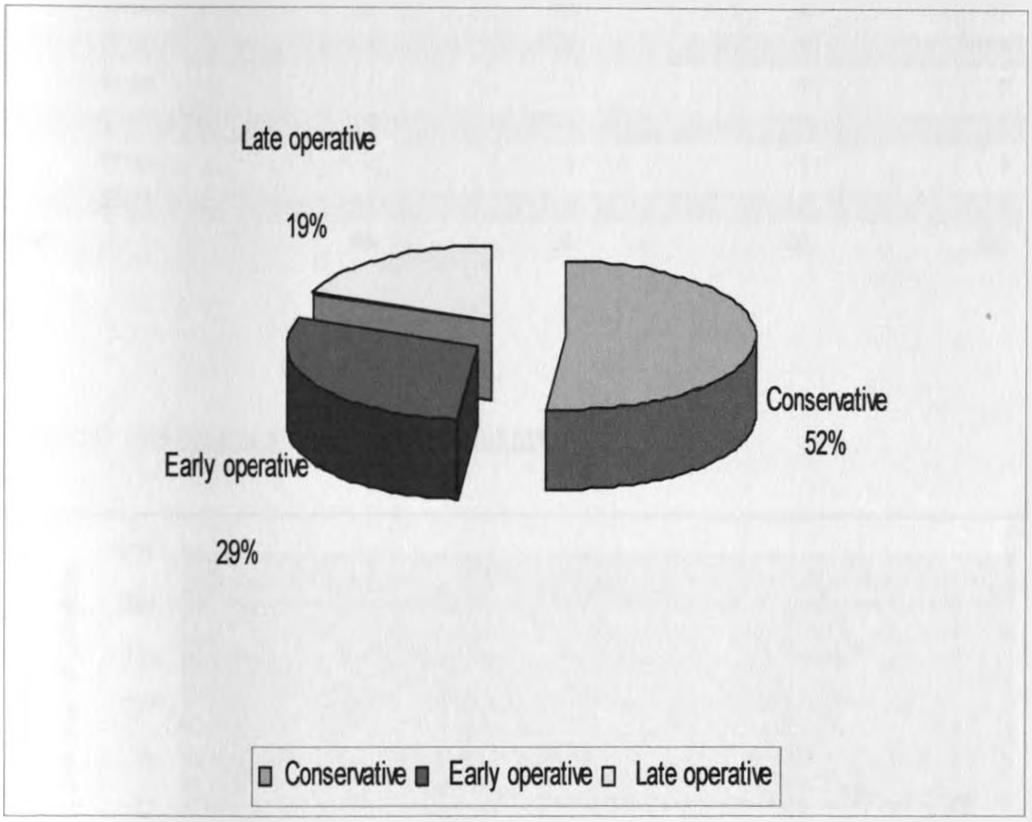
Most of the patients (76%) who had W.B.C counts of greater than 10×10^9 were managed by early operation.(p =0.000)

Figure 156: MANAGEMENT VERSUS ELECTROLYTE IMBALANCE



Most of the patients (78%) who had electrolyte imbalance were in the early operative group. when compared to the other groups there was statistically significant difference. (P = 0.000)

Figure 167: MANAGEMENT

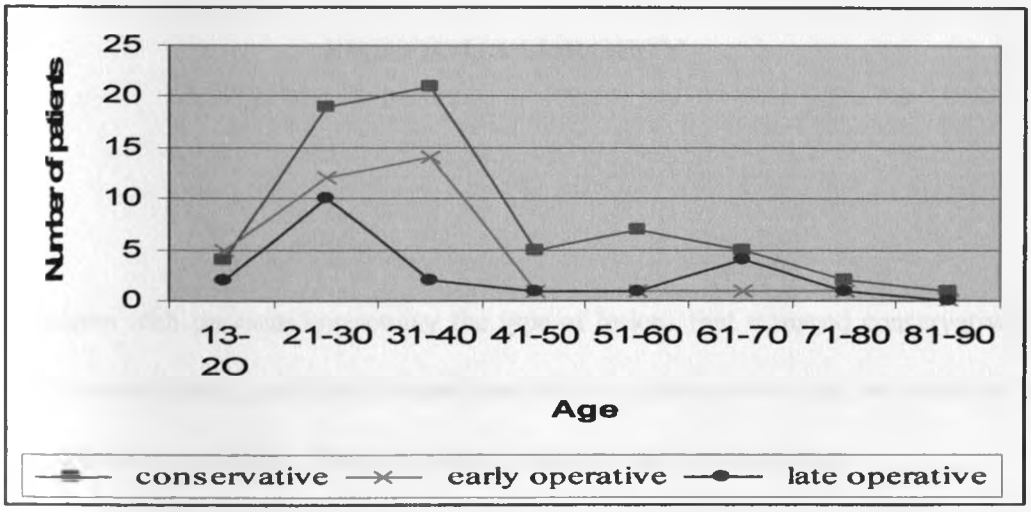


In general management 52% of the patients were managed conservatively, 29% were managed by early operation and 19% were managed by late operation.

Table 11: AGE VERSUS TYPE OF MANAGEMENT

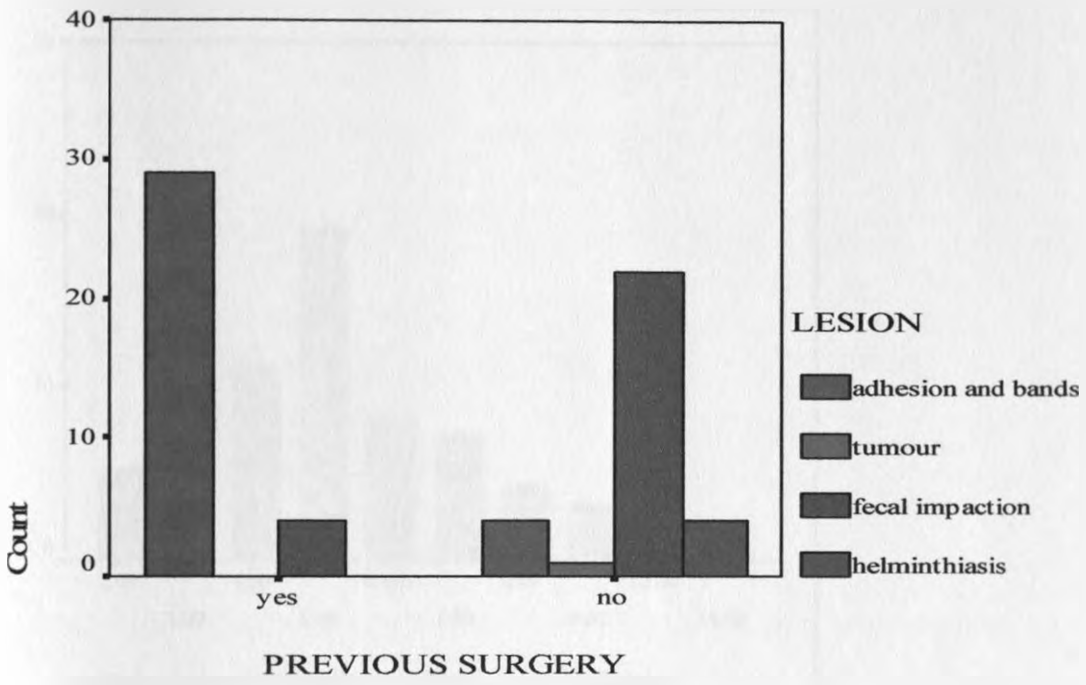
	MANAGEMENT			Total
AGE	Conservative	Early operative	Late operative	
13-20	4	5	2	11
21-30	19	12	10	41
31-40	22	13	2	37
41-50	5	1	1	7
51-60	7	1	1	9
61-70	5	1	3	9
71-80	2	1	1	4
81-90	1	0	0	1
Total	65	35	20	120

Figure 28: AGE VERSUS TYPE OF MANAGEMENT



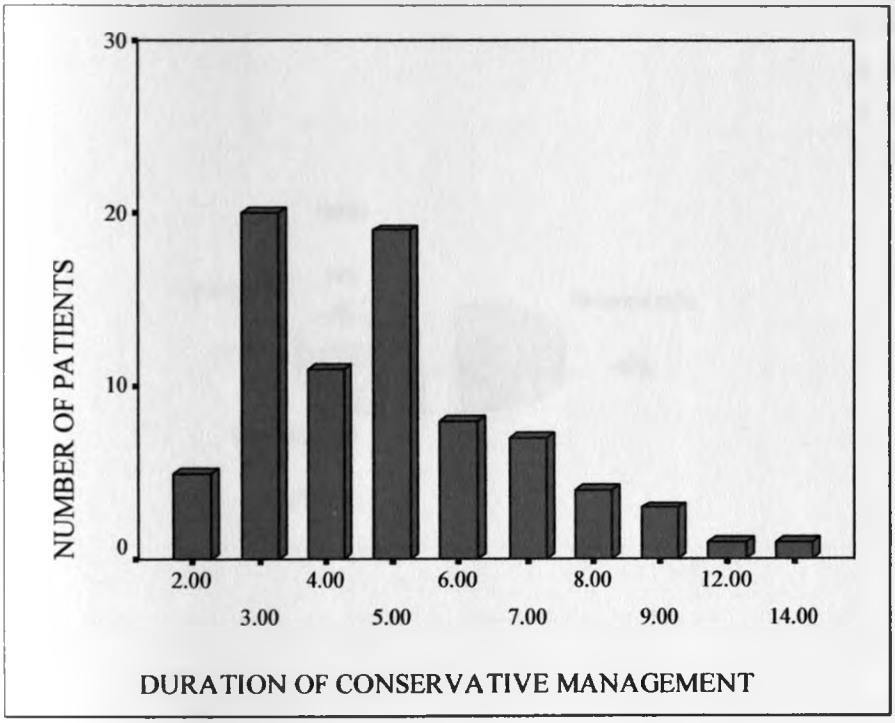
In all age groups conservative was the main form of management.

