



ARSI UNIVERSITY

COLLEGE OF HEALTH SCIENCES

DEPARTMENT OF GENERAL SURGERY

CLINICAL PATTERN AND EARLY SURGICAL OUTCOMES OF INGUINAL HERNIA REPAIR IN ADULTS ADMITTED TO SURGICAL WARDS AT ASELLA TEACHING AND REFERRAL HOSPITAL, ASELLA, ETHIOPIA

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ACRONYMS/ ABBREVIATIONS

ASA	American Society of Anesthesiologist
AOR	Adjusted Odds Ratio
ARTH	Arsi Referral and Teaching Hospital
COR	Crude Odds Ratio
CI	Confidence Interval
DC	Data collectors
DM	Diabetic Mellitus
HIC	High Income Countries
HTN	Hypertension
IHR	Inguinal hernia repair
LIC	Low Income Countries
MPH	Master of Public Health
MRN	Medical Record Number
MD	Medical Doctor
OR	Odds Ratio
PI	Principal Investigator
RCT	Randomized Clinical Trial
SSI	Surgical Site Infection
USA	United State of America

ABSTRACT

Background:

Inguinal hernia is one of the most common general surgical conditions worldwide. In low- and middle-income countries, delayed presentation and limited access to elective surgical care contribute to a higher burden of complicated hernias and poorer postoperative outcomes. In Ethiopia, there is limited evidence regarding the clinical pattern and early surgical outcomes of inguinal hernia repair.

Objective:

To assess the clinical pattern and early surgical outcomes of inguinal hernia repair among adult patients at Asella Teaching and Referral Hospital, Ethiopia.

Methods:

An institutional-based cross-sectional study was conducted from July 2022 to July 2025 among adult patients who underwent inguinal hernia repair. Patient charts were retrieved using medical record numbers from operation theater logbooks and surgical ward admission registers. Data were entered into Kobo Toolbox, then coded, cleaned, and exported to the latest version of SPSS for analysis. Bivariate analysis was performed to assess associations between independent variables and postoperative outcomes. Variables with a p -value ≤ 0.25 in the bivariate analysis were entered into a multivariable logistic regression model. Adjusted Odds Ratios (AORs) with 95% Confidence Intervals (CIs) were calculated, and variables with a p -value ≤ 0.05 were considered statistically significant.

Results:

A total of 114 patient records were analyzed. Most patients were male (73.7%), with a median age of 47 years. The majority of hernias were primary (91.2%), and indirect (75.4). Elective repairs accounted for 88.6% of cases, while 11.4% were emergencies. Tissue repair techniques predominated, with Desarda repair performed in 68.4% of patients. Postoperative complications occurred in 16.7% of cases, with surgical site infection being the most common (4.3%). On multivariable analysis, emergency presentation (AOR = 11.9; $p = 0.001$) and comorbidities (AOR = 10.6; $p < 0.001$) were independent predictors of adverse postoperative outcomes.

Conclusion:

Early postoperative outcomes were generally acceptable. However, emergency presentation and comorbid conditions significantly increased the risk of complications. Optimizing comorbidities and strengthening elective surgical services may improve outcomes in our settings.

Keywords: Inguinal hernia; clinical pattern; early surgical outcomes; hernia repair; Ethiopia.

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1 INTRODUCTION

1.1 Background

A hernia is defined as a protrusion of an organ or part of an organ through the body wall that normally contains it. The protrusion or passage of a peritoneal sac, with or without abdominal contents, through a weakening section of the abdominal wall in the groin is known as an inguinal hernia(1). Inguinal hernias are generally classified as direct and indirect based on the site of herniation relative to surrounding structures. Indirect hernias protrude lateral to the inferior epigastric vessels, through the deep inguinal ring. Direct hernias protrude medial to the inferior epigastric vessels, within Hesselbach's triangle(2).

Inguinal hernia is one of the most common surgical conditions worldwide, accounting for approximately 75% of all abdominal wall hernias. The lifetime risk of developing an inguinal hernia is estimated at 27% in men and 3% in women. Globally, more than 20 million inguinal hernia repairs are performed each year, making it one of the most frequently performed general surgical procedures(3).

The majority of patients with inguinal hernia present with a groin swelling that could be associated with a dull ache or dragging sensation, which typically increases with exertion and reduces on lying down. In some cases, especially with long-standing hernias, symptoms of intestinal obstruction such as abdominal pain, vomiting, and irreducibility may occur(4).

There is marked geographical disparities in pattern of presentation. In developed countries, such as those in Europe and North America, the majority of inguinal hernias are diagnosed and repaired electively(5). Untreated inguinal hernias are at risk of complications including incarceration, bowel strangulation, bowel necrosis, and sepsis, all of which contribute to significant morbidity and mortality. A retrospective study, reported a cumulative probability of strangulation for inguinal hernias of 2.8% at 3 months and 4.5% after 2 years (6).

