

FIVE YEAR RETROSPECTIVE REVIEW OF PATTERN OF
CLINICAL PRESENTATION AND OUTCOME OF PATIENTS
WITH DIAGNOSIS OF ILIOSIGMOID KNOTTING SEEN AT
JIMMA UNIVERSITY MEDICAL CENTER BETWEEN
SEPTEMBER 2016-NOVEMBER 2021 GC.



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JIMMA,ETHIOPIA

JIMMAUNIVERSITY
FUCALTY OF MEDICALSCIENCES
SCHOOL OF MEDICINE,DEPARTIMENT OF SURGERY.

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Abstract

Background; Intestinal obstruction is a common cause of emergency surgical admission. Several common causes are known in the general surgical practice, and the causes are different in the developing and developed world. One such cause is the Ileosigmoid knotting, which is associated with a high morbidity and mortality. Early diagnosis and intervention are the key of better outcome. Therefore, knowledge of clinical presentation, surgical management principal, factors affecting outcome is important.

Objective; The aim of this study was to retrospectively review the clinical presentation pattern, management and outcome of patient operated for ISK over period of five year in Jimma university medical center, Jimma, Ethiopia.

Methodology; A Cross-sectional retrospective study was employed. Medical record review of all patient operated for Ileosigmoid knotting at JUMC on patient from September 2016- November 2021 was conducted.

Results -: A total of 47 patient charts were reviewed and the patients' mean age was 41.8 years. The male to female ratio was 3.3: Most of the patients, (68.1%) Presented after twenty-four hours of symptom onset, with abdominal pain (91.5%), vomiting (74.5%), abdominal distention (25.55) and failure to pass either feces or flatus (53.2%) being the most common symptoms reported by patients. ISK was considered only in seven patients (14.9%) preoperatively. Most patients (59.6%) had both segment gangrene and resection of gangrenous segments with Ileostomy end colostomy was the commonest procedure performed. The mortality rate was 12.7. Statistically Significant association was found between postoperative complications and mortality.

Conclusion; ISK is an uncommon form of double-loop bowel obstruction. It generally presents with symptoms and signs of mechanical bowel obstruction. High index of suspicion should be maintained to early diagnose and avoid delays in management of these patients. The choice of surgical procedure is determined by intraoperative finding

Key words; iliosigmoid knotting, gangrenous bowel

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List of abbreviation

JUMC—Jimma university medical center

ISK---Ileosigmoid knotting

SBO -Small bowel obstruction

NO—Number

ARF-Acute renal Failer

HAI-Hospital acquired infection

SSI-Surgical site infection

MOF-Multiorgan Failer

CT—computerized tomography

SV—sigmoidvolvulus

CVP—Central venous pressure.

Operational definition

SHOCK—patient with unrecordable or systolic BP < 90, UO < 0.5 ml/kg/hr. and cold extremity.

Intestinal obstruction--A partial or complete block of the small or large intestine that keeps food, liquid, gas, and stool from moving through the intestines in a normal way.

Acute abdomen-acute presentation of a patient with abdominal conditions, which need urgent surgical intervention.

Obstipation - Failure of a patient to pass feces and flatus

Hypotension--systolic blood pressure < 90 mmHg

Leukocytosis ----WBC > 12,000

Delayed presentation---patient with ISK presenting > 24hr after onset of symptom

Early presentation-----patient presentation \leq 24hr after onset of symptom.

Ileosigmoid knotting--Intestinal obstruction in which loops of ileum and sigmoid colon wrap around each other forming knot and resulting in double closed loop obstruction.

Sign of peritonitis----patient with hemodynamic instability, tenderness, rigidity and guarding over the abdomen and hypoactive bowel sound.

hypoactive bowel----

Management outcome ---postoperative status of patient operated for ISK, (Discharged improved, death.)

Incomplete medical record----Patients medical record that does not contain one of the following (socio demography characteristics, preop evaluation, operation note)

CHAPTER ONE INTRODUCTION

BACKGROUND OF THE STUDY

Intestinal obstruction is the most common reason for emergency surgical admission (2). A common cause of intestinal obstruction that can rapidly progress to gangrenous bowel is mechanical intestinal obstruction, which can be caused by a variety of reasons. One such cause is Ileosigmoid knotting. (3)

The wrapping of the ileum or sigmoid colon around the other and its mesentery, resulting in a double-loop obstruction, is known as Ileosigmoid knotting (4).

In 1845 (3), Parker published the first case of ISK, titled "Case of Intestinal Obstruction." The ileum choked Sigmoid Flexure to death. Small series and classifications based on the arrangement of the intestines and rings involved were proposed by Eke horn (1903) and Faltin (1909). Burkitt (1952), who recorded six cases of twisted bowel in Uganda, believed to be the earliest record from Africa. (5).

It's a rare cause of closed-loop intestinal obstruction that leads to gangrene of the gut segments involved.

The incidence of ISK is unknown, however it occurs in locations where sigmoid volvulus is frequent, such as Asian, Middle Eastern, and African countries, and it is most common in adult males, with a peak incidence in the third to fifth decade (6)..It account 0.5–1.7% of intestinal obstruction Although the reported mortality rate in ISK varies from 0 to 48% (mean 35.5%), but ISK with gangrene has a mortality rate of 20–100%(1)

Although the cause of ISK is unknown, several anatomical features have been identified. The Ileosigmoid knot is caused by three reasons. I. A long mesentery with freely movable small bowel. II. A narrow pedicle with a long sigmoid colonial. Consumption of a high-bulk diet while the small bowel is empty. Pregnancy, adhesion, and nickels diverticula are some of the other reasons (3)

The motility of the gut is increased when a bulky meal is ingested into the proximal jejunum, and the heavier segments of the proximal jejunum descend into the left lower quadrant. Around the base of a thin sigmoid colon, empty loops of ileum and distal jejunum twist in a clockwise rotation. With two closed loop obstructions, peristalsis creates an Ileosigmoid knot. (3)

Shepherd, in (5)1967, characterized the pathophysiology of ISK. In general, the ileum loops wrap around the sigmoid colon and form a knot, according to this definition. The ileal loops and the sigmoid colon both distended. A double loop obstruction develops when the knot tightens, which can lead to extensive gangrene (8) (2) The anatomic pathology of the disease has been attributed to the presence of an elongated ileum and sigmoid colon, as well as a small base with an elongated mesentery (8)

Abdominal discomfort, distention, constipation, and vomiting are the most common symptoms, while abdominal distention and tenderness are the most common signs. There are no specific blood tests that can be used to diagnose ISK. A dilated sigmoid colon and many small intestinal air-fluid levels can be seen on plain abdomen radiography (9)

The four varieties of ISK are types I, II, III, and undetermined. In Type I, the ileum circles around the sigmoid colon; in Type II, the sigmoid colon revolves around the ileum; in Type III, the ileocecal segment rotates around the sigmoid colon; and in the Undetermined Type, the revolving segment is unknown. Based on a variety of preoperative and operational characteristics linked to mortality, a revised categorization for surgically treated ISK was established in 2009

Patients with ISK are classified as follows under the new classification: Patients in class 1 have no risk factors (advanced age, associated disease); patients in class 2 have a risk factor (advanced age, related disease). Class 2, individuals who do not have shock or intestinal gangrene but have the other risk indicators listed above; Shock; ileum or sigmoid colon gangrene; shock and ileum or sigmoid colon gangrene; ileum and sigmoid colon gangrene; ileum and sigmoid colon gangrene; ileum and sigmoid colon gangrene; ileum and sigmoid colon gangrene; ileum and sigmoid colon gangrene; ileum and sigmoid colon gangrene; ileum and sigmoid colon gangrene; ileum and sigmoid colon (9).