Figure 29: TYPE OF LESIONS THAT WERE MANAGED CONSERVATIVELY IN PATIENTS WITH AND WITHOUT PREVIOUS SURGERY



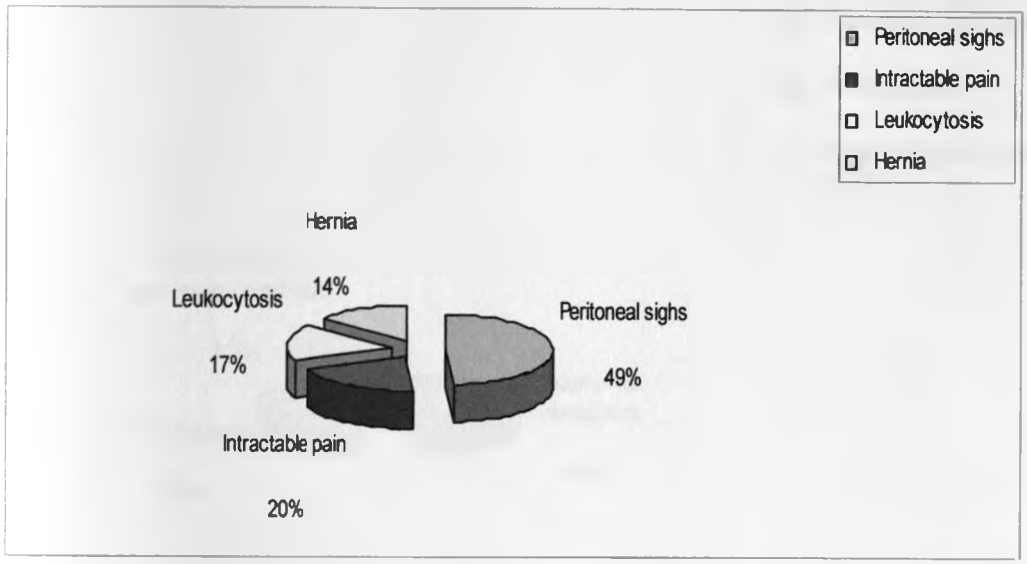
In patients with previous laparotomy the type of lesions that managed conservatively were adhesions and bands, and faecal impaction while in patients who had no scars the lesions were adhesions and bands, tumours, faecal impaction and helminthiasis.

Figure 30: DURATION OF CONSERVATIVE MANAGEMENT



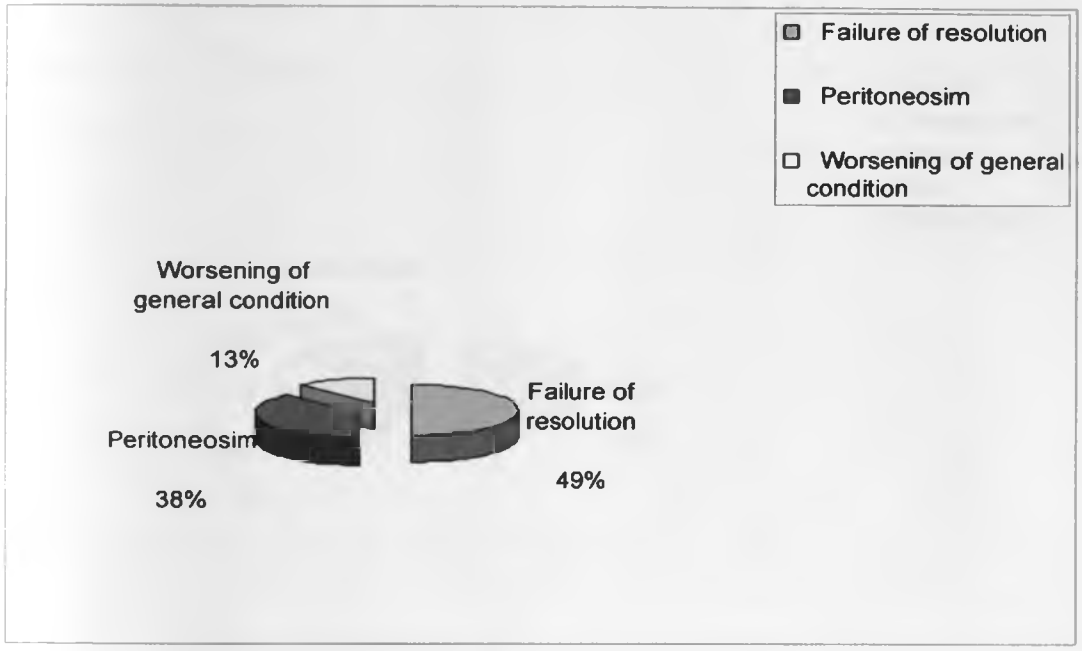
Most of the patients who were managed conservatively had resolution of symptoms in three and five days.

Figure 171: INDICATIONS FOR EARLY OPERATION



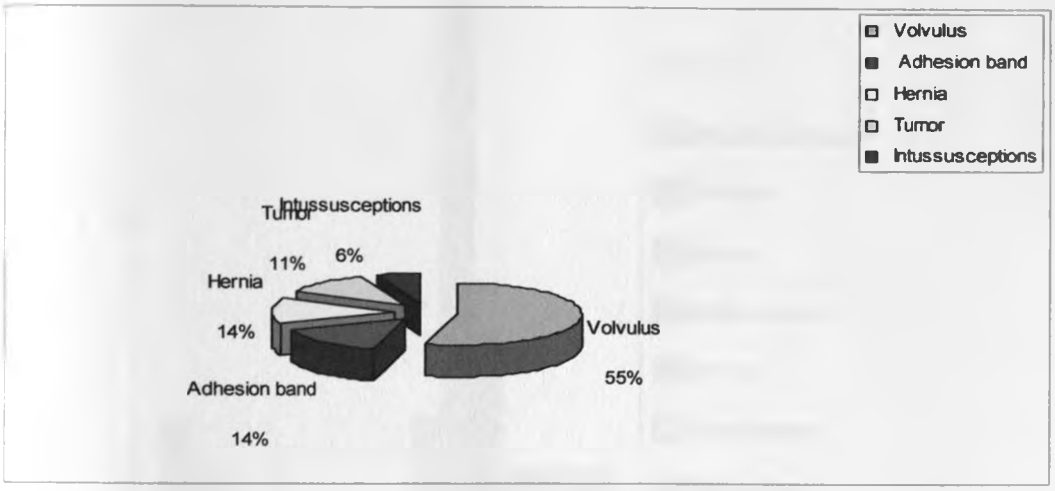
On clinical evaluation the main indications for early operative management were signs of peritonitis (49%), intractable pain (20%),leukocytosis(17%),hernia(14%).

Figure 182: INDICATIONS FOR LATE OPERATIVE MANAGEMENT



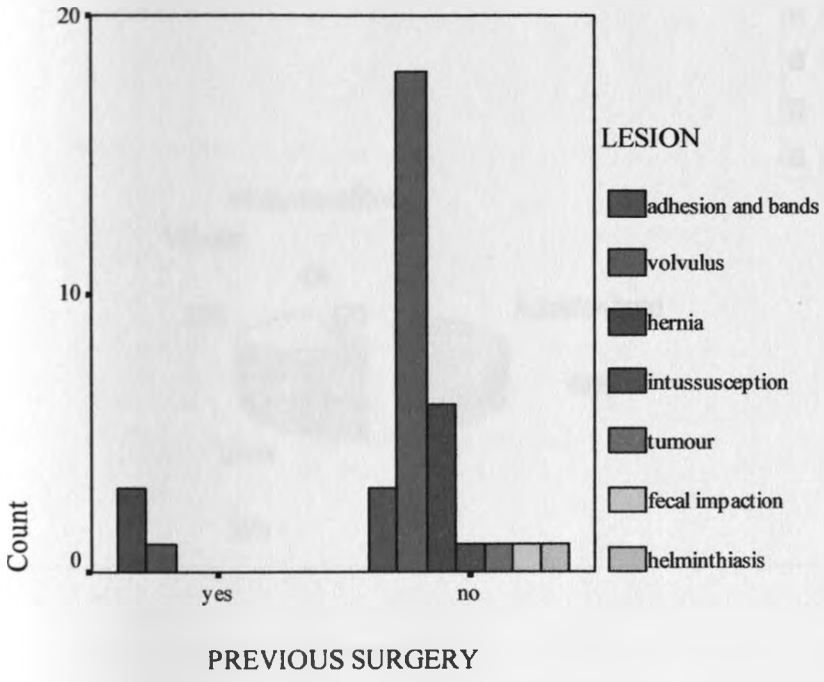
The indications for late operation were failure of resolution (49%), peritonitis (38%), and worsening of the general condition (13%).