Surgical repair is the definitive treatment for IH. The surgical treatment options of inguinal hernias include open tissue repair, mesh repair and laparoscopic repair. The current gold standard treatment of inguinal hernia is the open tension free mesh repair. The most popular technique in this type of procedure is the Lichtenstein procedure. Compared with the traditional sutured techniques, a reduction in the risk of recurrence between 50% and 75% has been demonstrated after mesh repair (5).

Despite advance in surgical techniques, particularly the introduction of tension-free mesh repair and minimally invasive approaches like postoperative complications such as wound infection, hematoma, seroma, and recurrence remain concerns that affect patient recovery and healthcare costs.

prospective study conducted at Obafemi Awolowo University Teaching Hospitals, Nigeria (2008 -2013) in patients who underwent groin hernia repair reported overall complication rate was about 7%(7) .

Retrospective study conducted at St. Paul's Hospital from (2013 to 2016) analyzed 130 adult patients who underwent open mesh repair, of which groin hernias 44 patients. Postoperative complication was seen in 10.8% (8).

1.2 Statement Of Problem

Inguinal hernia is one of the most common conditions encountered in general surgical practice worldwide, with significant geographical and socio-demographic variation in incidence and presentation. Each year, approximately 100,000 inguinal hernia repairs are performed in the United Kingdom and about 800,000 in the United States. In contrast, many African countries experience a high burden of disease, with reported annual incidences reaching 175 per 100,000 population, yet with substantially lower repair rates(9). This mismatch between disease burden and access to timely surgical care influences the pattern of clinical presentation.

Although surgical management has evolved from traditional tissue repair to mesh-based and laparoscopic techniques, postoperative complications remain a considerable challenge. Chronic groin pain, surgical site infection, recurrence, and delayed recovery continue to affect patient outcomes. A 2017 systematic review reported overall postoperative complication rates of approximately 8–10% following inguinal hernia repair, demonstrating that morbidity persists despite technical advances(10).

Importantly, outcomes after inguinal hernia repair are strongly influenced by the mode and timing of presentation. Emergency repairs are consistently associated with worse outcomes compared with elective procedures. A large Swedish Hernia Register study (2012–2018) involving 94,349 repairs reported a 30-day postoperative complication rate of 21.9% in emergency repairs compared with 8.8% in elective cases. Emergency cases also showed higher risks of bowel resection (7.8%) and a 30-day mortality of 2.7%, with markedly increased odds compared to elective surgery(11). These findings indicate that delayed or complicated presentation significantly worsens surgical outcomes.

Late presentation is particularly problematic in low-resource settings, where barriers to healthcare access, financial constraints, and limited surgical services contribute to patients seeking care only after complications develop. Studies from Africa show that a large proportion of adult inguinal hernias present as emergencies rather than elective cases — 65% in Ghana, 76% in Uganda, 33% in Sierra Leone, and 25% in Nigeria. Consequently, complicated hernias such as strangulated or obstructed hernias are common, leading to bowel resection, sepsis, prolonged hospital stay, increased treatment costs, and higher mortality. In fact, many young men in Africa die each year from preventable complications of untreated or delayed inguinal hernia(12).

Evidence from hospital-based studies in the region highlights the severity of this problem. A seven-year retrospective study in Nigeria involving 540 adults operated for complicated groin hernias reported strangulation in 46.5%, obstruction in 42.0%, and incarceration in 11.5% of cases, with a bowel resection rate of 28.5%. Nearly half of the patients (47.4%) experienced adverse postoperative outcomes, and mortality reached 8.1%. Delayed presentation beyond 24 hours was the strongest predictor of death (OR 13.42), followed by advanced age, comorbidities, and strangulated hernia(13). These findings emphasize that delayed access to care and emergency presentation are major determinants of poor outcomes.

Surgical technique and availability of materials such as mesh affect outcomes including recurrence and chronic pain. In Africa due lack of mesh and shortage of skilled personnel, most hospital use bassini repair techniques. Recurrence risk with non-mesh repair is significantly higher than with mesh repair. Data from Ghana showed ~22% vs ~7% at 3 years(14).

Chronic postoperative pain, a significant long-term morbidity, is reported in 10–30% of patients, impairing quality of life and productivity. In addition to that complications such as wound infection, recurrence, and prolonged recovery continue to affect patient quality of life and increase healthcare costs to the patient and caring family(4).

There are no studies on clinical pattern and surgical treatment outcome of inguinal hernia in our country. The lack of comprehensive research limits our understanding of the disease's epidemiology, associated factor and treatment outcome. This gap in knowledge poses challenges for early diagnosis, effective treatment, and the development of evidence-based healthcare policies. Conducting thorough studies on this area is essential to improve patient outcomes, allocate healthcare resources efficiently, and implement targeted preventive measures.

1.3 Significance of the Study

Inguinal hernia remains one of the most common surgical conditions worldwide, yet significant disparities exist in its management and outcomes across different regions depending on the type of hernia, surgical technique used, surgeon experience, and perioperative care practices. In Ethiopia and many other low-resource settings, delayed presentation, limited access to mesh repair, and variability in surgical expertise contribute to suboptimal outcomes.