There is considerable controversy regarding the preferred surgical procedure for ISK(2).(3),(4)Because untwisting the knot is both difficult and risks toxin release and

perforation, it has been advised that the sigmoid colon be deflated by means of needle deflation or colotomy, or en-bloc resection of the gangrenous colon. In gangrenous patients, all gangrenous small bowel segments are resected and bowel continuity is restored with an enter enterostomy; similarly, if the patient is stable and a tension-free anastomosis is available, a gangrenous sigmoid colon is excised and a primary anastomosis is performed. Despite the significant morbidity, an ileostomy or colostomy can be life-threatening, especially in cases when the intestine is unstable or borderline ischemia. In non-gangrenous cases, the knot can be carefully untied

Mastopexy, mesoplasty, or resection with primary anastomosis may be added as a stand-alone surgical procedure in unstable patients, or a volvulus-prevention procedure such as mastopexy, mesoplasty, or resection with primary anastomosis may be added to a volvulus-prevention procedure such as mastopexy, mesoplasty, or resection with primary anastomosis may be added to a vol (9).

ISK's prospects are grim. Non-gangrenous patients have a death rate of 6.8–8%, but gangrenous cases have a mortality rate of 20–100%. Morbidity is also at an all-time high. Shock is the most common cause of high mortality. The presence of shock, other medical conditions, advanced age, intestinal gangrene, or a combination of these factors perforation increases the mortality rate

Statement of the problem

The most prevalent reason for surgical emergency admission is intestinal obstruction (2). The most common causes of obstruction are well-known, but intestinal obstruction caused by an uncommon cause requires a high index of suspicion for diagnosis and surgical intervention. Iliosigmoidknottng, which happens when a loop of ilium wraps around the base of a redundant sigmoid colon and vice versa, is one such uncommon cause of intestinal obstruction. Intestinal obstruction is associated to ISK in 0.5 to 1.7 percent of people (12). The prevalence of ISK is unknown; however, it is frequent in poor and low-income countries such as Africa and Asia, with men over 40 years old being the most affected (2). Ileosigmoid knotting causes a closed double loop obstruction that can quickly develop to ischemia and gangrene of the affected bowel segment within few hours (13). When a double-loop obstruction is present, gangrene of one or both loops progress quickly. In patients with iliosigmoidknottng, bacterial translocation from the lumen to the peritoneal cavity, as well as absorption of toxic chemicals, shock and peritonitis can develop (14). Early diagnosis and effective resuscitation surgical intervention is lifesaving in iliosigmoidknottng pateint. There are usually no specific clinical, laboratory and imaging feature for the diagnosis of iliosigmoidknottng the diagnosis is established at laparotomy. Because of this nonspecific presentation there is challenge in preoperative diagnosis of ISK that may delay early surgical intervention and result in poor management outcome. A retrospective analysis of 34 pateint operated for ISK over 5year at St. Paulo's hospital ,Ethiopia, shows the correct preoperative diagnosis of ISK made in only 21.4% pateint(5).This is particularly major problem in low socio-economic area of the world like our country where there is delay in patient presentation, shortage of adequate imaging laboratory facility and lack of adequate postoperative intensive patient care. Unless early diagnose and appropriate surgical intervention is given the mortality and morbidity associated with iliosigmoidknottng is Hight. Sangwan and Mandal et al. mentioned that ISK caries a mean mortality rate of 35.5 per cent and in cases with gangrene, mortality ranges from 20 to 100 %..(6).There is still controversy among outers on the cause and principle of surgical management of Ileosigmoid knotting and predictors of management outcome .some of the these predictor of management outcome are, duration of symptoms, viability of bowel presence of shock.(4)By analyzing clinical presentation pattern and management outcome this research will try to solve some of the controversy on ISK.

Significance of the study

Ileosigmoid knotting is a rare cause of intestinal obstruction which needs prompt recognition and immediate surgical intervention to avoid catastrophic complications caused by gangrenous bowel and subsequent peritonitis. Because ISK is a common cause of intestinal obstruction, there is a limited number of researches done in the world as well in Ethiopia on ISK, which is not enough to elaborate the real burden and nature of the disease. Even surgical textbooks like Bailey & Love's Short Practice of Surgery and Shackelford's Surgery of the Alimentary Tract only give a brief overview of ISK (3). Conducting this study to assess the clinical pattern, type of surgery, and outcome determinants of ISK patients will help to provide updated data that can be used to develop management protocols and for further studies. It will also increase the level of awareness among surgeons and will serve as a way forward to establish a more rational and comprehensive approach.

CHAPTER TWO LITRETURE REVIEW

The Ileosigmoid knotting is a rare cause of intestinal obstruction. It is characterized as wrapping of ilium and sigmoid around base of each other forming knotting and resulting in closed double loop obstruction. The incidence of ISK is not well known but it is common in Africa, Asia and middle east. Males over the age of 40 are more likely than females to develop ISK. In India, a 6-year retrospective analysis of nine cases of Ileosigmoid knotting was conducted between July 2005 and May 2011. They discovered that the average age was 49.11 years (range 40–60 years) and that the male-to-female ratio was 8:1 based on sociodemographic statistics (17). In May 2020, SPHMMC in Addis Ababa, Ethiopia, undertook a retrospective medical record analysis of 28 patients who had ISK between February 2014 and January 2020. They discovered that the male to female ratio is 3 to 1, with a peak age of 20 to 29 years. With a mean age of 41.7 years and a range of 18 to 80 years (15).The clinical records of 63 patients who underwent surgery for Ileosigmoid knotting in the , Medical Faculty of Ataturk University(Turky) were reviewed , in a 35-year period between June 1966 and June 2001 and they found that Twenty-five of the patients (39.7 percent) were farmers, and 40 patients (63.5 percent) were from the countryside areas(2).