Figure 193: EARLY INTRAOPERATIVE FINDINGS



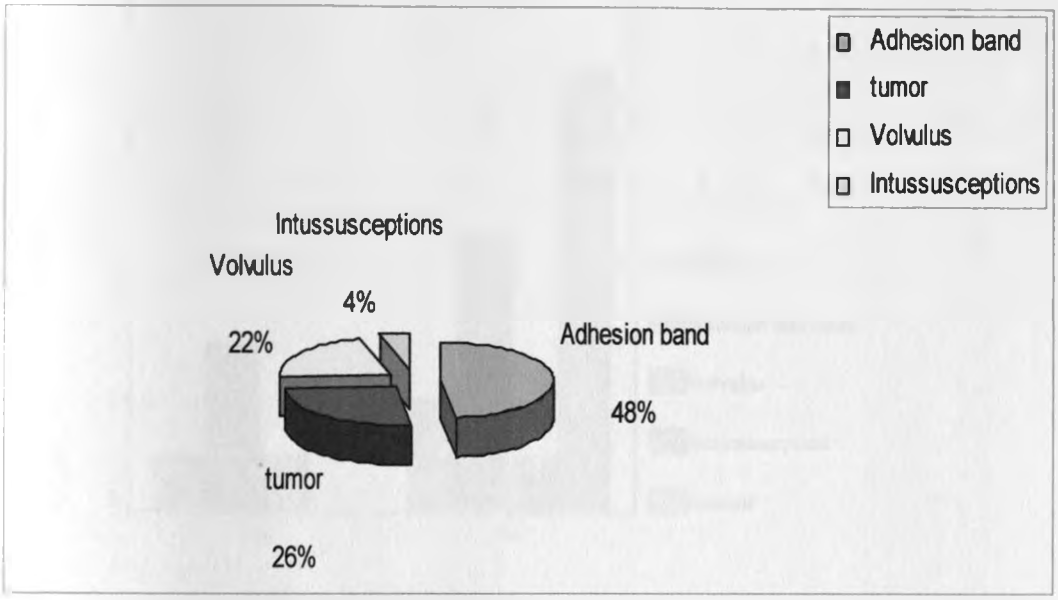
The most common finding in patients who were operated early was Volvulus(55%).Others were adhesions and bands(14%),hernia(14%),Tumour(11%) and intussusceptions(2%).

Figure 204: TYPE OF LESIONS THAT WERE MANAGED BY EARLY OPERATION IN PATIENTS WITH AND WITHOUT PREVIOUS SURGERY



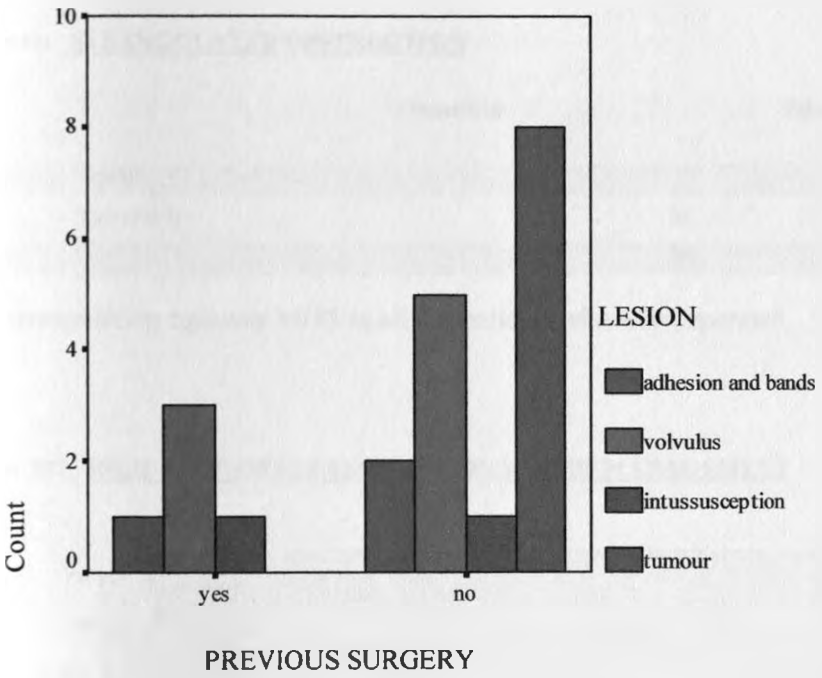
The lesions that were found in patients with scar who were operated early were volvulus and adhesions and bands causing ischemia while in patients who had no scars the lesions were as above.

Figure 215: DELAYED INTRAOPERATIVE FINDINGS



The most common finding in the delayed operation group was adhesions and bands (48%) .Others were tumour (26%), volvulus (22%), and intussusceptions (4%).

Figure 226: **TYPE OF LESIONS THAT WERE MANAGED BY DELAYED OPERATION IN PATIENTS WITH AND WITHOUT PREVIOUS SURGERY**



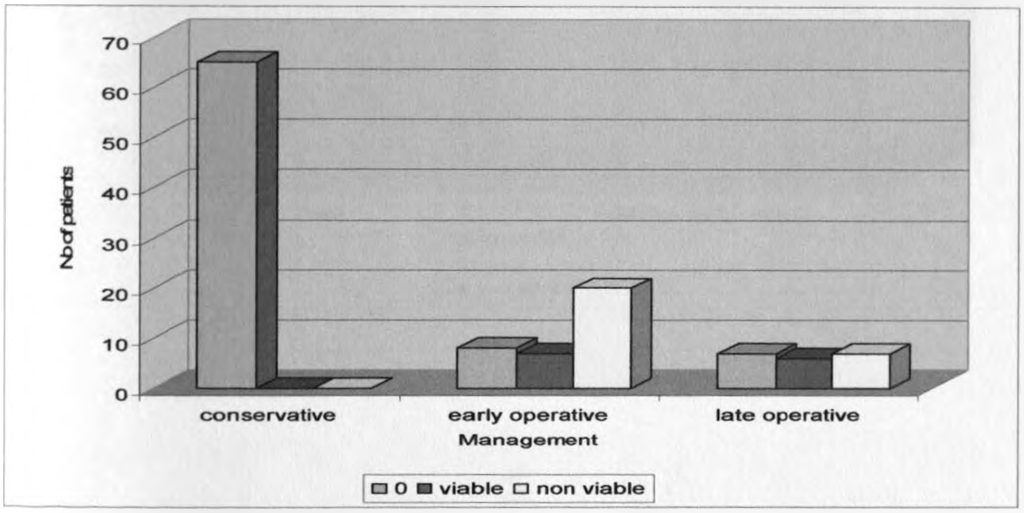
The most common lesion in patients with scar who were operated late was volvulus while the most common lesion in patients who did not have scars in this case was tumour.

Table 12: **STRANGULATED OBSTRUCTION**

		Frequency	Percent
	viable	22	41.0
	non viable	32	59.0
Total		54	100.0

The strangulation rate was 54/55 in all the patients who were operated.

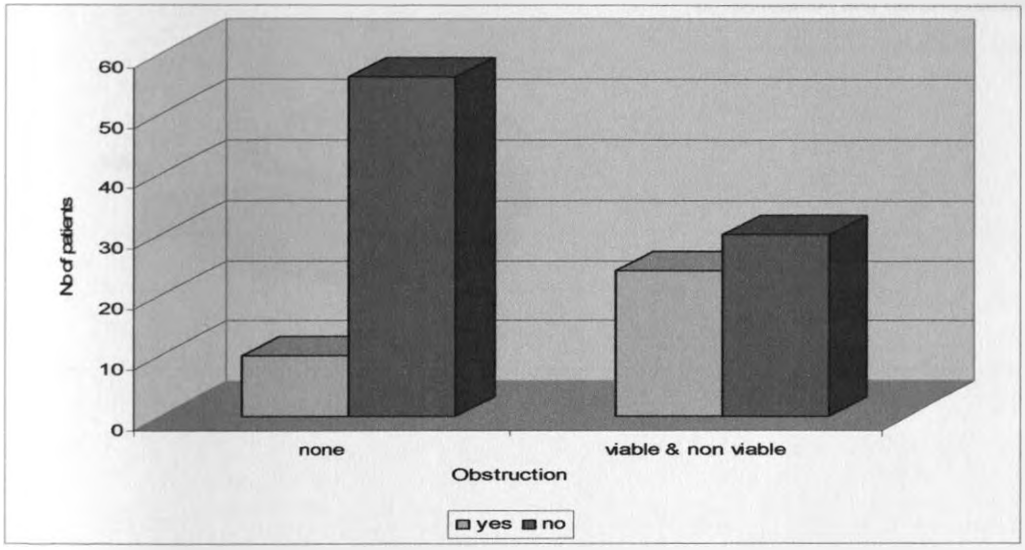
Figure 237: **INCIDENCE OF STRANGULATION VERSUS MANAGEMENT**



Most of the patients who were operated early had a higher rate of non-viable strangulation than those who underwent delayed operation. (P= 0.000)

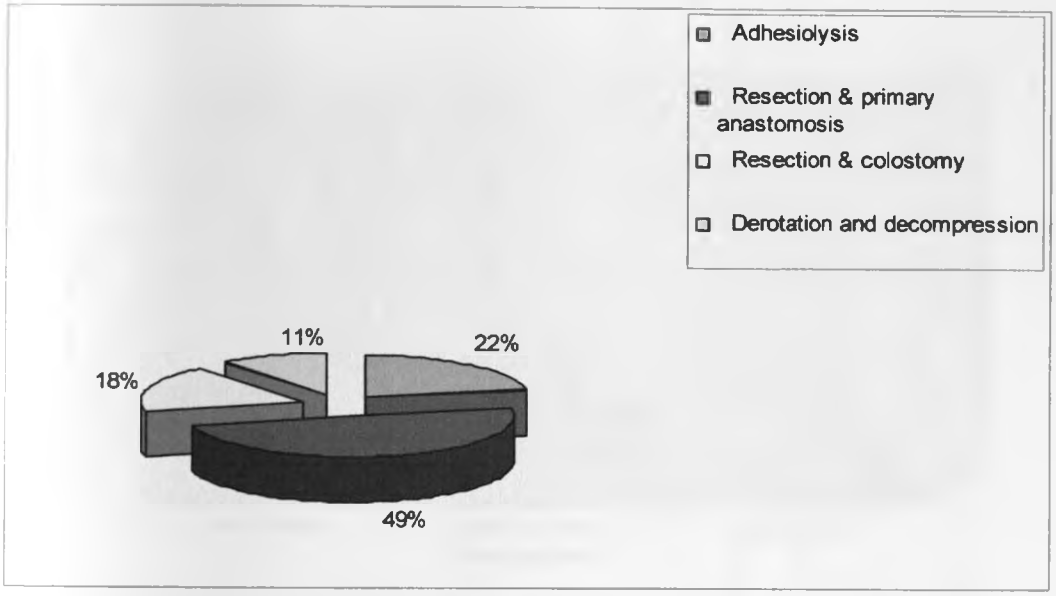
The positive and negative laparotomy rate for patients who were who were operated on early were 77% and 23% respectively. While the positive and negative laparotomy rates for the patients who were operated on late was 65% and 35% respectively.