Despite the high burden, regional data on presentation patterns and early postoperative results are sparse, often limited to single-center audits in LIC. A better understanding of the pattern of inguinal hernia presentation and the early postoperative outcomes within the local context is therefore essential. Such data can help identify prevailing trends in patient demographics, the common types of hernia encountered, and the preferred surgical methods used in the institution.

Findings from this research will contribute to the evidence base needed to improve surgical decision-making, standardize hernia repair protocols, and enhance postoperative care practices. Additionally, the study may serve as a reference for future audits, training programs, and policy development aimed at optimizing hernia management and improving patient outcomes in similar healthcare settings. Moreover, by evaluating early postoperative outcomes including post op complications, duration of hospital stays and recurrence rates, the study can provide insight into the quality and safety of hernia care being delivered

2 LITERATURE REVIEW

2.1 Socio-demographic and hernia characteristics

The presentation of inguinal hernia (IH) varies significantly across regions and populations, influenced by demographic structures and disparities in access to surgical care. The pattern of presentation differs between developed and developing countries, particularly in the rate of emergency repair. In high-income settings, emergency inguinal hernia operations account for only 2.5–7.7% of cases (11,15). In contrast, studies from developing countries report a much wider range, from 2.5% to 76%, reflecting variations in healthcare accessibility, delayed presentation, and limited elective surgical services (16,17).

A retrospective study conducted in Albania (2016 to 2018) involving 542 patients inguinal hernia reported a median age of 46 years (range: 14–92 years) with a strong male predominance (94.8%) with male-to-female ratio of 18.3:1. Indirect inguinal hernias accounted for nearly 60% of cases, and right-sided hernias (55.9%) were more common than left-sided. Approximately one quarter of patients presented more than one year after symptom onset, reflecting delayed health-seeking behavior (18).

A three-year retrospective study in Senegal (2019–2022) of 195 patients underwent IH repair demonstrated a strong male predominance, with 92.3% (n = 180) males and 7.7% (n = 15) females. The mean age was 48.8 years (range: 18–86 years). Indirect hernias accounted for 75.9% (n = 148) and direct hernias for 24.1% (n = 47). Primary hernias represented 92.3% (n = 180) of cases, while 7.7% (n = 15) were recurrent. Notably, 29.7% (n = 58) of hernias were strangulated at presentation, highlighting the burden of delayed diagnosis and intervention(19).

A retrospective study from Uganda (2008 to 2012) involving 159 IH patients reported a mean age of 44.8 years and a male-to-female ratio of 3.6:1. Right-sided hernias were predominant (65.19%), and the majority of repairs were performed electively (97.47%). The overall complication rate was 3.16% and mortality was One (0.63%) (17).

A prospective descriptive study in Nigeria (2010–2012), analyzed 261 patients undergoing elective repair for uncomplicated inguinal hernias, showed a male predominance of 80.8% (male-to-female ratio 4:1; $p < 0.05$) and a mean age of 35.7 ± 16.6 years, Indirect hernias were most common (66.3%), types, with right-sided hernias predominant (46.4%). Nearly half of the patients (46.7%) presented after more than five years of symptoms, highlighting prolonged delays prior to surgical intervention (20).

2.2 Hernia repair techniques: Historical Development of open Repair Techniques

The evolution of open tissue repair techniques began in the late nineteenth century with Bassini's description of his anatomic reconstruction in 1887. His method, which involved approximating the conjoint tendon to the inguinal ligament, established the foundational principle of anatomical restoration(21).

The Shouldice repair, developed at the Shouldice Hospital in Canada during the 1940s, remains the gold standard among non-mesh techniques. The first two layers reconstruct the transversalis fascia, while the remaining layers approximate the internal oblique and transversus abdominis to the inguinal ligament(22).

Later, in 2001, Desarda proposed a tension-free, mesh-free alternative using the external oblique aponeurosis. This technique is tension-free, mesh-free, and pays attention to the surgical physiology of inguinal canal. It uses the external oblique aponeurosis sutured to the inguinal ligament and internal oblique to reinforce the posterior wall of the inguinal canal(23).

The Lichtenstein tension-free mesh repair, introduced by Lichtenstein et al. in the 1980s, is currently one of the most widely adopted open techniques for inguinal hernia repair due to its simplicity, reproducibility, and low recurrence rate. The procedure involves placing a flat polypropylene mesh over the posterior inguinal wall, secured to the pubic tubercle, inguinal ligament, and conjoint tendon, thereby reinforcing the weakened floor without creating tension on surrounding tissues(24)

2.3 Surgical outcomes of inguinal hernia repair

Surgical treatment is successful in the majority of cases. Despite there is evolution in surgical repair techniques, post op complications are still common, with the incidence depending upon the clinical circumstance under which the repair was performed as well as the site and type of the hernia repair. The overall complication rate after inguinal hernia repair is 8%–10% of all inguinal hernia repair(25).