The 3 factors that are responsible for the Iliosigmoidknotting: are, along mesentery and freely mobile small bowel; a long sigmoid colon on a narrow pedicle, and finally the ingestion of a high-bulk diet in the presence of an empty small bowel. When a semiliquid bulky meal progresses into the proximal jejunum, it increases the motility of the intestine, and heavier segments of proximal jejunum fall into the left lower quadrant. The empty loops of ileum and distal jejunum twist in a clockwise rotation around the base of a narrow sigmoid colon. Further peristalsis forms an Ileosigmoid knot with two closed loop obstructions, one in the small bowel and one in the sigmoid colon. Evidence for this mechanism is suggested by studies carried out on the Buganda's in Uganda, who eat once a day, and Muhammadans who eat a single daily meal during the Ramadan fasting(7). The 5year Retrospective study done on 9 pateint in India and they found that, the majority of the patients were Muslim males and among them, in two cases it was just after the holy month of Fasting. (17)

There is usually significant delay in patient presentation to hospital even in acute abdomen in most of developing country (15). Late presentation and delayed diagnosis is responsible for a high mortality rate of 15–75% (2)(3). The retrospective review of 15 patients' record with intra operative diagnosis of ISK over a period of 3 years between July 2002 and June 2005 who were operated on in the three teaching hospitals in Addis Ababa, Ethiopia, i.e., Tukur Anbassa Hospital (TAH), Princess Zewditu Memorial Hospital (ZMH) and St. Paul's Hospital (SPH) and on this study, the mean duration of illness was 83 hours.

. A 7-year retrospective chart review of 61 patients managed for ISK at Tenwek Hospital in Bomet, Kenya from January 1, 2008 to December 31, 2014. the majority of patient was (39, 63.9%) presented within 1 day or less and with mean duration 1.6 day (range 3hr-7day). (8).

Abdominal Pain is the main presenting symptom in patient with Ileosigmoid knotting and the onset is acute and occurs most commonly in the early hours of the morning, awakening the patient from sleep. Initial central colic gives way to constant agonizing generalized pain. Vomiting usually occurs at the onset of pain the patient usually arrives at the hospital in shock, In the majority of cases, gangrene is present and a generalized peritonitis is found (9). From retrospective study that was done on iliosigmoid knotting patient operated at Paulos hospital in Ethiopia over 5 year there finding on patient presentation was Abdominal pain and vomiting were the presenting symptoms in all patients followed by abdominal distention (24, 85.7%). Five (17.9%) of the patients were in shock at presentation and (26, 92.8%) patient has sign of peritonitis (5). A retrospective study was undertaken on 63 iliosigmoid knotting patient in Turkey over 35 years period and there finding on patient presentation was. Almost all patient was presented with abdominal pain, obstipation and sign of peritonitis. Thirty-eight patients (60.3 percent) were in shock state on presentation (2).

Because there is no specific clinical or radiological means to make the diagnosis of ISK, correct preoperative diagnosis is difficult in most cases. The reported accuracy of correct preoperative diagnosis ranges from 0% to 71%. (10)(11)(5). The disease is generally misdiagnosed as an obstructive or nonobstructive acute abdominal emergency in the preoperative period and the correct diagnosis is made upon laparotomy (12). In retrospective study that was undertaken on presentation clinical experience of 80 patient operated for iliosigmoid knotting in Turkey between

1966-2018, The preoperative accurate diagnosis rate was only 13.8%.(11patient)Misdiagnoses, including nonspecific intestinal obstruction and non-obstructive acute abdomen, were noted in 68.8% and 17.5% of patients, respectively(13). One the study that was conducted for analysis of clinical profile and outcome of 34patient with iliosigmoidknotting at St. Paulo's Hospital, Ethiopia between 2014-2020. Accurate diagnosis of ISK was made preoperatively only in 6 (21.4%) patients. 'e three top misdiagnoses were small bowel obstruction (14, 50%), sigmoid volvulus (4, 14.2%),and perforated viscus (2, 7.2%)(5).

There are no specific blood tests and radiologic imaging to diagnose Ileosigmoid knotting. A raised white cell count ($> 18000 \cdot 10^9/l$) has been shown to correlate the presence of gangrenous bowel and the hematocrit may be elevated(4)..Plainabdominalradiographsmayshow characteristic double closed-loop obstruction, with the sigmoid colon in the right upper quadrant and the small bowel loops in the left. More often, the picture is that of either simple sigmoid volvulus or small bowel obstruction(14).A retrospective study that was done at St paolos Hospital on analysis of clinical profile and outcome of 34pateint with diagnosis of iliosigmoidknotting show that , 13 (46.4%) the pateint had leukocytosis. Erect plain abdominal X-ray was obtained in 17 (60.7%) of the cases, and the remaininghadnodocumentation if X-ray was requested or not. Finding on Xray was 7 (41.2%) ,5, (29.4%) patients had small andlargebowel distension with multiple air fluid level respectively. 3 (17.6%) patients had only large bowel distension, and2 (11.8%) patients had no clear features of obstruction the remaining has no Xray documentation (5).

Patients with Ileosigmoid knots benefit from diagnostic laparotomy because it improves diagnostic accuracy while lowering the risk of general peritonitis and septic shock (22). In the majority of cases, gangrenous bowel was found, although in a few instances, both small and large bowels were found to be viable in surgery. Surprisingly, those who arrived within 24 hours of their symptoms had a 90.9 percent chance of developing intestinal gangrene. Among those who presented after 24 hours after their initial symptoms, bowel gangrene was seen in 57% (chi-squared 9.94, $p<.01$)(1).A retrospective study that was done on presentation of clinical experience of 80 patient with diagnosis of iliosigmoidknotting done in Ataturk university (Turkey) over period of 1966-2018 shows that, at laparotomy 61pateint (76.3%) bowel were gangrenous of which

double segment gangrenous (46), ileum (8), sigmoid colon (7) and the bowel was viable in the remaining 19(23.8) of patient. From Retrospective study that was done on clinical profile and determinant of outcome on 34 ileosigmoid patient at St. Paulo's Hospital in Ethiopia show that, almost all patients (26, 92.8%) had gangrenous bowel at laparotomy. Of these, 17 (65.4%) involve both the ileum and sigmoid. The rate of gangrenous change was almost similar in those presented within 24 hours (11/12, 91.7%) and later (15/16, 93.7%)(5).

There is controversy regarding the optimal management of ISK. Management involves preoperative resuscitation, empirical administration of antibiotics and prompt relief of the obstruction. The anatomical and pathological changes of the involved loops of bowel determine the definitive surgical procedure. In the presence of gangrene untwisting of the loops of bowels not recommended because the risk of reperfusion syndrome and the potential of perforating the gangrenous and often friable bowel, en bloc resection of the involved loops of bowel including the knot is the preferred approach hemodynamically stable patient, intestinal continuity is re-established with an end-to-end anastomosis of the ileum and end to end anastomosis of the sigmoid ends. Colostomy should be done in the elderly & associated medical conditions patient, presence of shock or when the viability of the distal bowel edges is in doubt.