Figure 38: INCIDENCE OF STRANGULATION IN PATIENTS WITH FEVER



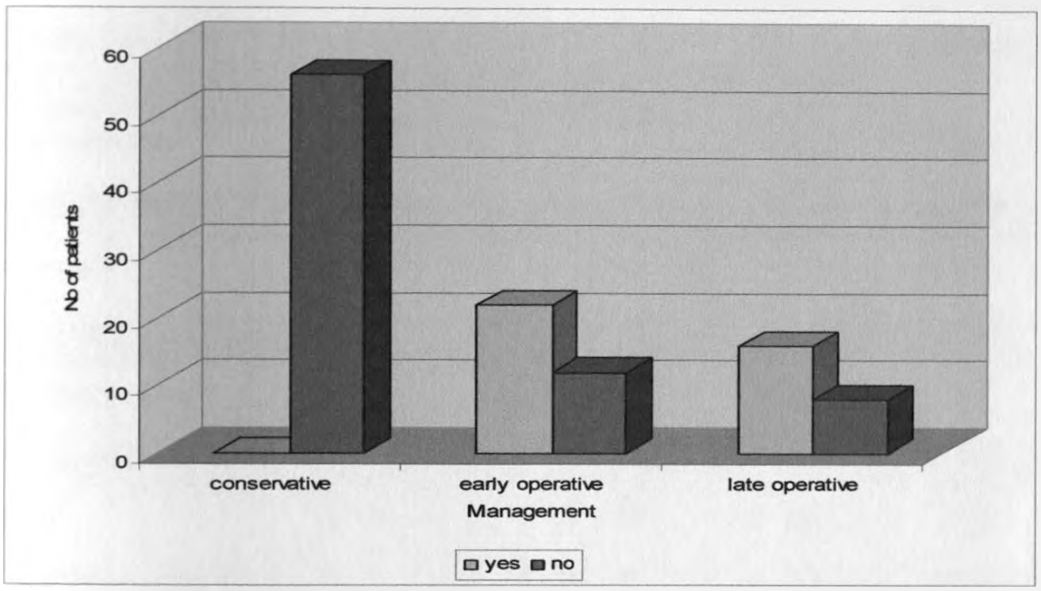
There was significant statistical difference in the presentation of fever in patients who had strangulation and in those who did not have strangulation. (P = 0.002)

Figure 39: TYPE OF SURGERY ON LAPARATOMY



Intra-operatively the most common procedure was resection and primary anastomosis (49%).The others were adhesiolysis (22%), resection and colostomy (18%), derotation and decompression (11%).

Figure 40: **INCIDENCE OF RESECTION ACCORDING TO MANAGEMENT**



Although there was no significant statistical difference in the resection rates between the early and late operative groups, a greater proportion of patients in the delayed operation group had resection. (P = 0.877).The resection rate in all the patients who were operated was 67%.

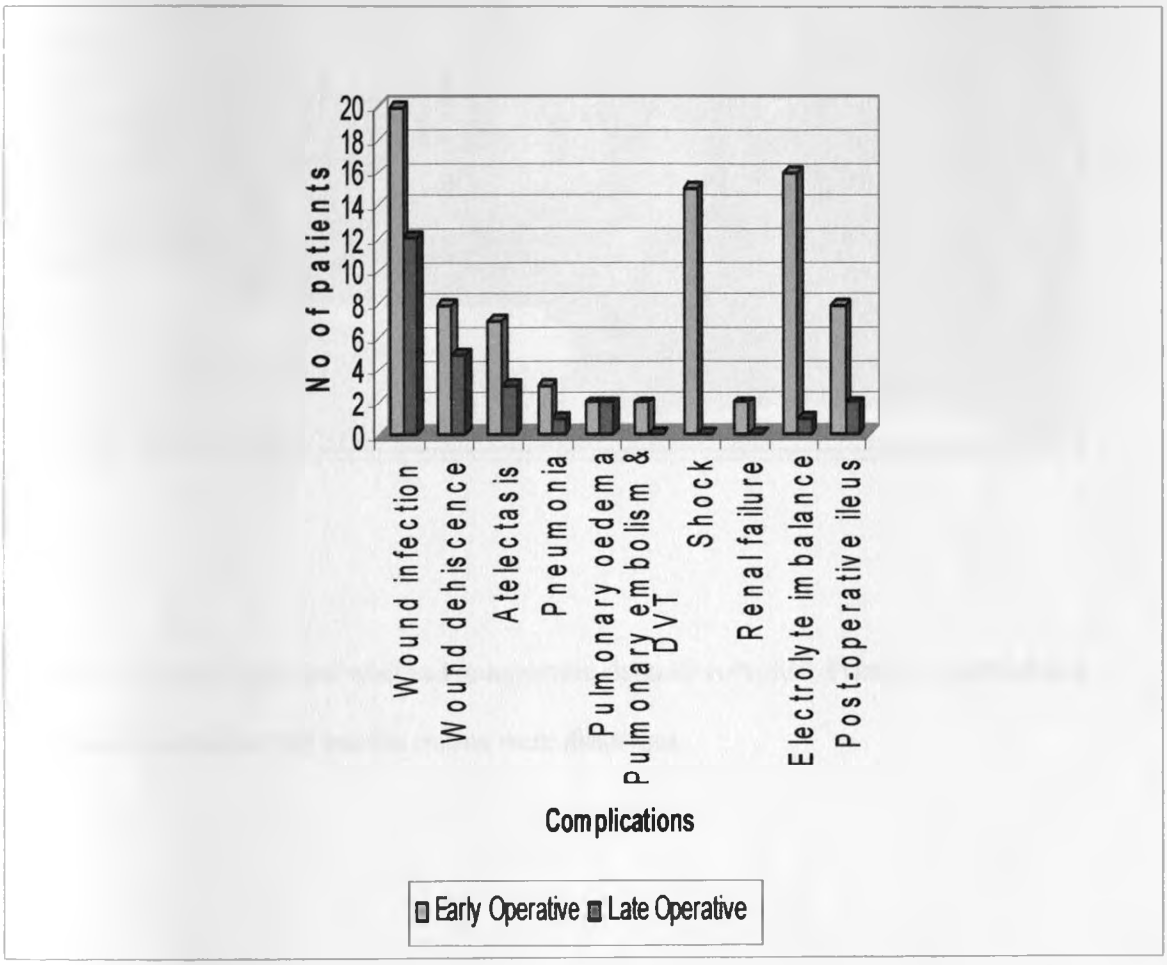
Table 13: COMPLICATIONS

COMPLICATION	MANAGEMENT			p value
	Early Operative	Late Operative	Total	
Wound infection	20 (16.7%)	12 (10.0%)	32 (26.7%)	0.000
Wound dehiscence	8 (6.7%)	5 (4.2%)	13 (10.8%)	0.002
Atelectasis	7 (5.8%	3 (2.5%)	10 (8.3%)	0.031
Pneumonia	3 (2.5%)	1 (0.8%)	4 (3.3%)	0.193
Pulmonary oedema	2 (1.7%)	2 (1.7%)	4 (3.3%)	0.079
DVT	2 (1.7%)	0 (0.0%)	2 (1.7%)	0.283
Shock	15 (12.5%)	0 (0.0%)	15 (12.5%)	0.000
Renal failure	2 (1.7%)	0 (0.0%)	2 (1.7%)	0.103
Electrolyte imbalance	16 (13.3%)	19 (0.8%)	17 (14.2%)	0.000
Post-operative ileus	8 (6.7%)	2 (1.7%)	10 (8.3%)	0.004
Anastomic leak	3 (2.5%)	1 (0.8%)	4 (3.3%)	0.270
Septicaemia	7 (5.8%)	2 (1.7%)	9 (7.5%)	0.004
Peritonitis	13 (10.8%)	5 (4.2%)	18 (15.0%)	0.000
Mortality	3 (2.5%)	2 (1.7%)	5 (4.2%)	0.161

The most common complication was post-operative wound infection which occurred in 26% of all the patients who were operated. This was higher in the early operation group.

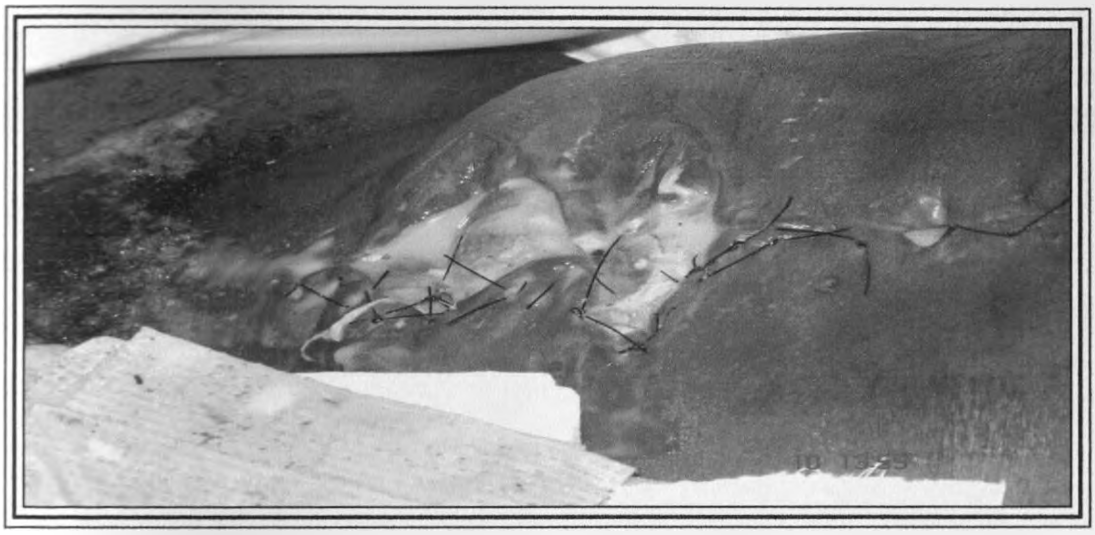
The infection rate in the early operative group was 20/35 while in the late operative group it was 12/20.