Complications are classified as early and late. Early: hematoma, organ or vascular injury, acute urinary retention, wound infection, seroma, death, anesthesia-related events. Late (months to years): includes recurrence, chronic pain (neuropathic or nociceptive), mesh infection/erosion, fistula/mesh migration, testicular atrophy or orchitis (rare)

Although mortality is rare in elective cases, it remains significant in emergency settings. The African systematic review reported mortality of 0.2% in uncomplicated cases versus 6.4% in complicated hernias (OR 47.7; 95% CI 27.2–83.47) (26). A seven-year Nigerian multicenter study reported mortality of 10.4% among complicated hernias(27).

According to systematic reviews updated in the Hernia surge guidelines the rate of surgical site infections (SSIs) after IHR broadly varies across the studies from 1.6% in low-risk environment to 4.2% in high-risk environment. In LMIC settings Systematic review and meta-analysis reported overall pooled SSI rate of 4.1 % (95 % CI 2.9–5.4). but single-center reports from parts of Africa and other LMICs show much wider ranges and occasionally substantially higher rates, reflecting differences in case mix (higher emergency surgery proportion), comorbidity burden, perioperative resources and follow-up(28).

Prospective descriptive study in Tanzania evaluated the surgical management of 452 patients with inguinal hernias, post-op complications were recorded in 12.4% patients. Of these, SSI was the most common post-operative complication accounting for 5.3% of cases. Complication rate was significantly higher in emergency herniorrhaphy than in elective herniorrhaphy (34.6% versus 15.9%) ($p = 0.002$). Intestinal obstruction and peritonitis requiring re-operation 0.89%(29).

Systematic review comparing open mesh versus non-mesh repair demonstrated no significant difference in superficial wound infections (3.4% vs. 2.8%; OR 1.24, 95% CI 0.84–1.84), reinforcing that mesh use does not substantially elevate infection risk(30).

Seroma and hematoma formation are relatively common complications, with incidence varying by surgical technique. A four-year retrospective study from Ghana evaluated outcomes of recurrent inguinal hernias repaired using the Lichtenstein technique and primary hernias repaired using the Shouldice technique. In the Shouldice group, 4.9% developed subcutaneous seroma and 0.7% developed hematoma, whereas in the Lichtenstein group, seroma and hematoma occurred in 13.8% and 1.9% of patients, respectively (31).

Post-operative urinary retention reported incidence range 0.4% to 22%. across studies the wide range reflects differences in definition catheterization thresholds, anesthesia type, perioperative fluid/analgesic management and patient factors such as male sex, older age, BPH(32).

The incidence of testicular atrophy 0.3–0.5% for primary repairs and 5% in recurrent repairs(28). Four-year retrospective study in Ghana (2014) reported temporal testicular atrophy 0.2% in primary hernia repair and 1.9% in recurrent hernia repair(31)

Retrospective review conducted at St. Paul's Hospital from September 2013 to August 2016, analyzed 130 adult patients who underwent open mesh repair, of which groin hernias 44 (33.8%). male, 42 (95.5%) versus 2 (4.5%), with a male to female ratio of 21:1. Postoperative complication was seen in 14 (10.8%) of the patients. surgical site infection (5), seroma formation (3), recurrence in (3), hematoma formation (2) and mesh infection (1) patients. There was an increased number of complications in females ($p=0.043$) and in patients with co-morbidity ($p=0.041$). there was no death in this series(8).

2.4 Factors associated

Postoperative outcomes following inguinal hernia repair are influenced by a complex interaction of patient-related, disease-related, and operative factors. Mortality is rare after elective inguinal hernia repair but remains a major concern in emergency settings, particularly among patients presenting with advanced disease and physiological compromise.

A six-year retrospective study done in Côte d'Ivoire among 288 patients with strangulated inguinal hernias demonstrated that presentation after 48 hours ($p = 0.002$), patients with higher ASA class ($ASA \geq III$; $p = 0.002$), presence of peritonitis, bowel obstruction, and perforation ($p = 0.001$), presence of bowel necrosis and the need for bowel resection predictors of death (both $p < 0.001$), (33) .this highlighting the critical impact of delayed surgical intervention and disease severity on survival outcomes.

Surgical site infection (SSI) represents one of common early postoperative complications following inguinal hernia repair. United States registry including 57,951 patients reported that diabetes mellitus ($OR \approx 2.0$), severe obesity ($BMI \geq 35 \text{ kg/m}^2$; $OR \approx 2.6$), and smoking ($OR \approx 2.07$) as independent predictors of SSI following open inguinal hernia repair(34).

Operative and disease-related factors have also related with SSI. A ten-year retrospective study from Japan involving 1,098 patients reported that emergency surgery, incarcerated hernia, prolonged operative time, increased intraoperative blood loss, and bowel resection were significantly associated with postoperative SSI ($p < 0.05$). Similar findings were reported in a nine-year retrospective review of groin hernia repairs, where emergency surgery, bowel resection, and prolonged operative duration remained independent predictors of SSI ($p < 0.05$) (36).