The management of a patient who has both viable loops of bowel on exploration is a contentious issue. Traditional teaching dictates that untying of the knot should be coupled with resection of the sigmoid colon to negate the risk of recurrence case reports suggest that resection may not be necessary as the risk of recurrence is believed to be low. In nongangrenous cases, careful untying of the knot may be performed as a sole surgical procedure in unstable patients, or a volvulus-preventing procedure such as mastopexy, mesoplasty or resection with primary anastomosis may be added. Management ultimately should be determined by the local expertise available and decided on a patient to patient basis(15). Five year retrospective that was done on analysis of clinical profile & determinant of outcome of 28 ileosigmoid patient at St. Poulos Hospital in Ethiopia and the most frequent procedure performed were ileal resection & anastomosis + Hartmans (57.1%), ileal anastomosis + tube decompression (28.5%) ileostomy + Hartmans, Hartmans (3.6% each) and in 7.2% untying was done(5). A seven year (January 2008-December 2014) retrospective chart review of 61 patients managed for ISK at Tenwek Hospital in Bomet, Kenya and the most common operative

procedure that was done was. Resection and anastomosis were carried out in most cases of gangrenous ileum(48/54, 88.8%) and gangrenous sigmoid colon (34/46, 73.9%)(8).The operative procedure that was done on study that was performed on presentation of clinical experience that was done on 80 Ileosigmoid pateint that has undergone surgical intervention in Turkey during 1966-2018 was 1, double segment gangrenous bowel 38 pateint ilial anastomosis and colostomy, 3 pateint resection & anastomosis of sigmoid, 2, gangrenous ilium 7 pateint anastomosis & iliostomy, 3 gangrenous sigmoid-6 pateint- colostomy & 1 pateint anastomosis And untwisting was done for 14 pateint(13).

The outcome of ISK is dependent on the speed of diagnosis leading to surgical intervention. The mortality rates of nongangrenous ISK range from 6.8% to 8%. Mortality rates for gangrenous ISK, however, vary from 20% to 100%. The morbidity rate is also high. The most common cause of death is septic shock leading to multiple organ failure (MOF)

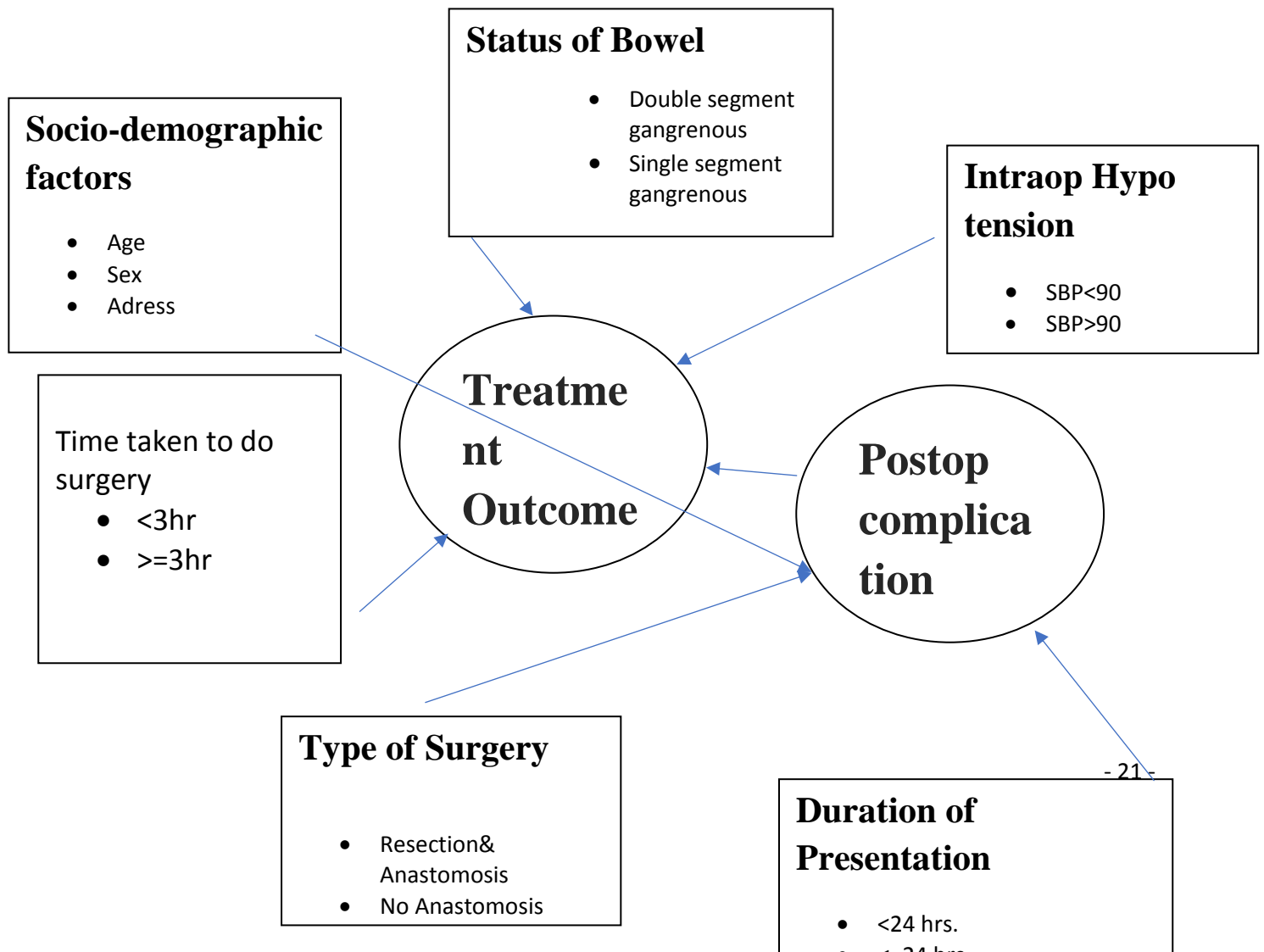
The following factors were noted to increase the mortality: age (older than 60 years), duration of symptoms (more than 24 h since the onset of symptoms) and the extent of gangrene(4) The retrospective review of clinical presentation and post-operative outcome of 15 patients' record with intra operative diagnosis of ISK over a period of three years between July 2002 and June 2005 who were operated on in the three teaching hospitals in Addis Ababa, Ethiopia, i.e. Tukur Anbassa Hospital (TAH), Princess Zewditu Memorial Hospital (ZMH) and St. Paul's Hospital (SPH) . Post-operative complications were observed in nine patients, sepsis and septic shock being top in the list. Three patients died, making the mortality rate 20% (16)

A retrospective analysis was performed on 21 patients operated on at Parirenyatwa Hospital with a diagnosis of ileo-sigmoid knotting between April 2011 and April 2018 on the characteristics, presentation, morbidity and mortality and to determine the preoperative diagnostic precision and management patterns of ileo-sigmoid knotting cases at PGH. Eleven patients (52.4%) were commenced on inotropic support perioperatively as a result of bowel gangrene-induced septic shock. Sixty-two per cent experienced a significant drop in hemoglobin postoperatively requiring transfusion of packed cells, with a transfusion trigger of 8.1 g/dl. Respiratory complications (inclusive of pleural effusion, respiratory distress syndrome) were noted in 28.6% of patients. There was one anastomotic leak (4.8%) and one death in the early postoperative period, giving an

in-hospital mortality rate of 4.8%(17).The clinical records of 63 patients who underwent surgery because of Ileosigmoid knotting in the Department of General Surgery, Medical Faculty of Ataturk University, in a 35-year period between June 1966and June 2001 were reviewed retrospectively and the finding on post-operative complication was, Ten patients (15.9 percent) died. The mortality rate was highest in patients who developed gangrene of both small bowel and sigmoid colon. Two died at laparotomy, and four (40 percent) died within 24hours. Seven patients (70 percent) who died had surgery 24 hours from onset of their symptoms, and eight (80 percent) were older than aged 60 years. The most frequent cause of death was toxic shock in seven patients (70 percent), with cardiac or pulmonary causes in the others. Twelve patients of 61 survivors (19.7 percent) developed wound infection, and two (3.3 percent) had abdominal evisceration. In one patient (1.6 percent),a sigmoid volvulus occurred in the early postoperative period after operative sigmoid detorsion and was treated with sigmoidoscopic detorsion(2).