Figure 241: **COMPLICATIONS**



The significant post-operative complications were wound infection and dehiscence, atelectasis, shock, electrolyte imbalance, septicaemia and peritonitis

Figure 252: **SEVERE POST-OPERATIVE SEPSIS**



This was a 43year old patient who had gangrenous sigmoid volvulus. Primary resection and anastomosis was attempted but the results were disastrous.

Table 14: MORTALITY

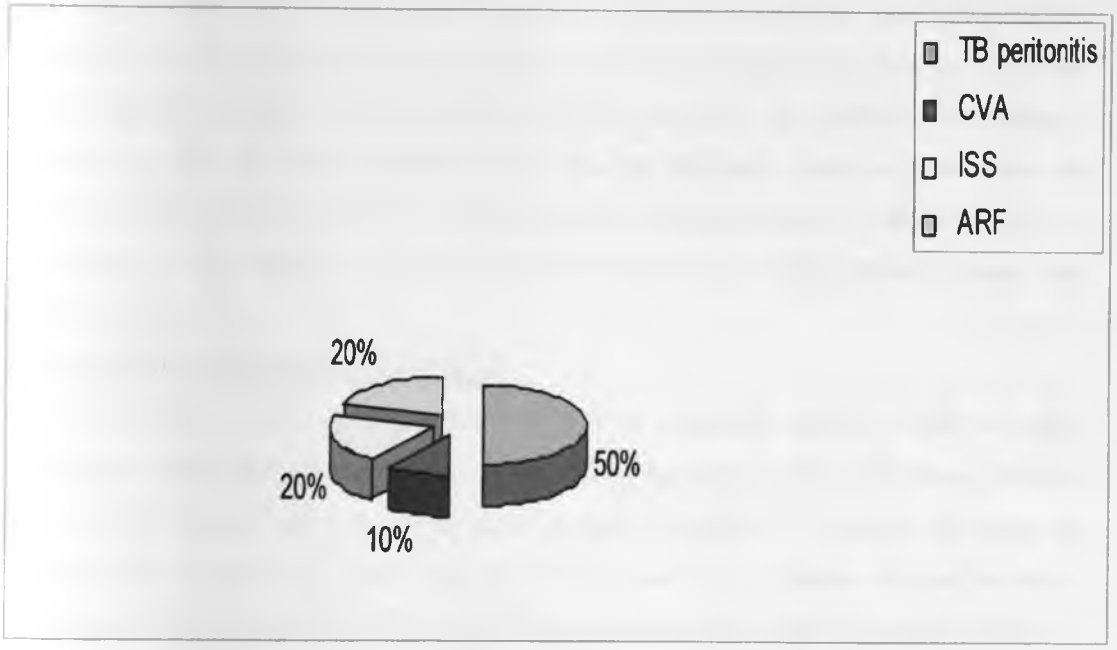
		Frequency	Percent (%)
	yes	5	4
	no	115	96
Total		120	100

Table 15: MANAGEMENT VERSUS MORTALITY

	Mortality		Total
Management	yes	No	
conservative	2 (3%)	63 (97%)	65 (100%)
early operative	2 (6%)	33 (94%)	35 (100%)
late operative	1 (5%)	19 (95%)	20 (100%)
	5 (4%)	115 (96%)	120 (100%)

Five patients died in total. Two of them were managed conservatively, two of them by early operative management and one by delayed operative management.

Figure 263: ASSOCIATED DISEASE



The most common co-morbid pathology was Tuberculous peritonitis but others included cerebrovascular accident, immunosupression and renal failure.

DISCUSSION

INTRODUCTION

Intestinal obstruction is one of the most common surgical emergencies. The aim of this study was to identify important management information from the evaluation of patients with mechanical intestinal obstruction.

Kenyatta National Hospital serves patients from all corners of this country but the majority of the patients are from within the Nairobi. In this study 82% [98] of the patients resided within the city while 18% [22] were from the suburbs.

By the time of admission 78 [65%] patients had already sought medical attention elsewhere before being referred to Kenyatta Hospital while 42 [35%] of the patients were seen at KNH for the first time. The main reasons for referral were lack of theatre facilities and qualified medical personnel to carry out the operations. Fifty percent of the referrals were managed conservatively, 36% by early operation and 14% by delayed operation. There was no statistical significant difference [P=0.51] in the mode of management of the referred and non-referred patients. This contrasts with a local study in which most of the referred patients were operated on early. [10]

DEMOGRAPHIC CHARACTERISTICS

The study included a total of 120 patients who were recruited randomly from the three surgical units during the ten month study period. The age ranged from 13years to 84years with a mean of 38years.These compares with a recent local study [10] in which the mean age was 37years but contrasts to a study done by Fevang et al [56] in a Norway hospital in which the mean age was 58years.The peak age distribution was bimodal with 30% of the patients in the 21-30years and 30% in the 31-40years age groups. This age distribution was related to the cause of intestinal obstruction in which adhesions were leading cause in the set-up of this study. In the developed countries there is a late peak in patients above 60years due to other causes like diverticular disease and tumours which account to up to 25% of mechanical obstruction. [57] The male to female ratio was approximately 2:1 with 78[65%] males and 42 [35%] females. This represents a male preponderance though a lower proportion as compared to the 3:1 ratio reported by Musila [10] in a previous local study.

Most of the patients in the study were of low social economic status. This is well depicted the greater number of those who are unemployed 95 [79.2%] as opposed to only 15 [12.5%] who were employed and 10 [8.3%] who were businessmen. This may be explained by the

predominance of intra-abdominal infections and trauma in this patients leading to multiple laparotomies and thus adhesions.

CLINICAL PRESENTATION

The assessment portion of the initial examination note was reviewed to gauge the diagnostic impression about bowel obstruction. "Diagnostic certainty" was assigned to patients for whom bowel obstruction or acute abdomen with intestinal obstruction was the first diagnosis. Diagnoses classified as certain included bowel obstruction, intussusception, volvulus, strangulated hernia, and obstruction with adhesions, gangrenes or perforation of the bowel. The clinical diagnosis of intestinal obstruction in this study was accurate in most patients at the casualty level and therefore very few patients were mismanaged for wrong diagnosis. Four patients were diagnosed as having peritonitis and one as having perforated duodenal ulcer but intra-operatively they were found to have perforation of obstructed strangulated gut.

A randomized controlled study in Finland of over 1300 patients with acute abdominal pain indicated that the presence of previous scar and the type of pain were the most accurate predictive symptoms in the diagnosis of intestinal obstruction. The most accurate clinical signs were abdominal distension and bowel sounds. [58] All the patients in the study presented with the cardinal symptoms of intestinal obstruction. Eighty five of the patients had severe abdominal pain while the other 15% had moderate abdominal pain. In 65% of the patients the site of onset abdominal pain was periumblical while in 35% of the patients it was in the hypogastric area. This corresponded with the site of the lesion causing intestinal obstruction as seen in patients who under went operative management. The nature of abdominal pain was important criterion in deciding the type of management .All the patients who underwent early operation had continuous pain while 85% of the patients in each of the other groups had intermittent colicky abdominal pain. Abdominal distension was an ominous symptom in all the patients except one patient who had high obstruction. In 90% of the patients the vomitus was bilious, in 7% it was non-bilious and in 3% it was feculent. In 65% of the patients the bowel sounds were increased while in 35% they were reduced. The reduced bowel sounds occurred in patients who had strangulation or peritonitis due to perforation. Sixty six percent of the patients who had reduced bowel sounds under went early operative management. Low haemoglobin was not common in these patients but this can be explained by hemo-concentration secondary to dehydration which raised the hematocrit.The lowest and the highest level of haemoglobin were 5gms/dl and 21gms/dl respectively with a

mean of 12gm/dl. Twelve percent of all the patients had haemoglobin level of less than 10gms/dl and half of them were in the early operative group.

PATTERN OF BOWEL OBSTRUCTION

The pattern of major causes of small-bowel obstruction has changed during the past five decades. The small-gut in this study was involved in 65% of the cases while the large gut was involved in 35% of the cases. Nearly 50% of surgical cases are directly related to postoperative adhesions. In a surgical report,[85] adhesions(49%), neoplasms (16%), and hernias(15%) collectively accounted for approximately 80% of all cases The causes of intestinal obstruction in this study were adhesions and bands [44%],volvulus [20%],faecal impaction [17%],tumours [8%],helminthiasis [4%],hernia [4%] and intussusceptions [3%].This trend might not be seen in the non-urban setting where hernias are the main lesions because they are not repaired electively. Several patients were found to have faecal impaction but a number of these patients could possibly have had intestinal pseudo-obstruction as no mechanical cause was identified. There were a total of sixteen patients with sigmoid volvulus. Ten of them underwent primary resection and colostomy for gangrenous loop while six of them underwent primary derotation and decompression with resection of the redundant loop on a second laparotomy in 1-2weeks time while the patients were still in the ward. No attempt of rectal decompression with a flatus tube was made.

ADHESIVE OBSTRUCTION

Although the aetiologies were diverse, most obstructions were related to adhesion. Patients who had previous surgery were 36% [43] .There was a wide spectrum of indications for the previous surgeries but the most common were gynaecological [34%] and intestinal obstruction [23%].This explained the peculiar distribution of the site of abdominal scars namely; infraumbilical (49%) mainly due to gynaecological operations, midline (42%) due to intestinal obstruction and supraumbilical (9%) due to hepatobiliary and gastric surgery.