In Contrast to above study, Chinese study reported that mesh use was not associated with an increased risk of infection in patients undergoing uncomplicated repair, suggesting that infection risk is driven primarily by patient condition and operative complexity rather than prosthetic material alone(35). Another systematic review of hernia registry reported higher ASA class ASA IV ($OR = 5.11$; 95% CI: 1.84–14.20; $p < 0.001$), female patients ($OR = 0.53$ for males; 95% CI: 0.35–0.81), and recurrent hernias ($OR = 0.51$ for primary; 95% CI: 0.34–0.77) as strong Predictors of occurrence of SSI. (28).

Early postoperative complications such as seroma and hematoma have been consistently reported following hernia repair. A systematic review of Hernia Surge Group reported seroma rates ranging from 0.5% to 12.2%. the study identified body mass index greater than 24.5 kg/m^2 ($p < 0.001$), hernial defect size exceeding 2.5 cm ($p < 0.001$), repeated reduction of the hernial sac ($p = 0.011$), and low preoperative serum albumin levels below 32.5 g/L as strong predictors of seroma formation ($p < 0.001$) (28).

Systematic review of Cochrane review hernia Guideline reported incidence of postoperative hematoma has been reported to range between 1% and 8%. this study reported presence of anticoagulant therapy (OR 3.5; 95% CI: 1.6–6.4; $p < 0.01$), valvular heart disease (OR 11.6; 95% CI: 2.6–51.3; $p < 0.01$), atrial fibrillation (OR 2.6; 95% CI: 1.2–5.5; $p = 0.01$), hypertension (OR 2.03; 95% CI: 1.1–3.6; $p = 0.02$), recurrent hernia (OR 3.7; 95% CI: 1.4–9.7; $p < 0.01$), and coronary artery disease (OR 2.1; 95% CI: 1.0–4.4; $p = 0.05$) as independent predictors for hematoma formation (39).

Recurrence remains a critical long-term complication of inguinal hernia repair, influenced by an interplay of patient demographics, hernia morphology, and operative approach. Systematic review and meta-analysis done in Sweden reported primary direct hernias (RR = 1.91; 95% CI: 1.62–2.26; $p < 0.001$), surgery for an existing recurrence (RR = 2.20; 95% CI: 2.00–2.42), history of smoking (OR = 2.53; 95% CI: 1.43–4.47) and female sex (RR = 1.38; 95% CI: 1.28–1.48) as independent predictors of hernia recurrence(37).

An RCT done in Sierra Leone (2017–2019, $n=230$) compare recurrence among mesh repair performed by medical doctors and trained associate clinicians showed that at 1-year, recurrence was 6.9% with medical doctors vs 0.9% with trained associate clinicians. an absolute difference of –6.0% (95% CI –11.2 to 0.7; $p<0.001$) highlighting the importance of structured training and standardized surgical technique.(38).

Chronic postoperative inguinal pain (CPIP) is one of long-term complication after inguinal hernia repair. A Cochrane-based systematic review and meta-analysis identified independent predictors of CPIP as: younger age (OR 2.26; 95% CI 1.13–4.55), female sex (OR 1.89; 1.02–3.47), small hernia defect <3 cm (OR 1.37; 1.01–1.85), preoperative pain (OR 2.32; 1.35–3.98), postoperative pain (OR 1.55; 1.28–1.89), other postoperative complications (OR 1.85; 1.03–3.31), and prior ipsilateral repair (OR 2.71; 1.45–5.07) (39).