The factors leading to the occurrence of the knot is unclear. Several factors have been reported the two most common anatomic factors to be considered. area long, mesentery with a freely mobile small intestine .and a long sigmoid colon on a narrow pedicle can lead to Ileosigmoid knotting.theotherpredisposingfactorsare,meckelsdiverticula,internalherniation,latepregnancyanddietaryfactor(4).A retrospective medical record review on clinical profile determinant of outcome of 34 patients operated for ISK between February 2014 and January 2020 was performed at SPHMMC, Addis Ababa, Ethiopia, in May 2020 .The Potential contributing factors identified intraoperatively include redundant sigmoid colon on a narrow mesenteric base (26, 92.8%), third trimester pregnancy (1, 3.6%), and previous surgery (1, 3.6%)(5).Retrospective analysis of the 36 patients with ISK who were surgically treated in the Department of General Surgery at Necmettin Erbakan University's Meram Medical Faculty (Konya, Turkey) throughout a 26-year period. The intraoperative finding of predisposing factor for ISK was. In 30 patients (83.3%), anatomic predisposing factors (hypermobile small intestine) and redundant sigmoid colon with elongated mesentery having narrow base) were found as causative factors, whereas in four patients (11.1%) late pregnancy and in two (5.6%) mobile ceca were determined as secondary associated factors.

Figure 1, Conceptual Framework factors affecting management outcome & complication.



CHAPTER THREE Objective of the study

General objective

The main objective of the study was to assess pattern of clinical presentation and Management outcome of patient with Ileosigmoid Knotting managed at Jimma university medical center, Jimma, Ethiopia, between september 2016-November 2021 GC.

Specific objective

- To describe sociodemographic characteristics of patient operated for ISK.
- To assess clinical presentation pattern of patient operated for ISK
- To evaluate the type of management offered for patient operated for ISK.
- To assess outcome of patient operated for ISK.

CHAPTER FOUR METHODOLOGY OF THE STUDY

3.1. STUDY AREA

The study was carried out in JMC which is found in the city of Jimma, one of the largest cities in southwestern Ethiopia. Jimma University is one of the largest and comprehensive public research universities in Africa. Jimma medical center provides services to more than 15 million people with around 1600 staff members and 800 beds. Department of surgery is one of the main departments in JUMC, which gives full-fledged clinical service and offers specialty training.

3.2 Study period

The study was conducted in JUMC from September 1,2021to November 30,2021; on patients managed for Ileosigmoid knotting.

3.3 *Study design*

Retrospective Crossectionalstudy study which was carried out among all pateintwith intraoperative diagnosis of ISK in JUMC during period of september2016- November2021GC.

3.4 *population*

3.4.1 *source population*

All patient operated for diagnosis of intestinal obstruction

3.4.2 **Study population**

All patient fulfilling the inclusion criteria were included in the study.

3.4.3 *Inclusion criteria*

All adult patient with iliosigmoidknotting and with complete medical record.

3.4.4 **Exclusion criteria**

- ✓ **All patient with incomplete medical record**

- ✓ patient whose medical record was lost.
- ✓ All patient operated at JUMC & transferred to other facility or vis.

3.5 sampling technique & Sample size

- ✓ Sample will be all patient operated diagnosed to have ISK during study period.

3.7 study variable

3.71 dependent variable

- ✓ outcome of patient
 - ✓ Postop complication
- #### ***3.72 independent variable***
- ✓ Age
 - ✓ sex
 - ✓ Residence
 - ✓ Clinical presentation
 - ✓ Time of presentation
 - ✓ Finding at laparotomy
 - ✓ Type of surgical intervention

3.8 Data collection instrument and methods

The medical record number of patients operated for ileosigmoid knotting was identified from OR logbooks and daily morbidity sheet and patient medical record was collected from the card room. Data was collected using pretested data collection format from individual patient charts. .

3.9 Data processing and analysis

The collected data was first checked for its completeness and the data was coded, entered and analyzed using SPSS (version26). Finally, data was presented in tables and graphs as necessary and cross tabulation with the statistical test for association.

3.10 Ethical consideration

Prior to data collection a formal letter of permission was collected from JU student research program office and forwarded to JUMC administrative office to get permission for the study. Purpose and procedure of the study will be explained to Jimma University administrative Office and other concerned body to avoid ambiguity.

3.11 Possible Limitation of the study

- Secondary data was used for analysis of our study which has its own limitation
- Loss of patient individual chart and poor documentation .
- Small sample size ,which makes difficult to do association of variable with outcome& make conclude from the result
- There was no local study so far on ISK to compare our finding.

3.12 Dissemination of Results

After data analyzed conclusion and recommendation was made, the result will be submitted to concerned body. And also, the result was presented at scientific symposium or meeting and published through national journals.

Chapter Five

RESULT AND DISCUSSION

5.1 Result

5.1.1 Sociodemographic characteristics

The Medical record number of 66 pateint operated for ISK during the study period was identified from OR Log book and daily morbidity sheet and it was possible to get the chart of 47 pateint, which were reviewed and analyzed. The age of pateint range from 25 -75 years. The peak age for ISK pateint was from 30-39yr and the mean age was 41.83 years (SD+_13.573). With about 75% aged between fourth and fifth decade of life. (Table1) Male to Female ratio was 3.3:1. Most of the pateint come from outside jimma town (95.7%). (Table 1)

Table1 1 Sociodimographic characteristics of patient operated for ISK at JUMC

Variable		Frequency	Percent
Age	20-29	6	12.8
	30-39	18	38.3
	40-49	13	27.7
	50-59	4	8.5
	60-69	2	4.3
	70+	4	8.5
Sex	M	36	76.6
	F	11	23.4
address	Rural	45	95.7
	Urban	2	4.3

5.12 Clinical presentation

Most of the patient presents more than twenty-four hours after onset of symptoms (68.1%) (figure 2)(Table 3), with abdominal pain (91.5%), vomiting (74.5%), Failure to pass feces and flatus (53.2%) and abdominal distension (25.5%) were being the most common symptoms reported by the patient. (Table 4). All the patients were found to have no previous abdominal surgery. Fifteen patients (31.9%) were in shock upon presentation. On abdominal examination, 80.9% of the patients were identified to have signs of peritonitis.