Overall, 70% of these patients with adhesive obstruction had been operated once, 31% twice and 9% thrice. More than half of all adhesive bowel obstructions developed within 10 years after previous laparotomy, and particularly within the first 5 years. The longest duration of a non-complicating scar was 30years in patient who had abdominal surgery for ano-rectal malformation in early childhood while the shortest duration was one year in a post-appendectomy patient.

Eighty percent [34] of patients with adhesive bowel obstruction in this study were managed conservatively, 11% by delayed operation and 9% were managed by early operation.

Adhesions and bands (80%) were the main cause of obstruction in the patients with previous scar, while other lesions for which surgery was done were; volvulus (9%) and intussusception (2%).Ten patients had adhesions due to congenital or inflammatory intra-abdominal conditions. Using the Pearson chi square test there was significant statistical difference between the modes of management in patients with and without scars [P = 0.001].A patient with a previous scar was likely to under go successful conservative management. The reported operative rate for adhesive small bowel obstruction ranged from 27% to 42%. [2, 18, 15].In this study the operative rate for adhesive intestinal obstruction was 20% which is slightly lower.

STRANGULATED OBSTRUCTION

One of the major issues governing the management of patients with mechanical bowel obstruction is the risk of strangulation. The classic signs and symptoms of strangulation are fever, tachycardia, peritoneal signs, leukocytosis, acidosis, palpable mass, blood in the stool, and absence of bowel sounds. Unfortunately, many retrospective and prospective studies have found that these signs and symptoms are neither sensitive nor specific for the identification of patients with strangulated bowel. (6, 20, 59) That is, many patients with strangulated bowel do not have these signs and symptoms or laboratory findings, and many patients with simple, uncomplicated small bowel obstruction do have many of these signs and symptoms and laboratory findings. This study however revealed that the some clinical parameters could act as a guide for the most appropriate management. This included: the general condition of the patient, fever, guarding, and Leukocytosis.

The general condition of the patient was a good indicator of the onset of multiple organ dysfunctions. The condition of 53% of the patients was poor. These patients had severe dehydration, shock, electrolyte-imbalance, etc due to strangulation for which they had to undergo early operation. Up to 80% of the patients whose condition was fair were managed conservatively. Due to septicaemia, 25% of the patients were having fever at the time of admission. Seventy three percent of them were operated on early while 10% of them underwent delayed operative management. Fifty six percent of the patients who had fever were found to have strangulation intra-operatively. Compared with conservatively managed group there was statistical significant difference [P= 0.009] in that patients with fever were likely to under-go operative management.

The main indicator of strangulation or perforation in this study was guarding and in total 25% of the patients had guarding. Eighty percent of these patients had to under go early operative management. Ninety five percent of the patients who had no guarding were successfully

managed conservatively while 5% developed guarding while in the ward and had to under go delayed operative management. Using the Pearson chi square test there was statistical significance [P = 0.004] in the mode of management of patients who had guarding.

During conservative management one of the key parameters for monitoring of the patients was leukocytosis. Nineteen of the patients who were being managed conservatively developed progressive leukocytosis which was a confounding factor for abandonment of the conservative management. Thirty percent of all the patients presented with white blood cell counts of greater than 10×10^9. The median WBC counts for the patients who managed by early operation on suspicion of strangulation was 11×10^9 while 96% of the patients who were managed conservatively had WBC counts less than 10×10^9 .Using the Kruskal-walis test there was statistical significance difference [P = 0.001] in the median WBC counts according to the mode of management .In retrospect up to 63% of the patients who were operated early and found to have strangulation had WBC counts above 10×10^9.

In a retrospective study by Tanphiphat et al. [4] the patients were operated on early in 17% of the 321 admissions and they found that 30% of these patients had strangulated bowel. The rate of strangulation was significantly higher among patients operated on early than in the trial group (P < 0.001). Seventeen percent of the 53 patients in the late operation group had strangulated bowel, and one third of the patients had resections. In this study the rate of bowel strangulation was much higher in patients with volvulus, intussusceptions, closed loop, and hernia than in patients with simple adhesion and tumour. In general 55 [46%] patients had surgery .Sixty percent of them were operated on early while 40% were operated after a period of conservative management. Fifty four of these patients had strangulated bowel in which 41% of were viable and 59% were no-viable. Twenty patients in the early operation group and seven patients in the late operation group had non-viable strangulation. The difference in strangulation rate between these two groups was statistically significant [P =0.002]. The positive and negative laparotomy rate for strangulation in patients who were who were operated on early were 77% and 23% respectively. While the positive and negative laparotomy rates for strangulation in the patients who were operated on late was 65% and 35% respectively. The higher rate of strangulation and resection in the late operative group might, to some degree, be the result of the delay in surgical treatment in our set up. Using the diagnostic tools given, the indication for early surgical treatment was good in the early operation group.

RADIOLOGY

Bender G.N, Maglinte D.T, emphasized a multi-displinary approach with the need for more involvement by radiologists both in the diagnosis and management of small-bowel obstruction. [60] In some centres this is now more realistic because of the increasing presence of radiologists at the casualty level. The radiologic approach to the investigation of small-bowel obstruction and the timing of surgical intervention has undergone considerable changes. Plain films have a reported sensitivity of only 60% for detecting mechanical bowel obstruction. [61]

Despite this conventional radiography is still requested as the initial method of radiologic examination at K.N.H. In other centres CT scan with contrast is now frequently performed in the acute setting, both to answer questions relevant to the management of small-bowel obstruction and to identify other causes of acute abdominal pain.[62] The ability of CT to depict strangulation and its high negative predictive value in the diagnosis of closed-loop obstruction and strangulation will help resolve the controversy about whether urgent operation or longer non-surgical measures are appropriate in patients with adhesive small-bowel obstruction. [63, 64, 65] The most common radiological investigation in this study was a plain abdominal radiograph which was done for all the patients. Ultrasound was done in 18% of the patients most of whom had a co-existing abdominal mass on physical examination. Barium studies were done in 10% of the patients. Computed tomography was useful for indicating the extent of underlying disease. It was done in 10% of the patients especially patients who had neither previous scar nor sighs of strangulation. In patients with tumours it was important in detecting ascites, lymphadenopathy or metastasis to the liver.

MANAGEMENT

Small-bowel obstruction is still associated with substantial mortality, largely because of the feared complication of strangulation and the difficulty associated with its preoperative recognition. [83] This is the reason for the dictum, "Never let the sun rise or set on small-bowel obstruction twice." The timing of surgery has changed in recent years. Most patients currently receive a trial treatment of decompression and timely operative intervention for no resolution or if there are clinical signs of strangulation. [13]

The first step in management was correction of all reversible potential causes of associated imbalances i.e. infection, hypovolaemia, hypoxemia, and abnormal electrolytes. The patients were then put on intravenous fluids and analgesics. No oral intake was allowed and a naso-gastric tube was inserted. Serial enemas were done in patients who did not have sighs of strangulation or peritonitis. Antibiotics were given to patients who were thought to have

developed septicaemia due to bacterial translocation or peritonitis. Parenteral nutritional support and electrolyte replacement was initiated according to the nutritional status of the patient as done in similar study series. [66] Rectal tubes were not used in this study. The supportive treatment of the patients who were on trial of conservative management was found be deficient mainly in the administration of fluid and electrolytes. This was more so in patients who had symptoms for more than 24hours.To prepare patients with moderate derangements particularly hypokalemia required 6 to12 hours; but patients with severe problems needed up to 24hours of preparation. Hypokalemia could have been the sole cause of delayed resolution in patients on trial of conservative management. The monitoring of fluid administration was limited to clinical evaluation of dehydration and to some extent the urinary out-put. This can be improved by monitoring the C.V.P which should remain below 10 to $12_{cm}H_2O$.

Emergency laparotomy was performed for patients with suspected bowel strangulation. Those without suspicion of bowel strangulation were treated conservatively, with close monitoring of vital and abdominal signs and serial abdominal radiographs. Patients with obstruction that improved clinically or radiologically in the initial 48hours continued to receive conservative treatment. Clinical improvement was defined as the presence of decreased abdominal pain, distension, tenderness, or nasogastric tube output, or bowel opening if the patient had constipation on admission. Radiologic improvement was defined as a decrease in the number of dilated bowel loops or in the diameter of dilated small bowel.

The percentage of patients whose obstruction settles on conservative treatment varies greatly among studies. Seror et al [67] obtained a resolution rate of 73% in their study but other studies report resolution rates from 20%–65% [68, 69, 72, 71, 72]. The difference in reported resolution rates is probably the result of differences in the selection of patients for the studies and in the treatment policy of each institution. In this study 85 [71%] of the patients were put on an initial trial of conservative management and 62 of them [52%] recovered successfully. The other 23 patients [19%] had to undergo delayed operative management. Eighty percent of the patients with adhesive bowel obstruction were managed conservatively. Thirty five patients [29%] were operated on early. This figures show a slight variation in overall management if compared with Musila's study [10] in which only 30% of the patients were managed conservatively and up to 60% of the patients were operated on. The current management trend at K.N.H as shown by this study is similar to that in the developing countries whereby the main aim is avoiding surgery that apparently has more complications. [73]

The aetiology of intestinal obstruction was an important determinant of therapeutic strategy. For example in patients with tumours complicated by occlusive intestinal obstruction, surgical policy depended on location of the tumour, degree of the obstruction, severity of general state, the predicted prognosis and concomitant diseases. Resection of the colon and subtotal colectomy with one-stage intestinal reconstruction or colostomy was done for patients with compensated stage of intestinal obstruction and stable general state. Treatment focused on preventing intestinal perforation, which is associated with a higher mortality rate as shown in other series.[73] However, there were patients with recurrent or advanced malignant disease who required non-operative treatment approaches because of morbidity and mortality risks as shown in other studies. [74] Factors that increased these risks were poor performance status, advanced age, poor nutritional status, previous radiation therapy to the abdomen or pelvis, massive ascites, and a history of multiple past episodes of small bowel obstruction.[75] Osteen et al found that resolution occurred with conservative treatment in 23% of the patients with tumour out of whom 43% developed recurrent intestinal obstruction.[76] In these study 8% of the patients had tumour as the cause of intestinal obstruction. All of them had a trial of conservative management but had to be operated late due to failure of resolution. In a report on patients with small-bowel obstruction after abdominal surgery for malignancy, 62% of patients had cancer-related obstruction and 38% had non-malignant obstruction. [76] The policy of aggressive surgical intervention in patients who develop mechanical bowel obstruction after treatment for malignant disease may produce worthwhile palliation or allow prompt treatment of obstruction due to other causes like adhesions. These data indicate the need for accurate diagnosis of the cause of obstruction, because the surgical management is influenced by the underlying cause.