2.5 Conceptual framework of study

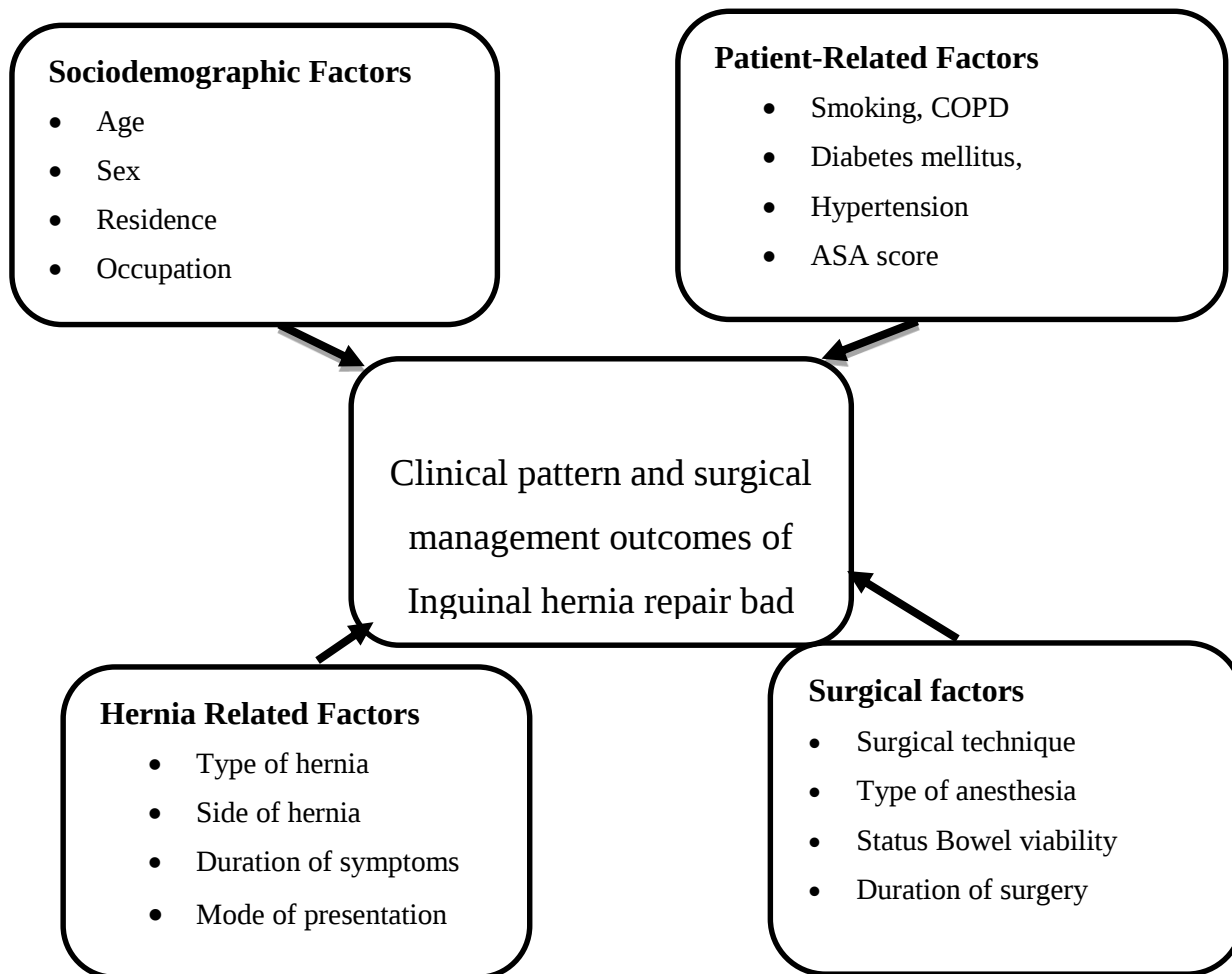


Figure 2.1: Conceptual framework of pattern and early surgical outcome of inguinal hernia repair among patients admitted to surgical ward

References (1,2,3,5,6,8,10,11,13,15,18,19,20,25,26,27,28,29,30,32,33,34,35,36,37,38,39)

3 OBJECTIVES

3.1 General objective

To assess the clinical patterns and early surgical outcomes of inguinal hernia repair among adult patients at Asella Teaching and Referral Hospital (ARTH)

3.2 Specific objectives

To describe the demographic and clinical characteristics of adult patients underwent inguinal hernia repair at ARTH.

To assess the early surgical outcomes in adult inguinal hernias patient operated at ARTH

To determine associating factor of outcome in adult inguinal hernias patient operated at ARTH

4 METHODS AND MATERIALS

4.1 Study area

The study will be conducted at Asella Teaching and Referral Hospital, located in Asella Town, Arsi Zone, Oromia Region, approximately 175 km east of Addis Ababa, the capital city of Ethiopia. The hospital serves as a major referral center for the region, with an estimated catchment population of over 3.3 million people. ATRH has five functional operating tables and provides 24-hour daily emergency surgical services. Elective surgical services are scheduled as follows: general surgery (three days per week), hepatobiliary, urology, neurosurgery, plastic surgery, and maxillofacial surgery (one day each per week), and orthopedic surgery (two days per week). The study will be conducted during data collection period from August 2025 to December 2025.

4.2 Study Design and Period

An institution-based cross-sectional study was conducted using medical records of adult patients admitted to the surgical wards at Asella Teaching and Referral Hospital from July 2022 - July 2025

4.3 Source and Study Population

4.3.1 Source population

All patients admitted to the surgical ward of Asella Teaching and Referral Hospital between July 2022 to July 2025

4.3.2 Study population

Medical charts of all adult patients (≥ 18 years) underwent inguinal hernia repair and admitted to surgical ward of Asella Teaching and Referral Hospital between July 2022 to July 2025

4.3.3 Inclusion criteria

Medical charts of adult's inguinal hernia patient underwent IHR and have complete medical records including operative notes and postoperative follow-up.

4.3.4 Exclusion Criteria

Medical charts with incomplete or missing essential information, particularly operative details or postoperative outcome data.

Medical charts that were unavailable in the medical records office during the data collection period

4.4 Sample size determination and sampling technique

Since the study was focused on surgical outcome, medical record numbers (MRNs) of all adult patients underwent inguinal hernia repair was included.

During the study period, a total of 161 adult patients underwent inguinal hernia repair at Asella Teaching and Referral Hospital. Of these, 114 complete medical records were retrieved and included in the analysis, yielding a chart retrieval rate of 70.8%. The remaining records were excluded due to missing charts ($n = 19$) or incomplete documentation ($n = 28$).