Leukocytosis was seen in 26 patients (55.3%), almost all had neutrophil predominance. And in 14 patients the CBC determination was not documented. In our study plain abdominal X-ray was requested in 14 patients in five patients (10.6%) it showed features of SBO and in two of them X-ray features showed LBO. Fourteen patients were X-rayed but the result was not found, For the other 33 patients plain abdominal X-ray was not requested. (Table 2) There was no additional investigation modality that was done.

Figure 2; Time since onset of symptom patient operated for ISK at JUMC

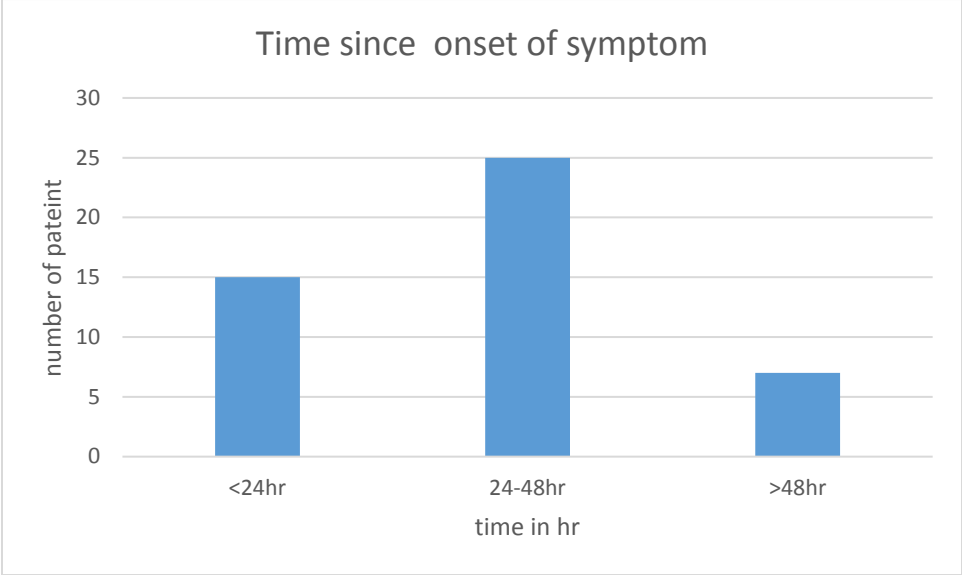
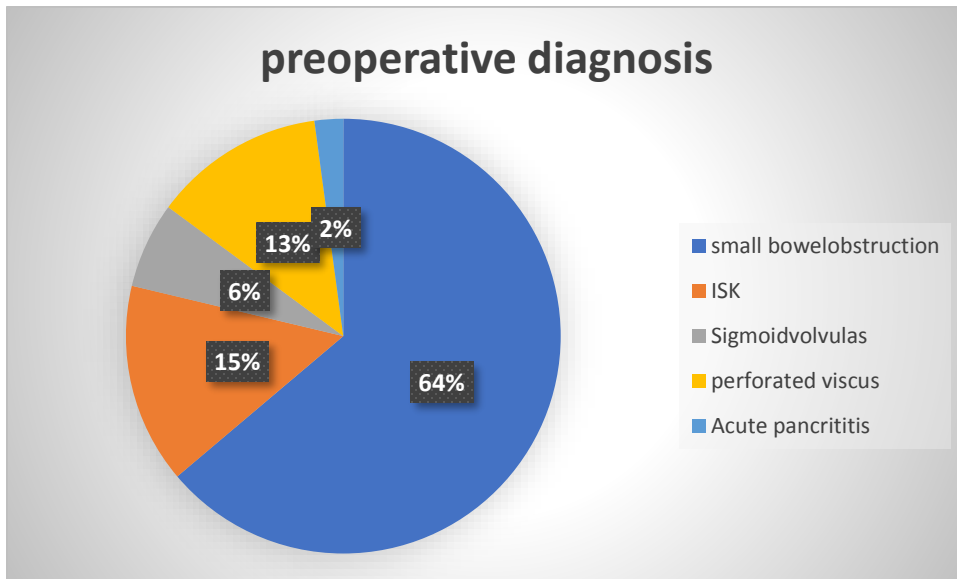


Table 2 1 Clinical presentation of patient operated for ISK at JUMC.

Clinical presentation		Frequency	Percent
Symptom	Abdominal pain	43	91.5
	Vomiting	35	74.5
	Abdominal distension	12	25.5
	Failure to pass feces & flatus	25	53.2
Sign	Patient in shock	15	31.9
	Sign of peritonitis	38	80.9
CBC	Leukocytosis	26	55.3
	Normal profile	7	14.9
	Not documented	14	29.8
Abdo Xray	Feature of SBO	5	10.6
	LBO	2	4.3
	Result not found	14	30

The most common preoperative diagnosis was SBO 2SBV (63.8%), ISK was diagnosed in only seven patients (14.9%) (figure 3) And there was only one pateint delayed for intervention due to misdiagnosis.

Figure3; preoperative diagnosis of Patient operated for ISK at JUMC.



All patient were resuscitated with crystalloid fluid, NGT inserted for gastric decompression, catheterized and broad-spectrum iv antibiotic started. Laparotomy were made through midline vertical incision in all pateint.

Intraoperatively , The ilium was active component in 17of the pateint(36.2%). which shows that Ilium was active component in majority our study which is in agreement with other study(5)(8) In 29.7% of the case no documentation of active component.

Both segment of bowel being gangrenous were the commonest finding, found in 28pateint(59.6%) .(Table3)

Three patient had intraoperative hypotension, systolic blood pressure less than 90, requiring vasopressor. Of these one pateint had passed away on table while the other one died postoperatively and intra operative e hypotension is significantly associated with mortality (p value 0.039)

Table3 1 Intra operative finding patients operated for ISK at JUMC.

Status of bowel	Frequency	Percent
both segment	28	59.6
gangrenous		
gangrenous	2	4.3
sigmoid&vaiable ilium		
gangrenous ilium viable	11	23.4
sigmoid		
both bowel segment	6	12.8
viable		
Total	47	100.0
Intra operative	3	6.4
hypotension		

Ileostomy and Hartman’s colostomy was the commonest performed procedure which account 15, of the patient (31.9%), followed by resection anastomosis of small bowel with Hartman’s colostomy (29.8%)(table4). There was no double segment anastomosis in the study. The mean time to do the procedure was 3.125hr, with (76.6%) of the procedure took more than three hour there was no significant association between time taken to do the procedure and mortality(pvale0.308).

Sixty-three percent (63.8%) of the procedure were performed by Final year General surgery resident.