The big dilemma that still exists is for how long patients can be managed conservatively when there is no clinical or radiological evidence of strangulation. Ellozy et al [77] recommended exploration for patients whose symptoms fail to resolve within 1 week. Resolution of the condition without operation usually occurs within 2 weeks, as was the case in 96 per cent of patients in Pickleman and Lee's series. [78] Cox et al reported that, of patients who were cured by conservative treatment, 88% had obstruction resolved within 48 hours.[14]Assalia et al recommended that surgery should be considered if the obstruction failed to improve after 48 hours of conservative treatment.[79] Sosa and Gardner found that patients without signs of strangulation could be treated nonoperatively for 24 to 48 hours.[20] In this study the duration of conservative management lasted from a minimum of two days to fourteen days with a mean of three days. Majority of the patients had resolution by the fifth

day. The criterion for proceeding to surgery if there is no clinical or radiological improvement within 72hours was generally acceptable according to the literature. [14, 20, 74] One patient was observed for a period of 14days as she swinged between resolution and recurrence. The main reasons for abandonment of trial of conservative management were failure of resolution of symptoms and sighs [61%] followed by sighs of peritonism [22%] and lastly worsening of the general condition of the patient [17%].

The majority of patients with small bowel obstruction gave a history of previous abdominal surgery or irreducible hernia. If these factors were not present then a laparotomy was inevitable. The main intra-operative findings in patients who were operated early were volvulus [55%], adhesions and bands [14%], hernia [14%], tumour [11%], and intussusceptions [6%].The delayed intra-operative findings were adhesion bands [48%], tumors [26%],volvulus [22%] and intussusceptions [4%].In this study, the main indications for early operation were peritonism[49%],intractable pain[20%],leukocytosis[17%] and obstructed hernia[14%].The main indications for delayed operation were failure of resolution[52%],peritoneosim[38%] and worsening of general condition[13%].

Intra-operatively during laparotomy the definitive surgical procedures included; Derotation and decompression [11%].Resection and colostomy [18%], Adhesiolysis [22%], Resection primary anastomosis [49%].

Clinically, resection was an important outcome because it increased patients' risk of postoperative sepsis, prolonged recovery, increased risk of ICU admission, lengthened the stay, and had significant higher mortality risk. Twenty two [58%] of the patients operated on early and fifteen [42%] of the under went delayed operation had primary resection and anastomosis of the bowel. The difference was not statistically significant [P =0.877].

Delays in care can result in worse outcomes for patients with acute surgical conditions. For complete small bowel obstruction, substantial delays between symptom onset and definitive treatment may increase the need for resection, placing patients at increased risk for infection and other complications. [15] In this study the duration of symptoms prior to admission ranged from one to twenty-five days with a median of 3 days for the patients who were managed conservatively, 4 days for the early operative group and 7days for the late operative group. Though there was no significant statistical difference in duration of symptoms [P = 0.010].The delayed presentation in later group indicates that the symptoms were of less severity compared to the other groups. The majority of the patients 71[59%] in this study presented in 2-5days.Some studies have shown that delay in seeking medical treatment may determine the type of management as these patients are deemed to have more complications

but Fevang and associates [56] and Bizer and co-workers [69] evaluated the relationship between duration of untreated symptoms and nonviable bowel, but did not find a significant association. This was similar to the findings in this study [P = 0.094].Delay in treatment can also be due to the underlying pathology. Patients with tumour had a series of investigations which delayed the provision of definitive treatment. Data in a study by Nina A. Bickell et al [57] indicate resection risk continues to rise after 24 hours, remains higher than 10% up to 96 hours after onset of symptoms, and then declines but remains ever present. These findings suggest that early intervention for patients suspected of having complete obstruction might reduce the need for bowel resection. Resection anastomosis rate in this study increased significantly in patients who presented more than 72hours after the onset of the symptoms [P=0.002].Most these patients were operated on early. Using resection as an out come index; the resection rate in the early operation group was 22/35[63%] and 15/20[75%] in the late operative group. Though this was not statistically significant [P = 1.00], the slightly higher rate in the late operative group could have been reduced by operating earlier. Patients with bowel resection tended to have a longer and more complicated hospital course than patients without resection.

Chosidow et al [80] reported laparoscopic adhesiolysis on an emergent basis in 39 patients; the conversion rate was 36% compared with 7% in elective cases. Though laparoscopy has its own limitations in patients with abdominal compartment syndrome due to gross distention and in patients extensive adhesions it can be invaluable in patients with sub-acute intestinal obstruction. It also reduces adhesion formation and lowers the risk of subsequent bowel obstruction. Laparoscopic management was attempted on three patients who had adhesive intestinal obstruction and one patient who had no previous scar but the conversion rate was 100%.One of the patients had a Caecal tumour for which colectomy had to be done by a formal laparotomy.

Most of the complications were seen in the patients who had been operated on early as opposed to those who were operated on after conservative management. This is in contrast to the series done by Sosa et al [20] in which most of the complications occurred in patients who were operated on late. This could be explained by the late presentation of patients after symptom onset in our set-up. The significant post-operative complications were wound infection and dehiscence, atelectasis, shock, electrolyte imbalance, septicaemia and post-operative peritonitis. Four of the patients developed entero-cutaneous fistula fortunately all of them had successful recovery.

The prognosis of patients with acute intestinal -obstruction varies with the underlying clinical condition. The mortality rate is highly variable, from 0 to 32%, which may reflect the inclusion of different types of patients in each series. In recent local study [10] the mortality went up to 18% while overall mortality for the duration of this study was 4%. Five patients died in total. Two of them were managed conservatively, two of them by early operative management and one by delayed operative management. The causes of death were renal failure due prolonged hypovolaemic shock; post-operative aspiration pneumonia, electrolyte imbalance and septicaemia. These deaths were related to multiple organ dysfunction and failure. In order to reduce the mortality rate in these patients, clinical and radiological risk factors for perforation have been sought to select patients for prompt decompression, and surgery.

Fevang and Jensen [56] looked at a total of 154 patients with mechanical bowel obstruction. The overall median hospital stay was 5days.The patients who were operated early had a median stay of 7days.The conservative group had a median stay of 4days while the late operative group had a median stay of 11days.In this study the duration of hospital stay ranged from 3days to 25 days with a mean of 10 days for all the patients. Forty nine patients stayed in the ward for less than one week. Forty patients spent between one week and two weeks while 31 patients were in the ward for more than two weeks. The patients who were managed conservatively spent the least time in the ward [3 to21days] with a median stay of 7days.The patients who were operated early spent 4days to 22days with a median stay of 10days.The longest stay was by the patients who underwent delayed operative management who had a median stay of 16 days. Using the chi-squared test there was significant statistical difference in the duration of stay among the three groups. In comparison to the above study done by Fevang and Jensen, the patients in this study had a longer duration of Hospital stay which may translate to higher costs of low quality medical care.

Follow up was made at surgical out-patient clinic. Most of the patients were seen after two weeks. One of the patients who had colostomy after resection of gangrenous large gut developed colostomy stenosis had to be re-admitted for refashioning. Unfortunately, there was no data available to determine the long-term outcome of patients treated surgically compared with those treated successfully without surgery. A series calculated a 10-year crude mechanical bowel obstruction recurrence rate of 53% in patients treated nonoperatively versus a rate of 29% in those initially treated operatively. Most recurrences were within 4 years. The better outcomes with surgery were not gained at the cost of increased mortality. In summary, the risk of recurrent bowel obstructions was reduced, but

not eliminated, by operative intervention. These data support aggressive surgical intervention in many patients with mechanical bowel obstruction. In this study three patients with previous scars who had been managed conservatively had to be re-admitted for recurrence. A longer time frame is required to get the recurrence rates in operative and conservative management in our set up [81]

CONCLUSIONS

1. The pattern of mechanical intestinal obstruction is changing with adhesions being the leading lesion and the small gut being involved in 65% of the patients.

2. Most of the patients were in the 21-40 years age-group with 66% of them being males.

3. Most patients with adhesive mechanical bowel obstruction will benefit from trial of conservative management as the resolution rate is high (80%).In those who fail to settle there is no significantly increased risk of bowel strangulation.

4. Most of the patients on trial of conservative treatment had resolution in five days.

5. Prolonged time from the symptom onset to the definitive treatment may increase the need for bowel resection in patients with complete bowel obstruction.

6. Patients with complete obstruction should be operated on immediately after resuscitation.

7. The aetiology of intestinal obstruction was not only significantly related to bowel strangulation, but was also an important determinant of therapeutic strategy.

8. The main indications for early operation were signs of peritonism, Intractable pain, Leukocytosis, hernia.
9. The main indications for delayed operation were failure of resolution, signs of peritonism and worsening of general condition of the patient.