4.5 Study Variables

4.5.1 Dependent Variable

outcomes of Inguinal hernia repair

4.5.2 Independent variable

Age

Sex

Body Mass Index (BMI)

Smoking status

Comorbidities: (Diabetes mellitus, Hypertension, COPD)

ASA score

Type of hernia (direct/indirect, primary/recurrent)

Duration of symptoms

Mode of presentation (elective/emergency)

Surgical technique (mesh vs non-mesh repair)

Type of anesthesia (local, regional, general)

Duration of surgery

4.6 Operational definition

Adult: A patient aged 18 years or older at the time of inguinal hernia repair.

Inguinal hernia: A protrusion of peritoneal sac, with or without abdominal contents, through a weakened area of the inguinal region, as documented in the operative note.

Direct Inguinal Hernia: A hernia in which the peritoneal sac protrudes medial to the inferior epigastric vessels through Hesselbach's triangle, as recorded in the operative findings.

Indirect Inguinal hernia: A hernia in which the peritoneal sac protrudes lateral to the inferior epigastric vessels, passing through the deep inguinal ring toward the superficial ring, as documented in the operative note.

Primary Inguinal Hernia: An inguinal hernia occurring for the first time at a given anatomical site, with no prior history of hernia repair on that side.

Recurrent Inguinal Hernia: An inguinal hernia that reappears at the same site after a previous hernia repair.

Elective: Patient admitted and operated on without features of incarceration, obstruction, or strangulation.

Emergency: Patient presenting with complications such as irreducibility, bowel obstruction, strangulation, or peritonitis requiring urgent surgery.

Complicated Inguinal Hernia: An inguinal hernia associated with incarceration, bowel obstruction, strangulation, bowel ischemia, or perforation, as documented intraoperatively

Incarceration: A hernia that cannot be manually reduced back into the abdominal cavity and is trapped in the hernia sac, causing persistent protrusion without signs of blood flow compromise. Diagnosed clinically by inability to reduce the hernia and associated discomfort or pain.

Strangulation: Compromise of the blood supply to the herniated tissue (commonly bowel) due to constriction at the hernia defect, leading to ischemia. Diagnosed by acute pain, tenderness over the hernia, systemic signs (fever, tachycardia), and sometimes confirmed intraoperatively.

American Society of Anesthesiologists (ASA) Physical Status Classification: A preoperative assessment tool used to classify patients' physical status, documented as ASA I, II, III, or IV in the anesthesia record.

Early Postoperative Period: The first 30 days following inguinal hernia repair.

Surgical Site Infection: Infection occurring at the surgical incision site within 30 days postoperatively, as documented in the medical record, including superficial or deep incisional infection.

High infection risk environment: A surgical care setting in which SSI rate of ≥ 5 percent

Low infection risk environment: A surgical care setting in which SSI rate of < 5 percent

Hematoma: A localized collection of blood at or near the surgical site occurring within 30 days after surgery.

Seroma: A collection of serous fluid at the surgical site detected clinically within 30 days postoperatively.

Early Surgical Outcome: The postoperative status of the patient within 30 days of surgery, categorized as: Presence of one or more postoperative complications (SSI, hematoma, seroma, urinary retention, reoperation, prolonged hospital stays, or death)

Early Postoperative Mortality: Death occurring within 30 days of inguinal hernia repair during the same hospital admission or follow-up period

4.7 Data collection instrument and procedure

The data was collected using kobo Toolbox data collecting system. The tools included information such as socio-demographic information, clinical presentation, date of admission and discharge, surgical intervention details, and postoperative outcomes. Data was extracted from patient medical charts by 1st year surgical residents and medical interns and assisted by medical record unit workers, and one third year surgical residents has supervised data collectors.

4.8 Data Quality Assurance

Training was given to data collectors and supervisors by principal investigator to approach the study, confidentiality and privacy of data and how to use the tools. Investigator and supervisor have made a thorough check before receiving the filled questionnaire from each data collector and they have randomly selected questionnaire to cross check its completeness and errors on spot.

4.9 Data processing and Analysis

After data collection and questionnaire checked for completeness, data was encoded to Epi-data info latest version and was analyzed using SPSS latest version. After cleaning data for missing values, outliers and extreme values, data was recoded and categorized accordingly. Descriptive statistics was applied to determine means, frequency and ranges. Results are presented using tables, graphs and pie charts .

The early surgical outcome of inguinal hernia repair was dichotomized as good or bad, where unfavorable outcome is defined as the occurrence of one or more early postoperative complications (such as surgical site infection, hematoma, seroma, urinary retention, recurrence, or death) within the early postoperative period.

Bivariate analysis using binary logistic regression was performed to assess the association between each independent variable and the outcome variable. Variables with a p-value ≤ 0.25 in the bivariate analysis were entered into a multivariable logistic regression model to identify independent predictors of early surgical outcomes and to control for potential confounders. This cutoff is chosen to avoid excluding potentially important variables at the preliminary stage.

Model fitness was assessed using the Hosmer–Lemeshow goodness-of-fit test, and multicollinearity among independent variables were checked. The strength of association was expressed using Adjusted Odds Ratios (AORs) with 95% Confidence Intervals (CI). Variables with a p-value ≤ 0.05 in the multivariable analysis were considered statistically significant.