Table4 1Type of procedure done for patient operated with diagnosis of ISK at JUMC

Type of procedure	Frequency	Percent
Ileostomy +Hartman's	15	31.9
Resection & anastomosis of ilium + Hartman's	14	29.8
Resection &anastomosis of ilium +Rectal tube	6	12.8
Untying + Rectal tube	6	12.8
Ileostomy +Rectal tube	4	8.5
Untying +Hartman's	2	4.3

Table 5 1 operating personnel time taken to do procedure for ISK patient at JUMC

Operating personnel		Frequency	Percent
Senior		17	36.2
Resident		30	63.8
Total		47	100.0
Time taken to do	<3hr	11	23.4
surgery	>3hr	36	76.6

Post op complication was documented in nine of studied patient. Hospital acquired infection was the most common pos op complication identified in four patients. Pneumonia was the most common complication (8.5%)(Figure 5) followed by superficial surgical site infection. Post-operative complication was significantly associated with mortality rate.

Figure 4 Post op-complication of patient oerated for ISK at JUMC

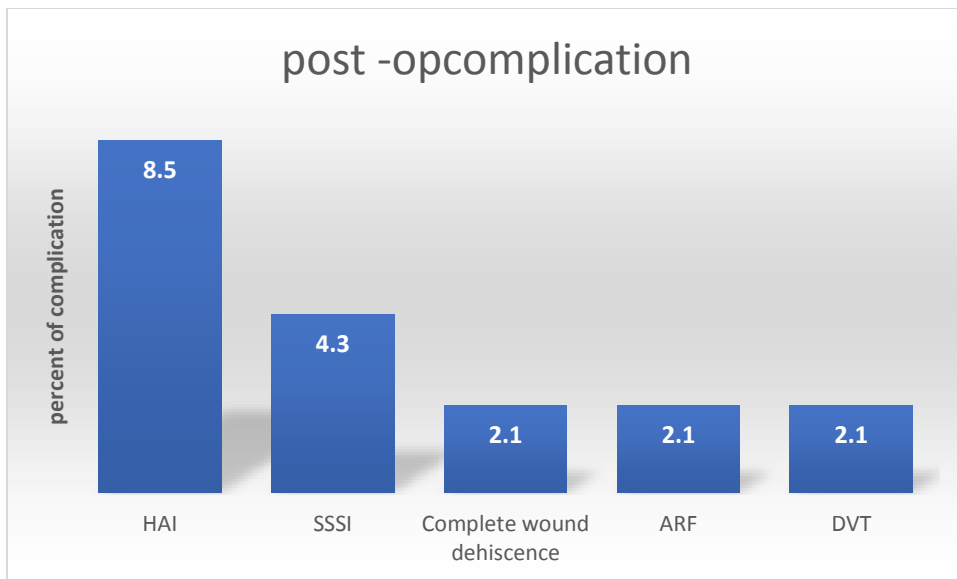


Table 6 1 Factors associated with post-operative complication of patient operated for ISK at JUMC.

Variables		Postop complication		P value	CI
		Yes(n)	NO(n)		
Age	<60yr	6	35	0.04	95
	>=60yr	3	3		
Intraop hypotension	SBP<90	1	2	0.519	95
	SBP>90	8	36		
Time to do surgery	<3hr	1	10	0.33	95%
	>=3hr	8	28		
Anastomosis done or not	Yes	1	19	0.03	95%
	NO	8	19		

There are different factors that are responsible for formation of ISK aside anatomical factors, like Redundant sigmoid, late sigmoid, late... In our study result the commonest cause is redundant sigmoid (31.95%), followed by late pregnancy (12.8%). Ileum was found to be the active component of bowel segment (36.2%).

Table 7.1 Intra-operatively identified cause and active component of bowel of patient operated for ISK at JUMC.

Identified cause of knotting	Frequency	Percent
Redundant sigmoid	15	31.9
Pregnancy	6	12.8
Total	21	44.7
Active bowel component		
Sigmoid	16	34
Ileum	17	36.2
Total	33	70.2

Most of the patient in the study were improved and discharged. Six patient were passed away making the mortality rate of 12.7%. All mortality in the study were associated with intraoperative hypotension and post-operative complication. Post-operative complication were significantly associated with mortality. (pvalue 0.002). The cause of death was multiorgan Failer secondary to sepsis.

Figure 5 cause of death of patient operated for ISK at JUMC.

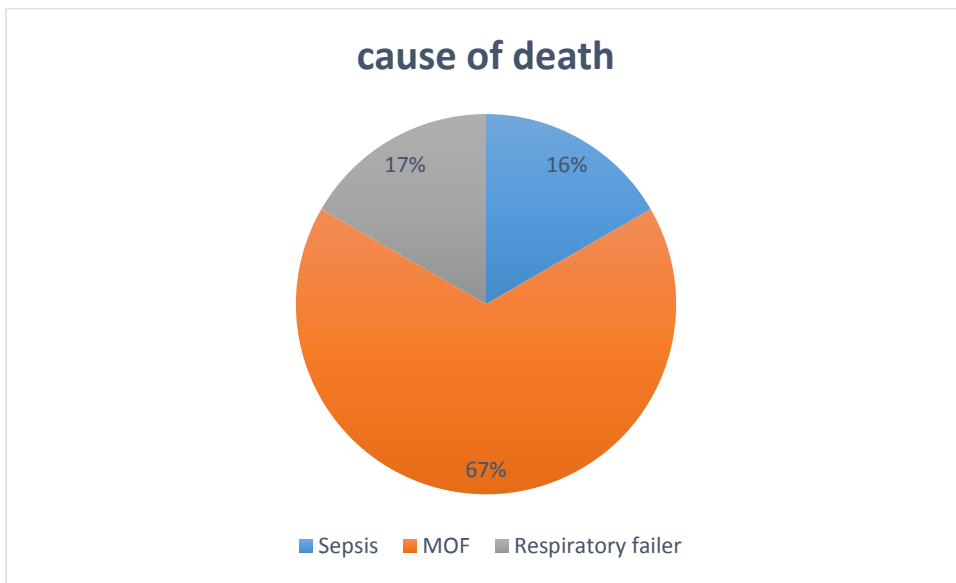


Table 8 1, Factors associated with mortality in Patient operated for ISK, JUMC, ETHIOPIA Frame September 2016 to November 2021.

Variables		Patient outcome		Pvalue	CI
		Improved(n)	Died(n)		
Age	<60yr	37	4	0.106	95
	>=60yr	4	2		
Sex	M	30	6	0.147	95
	F	11	0		
Adress	Rural	39	6	0.58	95%
	Urban	2	0		
Duration of symptom	<24hr	14	1	0.391	95
	>=24hr	27	5		

Variables		Patient outcome		P value	CI
		Improved(n)	Died(n)		
Status of bowel	Double segment gangrene	22	6	0.03	95
	Single segment gangrene	13	0		
Intraop hypotension	SBP<90	1	2	0.004	95
	SBP>90	40	4		
Time to do surgery	<3hr	10	1	0.67	95%
	>=3hr	31	5		
Postop complication	Yes	4	5	0.01	95
	NO	37	1		

5.2 Discussion

The ISK, which is resulted from wrapping of segment of bowel over each other resulting in knotting is a rare cause of acute intestinal obstruction. The incidence is not known but commons in sigmoidvolvulus area. Most study shows it is common in young male adult.