10. The strangulation rate was higher in the patients under delayed operative management than in those who were operated on earlier.

11. There was significant difference in the length of hospital stay according to management.

12. Patients seen at K.N.H with mechanical bowel obstruction have a low mortality but a relatively higher morbidity in the post-operative period.

RECOMMENDATIONS

1. Surgeons should be cautious in postponing surgery beyond 24 hours in patients with unresponsive symptoms from complete obstruction as the risk of resection rises dramatically within 72hours.

2. The monitoring of fluid and electrolytes administration for patients who are on trial of conservative management should be improved.

3. It is imperative that a standardized protocol with a symptom and signs scoring system for fever, tachycardia,guarding,leucocytosis, e.t.c in patients with covert signs of strangulation This can be boosted by radiological investigations like contrast C.T scan in emergent situations.

4. Similar studies should be carried out in different localities in the country. The results can be compared and used in assessment of the level of medical care.

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APPENDICES

APPENDIX 1: QUESTIONNAIRE

1 NAME..... FILE No.....Ward.....

2. AGE .....in years SEX... 1= Male.... 2= Female.....

3. **DATE OF ADMISSION**..... DATE OF DISCHARGE.....

4. OCCUPATION..... RESIDENCE.....

CLINICAL FINDINGS ON ADMISSION

HISTORY

PRESENTING COMPLAINTS

1. Abdominal pain.....

a) Site at onset.....

b) Current site.....

c) Severity 1= mild..... 2= moderate..... 3= severe.....

d) Nature 1= intermittent... 2=continuous.....

e) Duration.....

2. Vomiting .....1= Non-bilious .....

2= Bilious.....

3= Feculent.....

4= Duration.....

3. Distension..... 1= Localized .....

2= Generalized.....

3= Duration.....

4. Bowel movements.... 1= Constipation

2= Obstipation

3= Normal

Duration of symptoms prior to seeking medical attention.... 1= < 2 days

2= 2---5 days

3=>1week

Treatment before admission .....1= YES 2=NO

Reason for delayed treatment

a) Traditional beliefs..... 1= YES 2=NO

b) Poor access to health facility..... I= YES 2=NO

c) Misdiagnosis..... I= YES 2=NO

Referral ..... I= YES 2=NO

Reasons for referrals.... a) Lack of qualified personnel.....

b) Lack of technical capacity (theatre, instruments, etc)

PAST MEDICAL HISTORY

Previous illness..... 1= Yes.....specify..... 2= No

Previous abdominal surgery.... 1= Yes..... I)When..... 2= No

II)Why.....

III) How many..

PHYSICAL EXAMINATION

General condition ... Pallor .....Fever.....

Hypotension..... Tachycardia.....Tachypnoea.....

Dehydration.....1=mild.....2=moderate ..... 3=Severe

ABDOMEN:

1) Scars.....1=Yes... specify...1=Supraumbilical 2=Infraumbilical

2=No

2) Movement.....1=Normal 2=Reduced

3) Distension .....a) Localized

b) Generalized

4) Tenderness.....a) Site

b) Rebound

5) Guarding.....

6) Rigidity.....

7) Mass.....a) site.....

8) Abdominal girth... I) 0Hrs..... II) 72Hrs.....

9) Bowel sounds....a) Absent b) Reduced

c) Increased d) Normal

9) Rectal examination; .a) obstructing mass/stool b) Empty

CLINICAL DIAGNOSIS

I) At casualty.....

II) In the ward.....

III) Misdiagnosis.....

INVESTIGATIONS

1. Haemoglobin [ ] ..... 1= >10$_{gms/dl}$..... 2= <10$_{gm/dl}$.....
2. WBC Counts..... 1= >12 x 10^9..... 2= <12 x 10^9
3. UREA [ ]..... 1= >20$_{mmols/l}$ 2= <20$_{mmols/l}$
4. CREATININE ..... 1= >130$_{umols/l}$..... 2= <130$_{umols/l}$.....

ELECTROLYTES

1) K^+.....1=High 2=Low 3=Normal
2) N_a^+.....1=High 2=Low 3=Normal

7. RADIOLOGICAL INVESTIGATIONS

1) Plain abdominal x-ray

1= Gas in small-gut 2=Air-Fluid levels 3=Non-suggestive
4=Gas in the colon

2) Ultrasound
3) Barium studies

8. Serostatus.....HIV 1= +ve 2= -ve 3 = Not known

MANAGEMENT

1. **CONSERVATIVE**

a) Indication..... 1=No pain 2=No tenderness

b) ASA-classification 1=Normally healthy 2=Mild systemic disease
3=Severe systemic disease 4=Life threatening disease
5=Moribund

c)Parameters for success 1=subsiding pain 2=passing stool/flatus
3=↓Distension

d) Duration.....

e) Reason for abandonment

1=Symptoms and Sighs of strangulation
2=Worsening of general condition
3=Failure of resolution

2. **EARLY OPERATIVE** (within 12hrs of admission)

a) Indication.....1=Intractable pain, 2=Fever,3=Tachycardia,4=Peritoneal signs, 5=leucocytosis, 6=Acidosis,7=Palpable mass,8=Blood in the stool,9=Absence of bowel sounds, 10=hernia

b) Pre-operative ASA-classification

c) Intra-operative findings

1] Type of lesion causing obstruction.....

2] Site of obstruction.....1=small-gut 2=large-gut

3] Simple obstruction.....

4] Strangulated obstruction 1= viable strangulation

2= Non- viable strangulation

5] Peritonitis.....

6] Perforation with faecal soiling.....

d) Laparotomy with

1=Adhesiolysis 2=Resection and primary anastomosis

3=Resection and colostomy 4=Derotation

3. **DELAYED OPERATIVE**

d) Indication.....1=Intractable pain, 2=Fever,3=Tachycardia,4=Peritoneal signs, 5=leucocytosis, 6=Acidosis,7=Palpable mass,8=Blood in the stool,9=Absence of bowel sounds, 10= Failure of resolution 11=hernia

b) Preoperative ASA-classification

c) Intra-operative findings

1] Type of lesion causing obstruction

2] Site of obstruction....1=small-gut 2=large-gut

3] Simple obstruction

4] Strangulated obstruction 1= viable strangulation

2= Non- viable strangulation

5] Peritonitis

6] Perforation with faecal soiling

d) Laparotomy with

1=Adhesiolysis

2=Resection and primary anastomosis

3=Resection and colostomy

4=Derotation

DURATION OF HOSPITAL STAY

a) Less that one week

b) 1 – 2 weeks

c) More that 2 hours

PRE AND POST-OPERATIVE MORBIDITY/ COMPLICATIONS

Wound infection……..

Wound dehiscence……..

Atelectasis……

Pneumonia……

Pulmonary oedema……..

Pulmonary embolism and DVT…….

Shock……..

Renal failure……..

Electrolyte imbalance……

Post-operative ileus……..

Anastomotic leak……

Septicaemia……...

Peritonitis……

FOLLOW-UP

Recurrence 1=Yes 2=No

MORTALITY…… 1=Yes 2=No

RE-LAPARATOMY RATES

A) Early operative

B) Delayed operative

APPENDIX II: PATIENTS INFORMATION LEAFLET.

My name is Dr Ligeyo Emmanuel .I'm carrying out a study aimed at evaluating you (patient) on your present symptoms of disease, which has made you come to hospital.

This study will enable us improve on the level of care of patients who present with the disease condition like yours so that we can avoid many complications.

You will be asked questions about your personal details to enable us personalize your treatment.

The information shall be treated with uttermost confidentiality and solely for the purposes of the medical research.

We shall also ask you to do some tests and avail these test reports performed on you.

We shall read them, share the information on them with you and copy some information from them.

We shall assess you subsequently to observe any progress.

In case you are interested, the information shall be shared with you.

The participation in this study is voluntary and you are under no obligation to enrol in this study, and your decision will not affect the best option of treatment that you can get at this hospital.

Please feel at ease to enquire about any issues that are not clear to you.

Thank you very much

Dr Ligeyo .E .O

P.o. Box 366-0202 Nairobi

Telephone 0722863011

CONSENT BY THE PATIENT

I have understood the explanation given to me by Dr. Ligeyo who is carrying out a Prospective study on the treatment of intestinal obstruction and hereby consent to participate in the study. I agree to participate on my own freewill and also to do the following,

1. Be interviewed and examined physically on the nature of my illness
2. To allow some blood tests and radiological investigations performed on me.
3. To be followed up on the subsequent management of my illness
4. To have this details recorded by Dr.Ligeyo

I have understood that my participation is completely voluntary and that I can withdraw my consent at any time during the study and that this will not affect my treatment in any way.
I have also understood that the information I give is confidential and my name will not appear in the final draft.

KIBALI CHA MGONJWA

Nimeelewa maelezo yote aliyonipa Daktari.Ligeyo anayefanya utafiti/uchunguzi kuhusiana na ugonjwa wa kuzibana kwa matumbo.Ninatoa Kibali ya kuhusika kwa hiari yangu bila kulazimishwa.Nina kubali kutimiza maagizo yafuatayo:

1. *Kuhojiwa na kuchunguzwa kimwili juu ya maradhi yangu*
2. *Kufanyiwa uchunguzi zaidi matibabu yanapoendelea*
3. *Kukubali matokeo yaorodheshwe na Daktari Ligeyo*

Nimeelewa kuwa kuhusishwa kwangu ni kwa hiari na nina uhuru wakujiondoaKwa huu utafiti wakati wowote ,bila kuadhirishwa kimatibabu . Nimeelewa kuwa habari nitakayo toa ni siri na jina langu halitaonekana kamwe katika nakala ya mwisho

Dr Ligeyo..... Signed .....

Participant..... Signed.....

or Left Thumb Print:.....

Witness..... Signed .....

Daktari..... Sahihi .....

Mhusika.....Sahihi.....

Shahidi..... Sahihi.....