In our study the patients mean age was 41.8 year and 75% of the pateint were between third and fourth decade of life. This is in agreement with the study that was done in Ethiopia by Kirubel Abebe et al(5) .

This show that ISK patients in our country are relatively younger when compared with other part of the world.(13),(18).Male accounts(76.6%) of the case with male to female ratio 3.3:1.The male predominance of this study was in agreement with the study that was done Ethiopia Kotis et al(16) and east. Most(13),Chirantan Banerjee et al(18).Ninety five percent(95.7%) of our study pateint were from rural area of the downweigh is consistent with the study done by krubel et al(5) and ataman lap etal(13).

There is significant delay in presentation of ISK patient particularly in developing country. Study shows the mean duration of presentation (1-6day)(8) (5).In our case mean duration(1.7day) which is slightly above the range. Most (68.1%) present >24hr after onset of symptom. This study shows late presentation common for pt coming from rural, ich indicate the absence of nearby emergency surgical care.

The major presenting symptom of ISK in our study were abdominal pain (91.5%), Vomiting (74.5%), Failer to pass feces and flatus (53.2%) and abdominal distension. Peritonitis has been noticed in(80.9%)of the patient, which is not different from the study in other parts of our country like, Kirubel etal(5),kotiso et al(19), and Gonder teaching Hospital. And also similar finding was reported from study that was in Kenya(8), Ataturk university hospital,Atamanalap et al (13).

Shock is the presenting sign in 60% of ISK pateint(13).In contrast to this study ,our study result shows less rate of shock on presentation(31.9%) but it is higher than report from

Kenya(16.4%)(8)andStpaulos Hospital(17.9%)(5). In our study there was no significant association with mortality rate shock on presentation.

Since there is nonspecific clinical and radiologic feature of ISK, preoperative diagnosis is difficult, that lead to delay in surgical intervention. The preoperative diagnosis rate is (0-71%)(19)(4).In our study the preoperative diagnosis of ISK made only, in seven pateint(14.9%), but there was only for one pateint that management was delayed.

The double closed loop obstruction nature of ISK lead to rapid progression to strangulation. The rate of strangulation from different literature range(73.-93.9%),commonly in volving both segment.(3)(6).The same result was shown in our study in which ,59.6% of the patient had double segment gangrenous bowel. Our study is in agreement with the study that was in Kenya(8) St.paulos hospital(5),which show that there is no correlation between duration of symptom and rate ofstrangulation.Similar to other study most of our pateint(36.2%)found to have ilium as active component. Double segment gangrenous bowel has statistically significant association with mortality rate (pvalue 0.031) chi-squertest)

The type of procedure that is performed for ISK depend on intraoperative finding and status of the pateint. In contrast to other different study reports(20)(8)(13) ,In which resection & anastomosis of small bowel and Hartman's was the procedure of choice ,our study shows ileostomy and Hartman's as commonly performed procedure(31.9%).This is because most of our study case was found to have peritonitis(80.9%),that may result in edematous &contaminated bowel, that is way the intension of anastomosis was differred. In pateint with only gangrenous small bowel resection &anastomosis with rectal tube but ileostomy was also performed for four pateint and ileostomy with Hartman's for one patient. Resection and anastomosis of small bowel is the recommended modality of surgical intervention from different report unless, pateint condition or bowel status doesn't allow to do so. This is similar in our case.

More article is advocating for resection of sigmoid even if it is viable and to do primary anas - tomosis if pateint condition allow so.

Overall mortality rate in ISK patient is 6.8-8% (non gangrenous) and 20-100% (gangrenous bowel) (7).

Most of our patients (87.2%) recovered and were discharged improved. But ISK is still associated with poor prognosis. Factors associated with ISK mortality are, presence of shock, gangrenous bowel, old age, pregnancy and comorbidity. The mortality rate in this study was (12.7%) which is lower than most study reports, all the deaths were in patients with double segment gangrenous bowel, intraoperative hypotension and post-operative respiratory complication. This may be due to the young age of the patient in this study. This and other studies reveal multiple organ failure (MOF) due to sepsis as a major cause of death.

Chapter 6 Conclusion and recommendation

6.1 Conclusion

Ileosigmoid knotting is cause of closed loop intestinal obstruction, which rapidly progress to strangulation of involved bowel segment. It is common in adult male patient, the incidence of ISK worldwide is not known, but in our study, we found that about 66 pateint were operated for ISK over five year. There is no specific clinical or radiologic feature of ISK that may result in mis diagnosis and delay in surgical intervention. Awareness of this condition among surgeon will help to reduce the morbidity and mortality associated with this un common but fatal cause of intestinal obstruction. The choice of surgical intervention is determined by intraoperative finding and hemodynamic status of the patient. Intraoperative hemodynamic instability and post-operative complication associated with increased mortality.

6.2 Recommendation

- ISK should be one of the differential diagnosis for pateint with intestinal obstruction, especially in area where sigmoid volvulus is common
- Resection followed by stoma should be employed for unstable pateint.
- Intraoperatively unstable need aggressive resuscitation, with possible damage controll surgery and strict postoperative ICU care.
- Post op complication should, be identified, prevented and managed early &aggressively.
- This study result can be used as base line for further prospective study

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Questioner

Part I

➤ socio demographic status

➤ 1 Age chart number----- 3 Occupation Farmer merchant Gen ply
Other

4 Sex male female

5 Adress jimma towon outside jimma town

6 Reliigion muslim orthodox protestant others

Part II

➤ Clinical presentation of patient

1.1 Duration of sypmtom

<24hr

>24hr

1.2 presentingsymptom

Abdominal pain

Vomiting

Abdominal distension

Failer to pass faeses & flatus

2 Signs

Pateint in shock

signof peritonitis

3 Finding on investigation

- Leukocytosis
- Abdominal Xray

Part III 3 Preoperative diagnosis

- Small bowel obstruction
- ISK
- Acute mesenteric ischemia
- Sigmoid volvulus
- Perforated viscus
- Others

Part IV

4 Intraoperative finding at laparotomy

- Intra operative hypotension SBP < 90
- Both ileum & sigmoid gangrenous
- Gangrenous sigmoid, viable ileum
- Gangrenous ileum, viable sigmoid
- Both sigmoid & ileum viable

a. Intra operatively identified cause of knotting

- Redundant sigmoid
- Adhesion

Mechels diverticula

Others

4.1 Time taken to do procedure

<3hr

>3hr

5.Type of surgical procedure

Resection &EEA for ilium ,hartmans for sigmoid

Iliostomy for ilium&hartmans for sigmoid

Untwisting of volvulated intestine &rectl tube for sigmoid volvulus

Otherprocedure

6 operating personel

Senior

Resident

partvi

7 .Patient out come

7.1 Is there postop complication?

Yes NO

7.2 If yes on Q 7.1 what was the complication

- Anastamotic leak
- Complete wound dehescense
- Superficial surgical site infection
- HAI
- Acute renal failer

7.3 What was the status of pateint on Discharge?

- Improved
- Dead

7.4 Cause daeth

- Sepsis
- MOF
- Cardiac arrest
- Respiratory failer