4.10 Ethical consideration

Ethical approval for the study was obtained from the College of Health Sciences, Arsi University, and Ethical Review Committee (ERC). Permission has taken from department of surgery and then ATRH medical records room. Individual informed consent and name of the patient have not been undertaken as the study used patients' medical records.

4.11 Dissemination of the study result

The findings of the study will be communicated to academic advisors and Arsi University through oral and written communication. The findings will be communicated to Asella Teaching

and Referral Hospital with their health facilities through seminars and further efforts will be made to publish the findings on national or international peer reviewed journal.

5 RESULTS

5.1 Socio-Demographic Characteristics

During the study period, a total of 161 adult patients underwent inguinal hernia repair at Asella Teaching and Referral Hospital. Of these, 114 complete medical records were retrieved and included in the analysis, yielding a chart retrieval rate of 70.8%. The remaining records were excluded due to missing charts (n = 19) or incomplete documentation (n = 28).

Among the study participants, 84 (73.7%) were male and 30 (26.3%) were female, resulting in a male-to-female ratio of 2.8:1. The age of patients ranged from 20 to 80 years, with a median age of 47 years. The most common affected age group was 40–60 years, accounting for 65(57%) patients, followed by those aged 20–40 years (29,25.4%). Patients aged 60-80 years accounted for 20 (7.9%).

The majority of patients were residents of rural areas (75, 65.8%). Regarding occupation, farmers constituted the largest group (51,44.7%), followed by daily laborers 15 (13.2%), housewives 14 (12.3%), private employees 13 (11.4%) and government employees 12 (10.5%), while merchants accounted for 9 (7.9%) of the participants,

Table 5.1: Socio-Demographic Characteristics of Patients Underwent Inguinal Hernia Repair (n = 114)

		Frequency	Percent %
Age group	20-40	29	25.4
	40-60	65	57
	60-80	20	17.5
	Total	114.00	100.00
Sex	Male	84	73.7%
	Female	30	26.3%
	Total	114.00	100.00
Residence	Urban	39	34.2%
	Rural	75	65.8%
	Total	114.00	100.00
Occupation	Farmer	51	44.7%
	Merchant	9	7.9%
	Government employee	12	10.5%
	Private employee	13	11.4%
	Daily laborer	15	13.2%
	Housewife	14	12.3%
	Total	114.00	100.00

5.2 Comorbidity and Medical Conditions of patients

Most patients had no history of smoking, accounting for 85 (74.6%), while 29 (25.4%) reported a positive smoking history. Based on the American Society of Anesthesiologists (ASA) classification, the majority of patients were classified as ASA I, representing 86 (75.4%) cases. ASA II and ASA III accounted for 14 (12.3%) and 5 (4.4%), respectively. 9 (7.9%) cases had undocumented ASA status while no patients were classified as ASA IV.

Overall, 19 (16.8%) patients had comorbid condition. The most frequently observed comorbidities were heart disease and hypertension, each affecting 6 (5.3%) patients, followed by chronic cough in 5 patients (4.4%) and diabetes mellitus in 2 patients (1.8%).

Table 5.2: Comorbidity and Pre-Existing Medical Conditions of Patients (n = 114)

		Frequency	Percent (%)
Smoking history	No	85	74.6%
	Yes	29	25.4%
	Total	114.00	100.00
Comorbid present	No	95	83.3%
	Yes	19	16.7%
	Total	114.00	100.00
ASA class	ASA I	86	75.4%
	ASA II	14	12.3%
	ASA III	5	4.4%
	Not documented	9	7.9%
	Total	114.00	100.00

5.3 Clinical Presentation of Inguinal Hernia

The majority of patients presented with primary inguinal hernia, observed in 104 (91.2%) cases, while 10 (8.8%) patients had recurrent hernia. Anatomically, indirect inguinal hernia was the most common type, accounting for 86 (75.4%) cases, followed by direct inguinal hernia in 28 (24.6%) patients.

Regarding laterality, most hernias were right-sided, seen in 72 (63.2%) patients, followed by left-sided hernias in 31 (27.2%) patients. Bilateral hernias were observed in 10 (9.6%) cases.

At the time of presentation, the majority of patients had reducible hernia, accounting for 84 (73.7%) cases. Incarcerated (irreducible) hernias were observed in 17 (15.0%) patients, while obstructed and gangrenous hernias were identified in 6 (5.2%) and 7 (6.1%) patients, respectively.

Table 5.3: Clinical Characteristics of Inguinal Hernia Among Study Participants (n = 114)

		Frequency	Percent %
Type of hernia	Primary	104	91.2%
	Recurrent	10	8.8%
	Total	114.00	100.00
Anatomical type	Indirect	86	75.4%
	Direct	28	24.6%
	Total	114.00	100.00
Side of hernia	Right	72	63.2%
	Left	31	27.2%
	Bilateral	11	9.6%
	Total	114.00	100.00

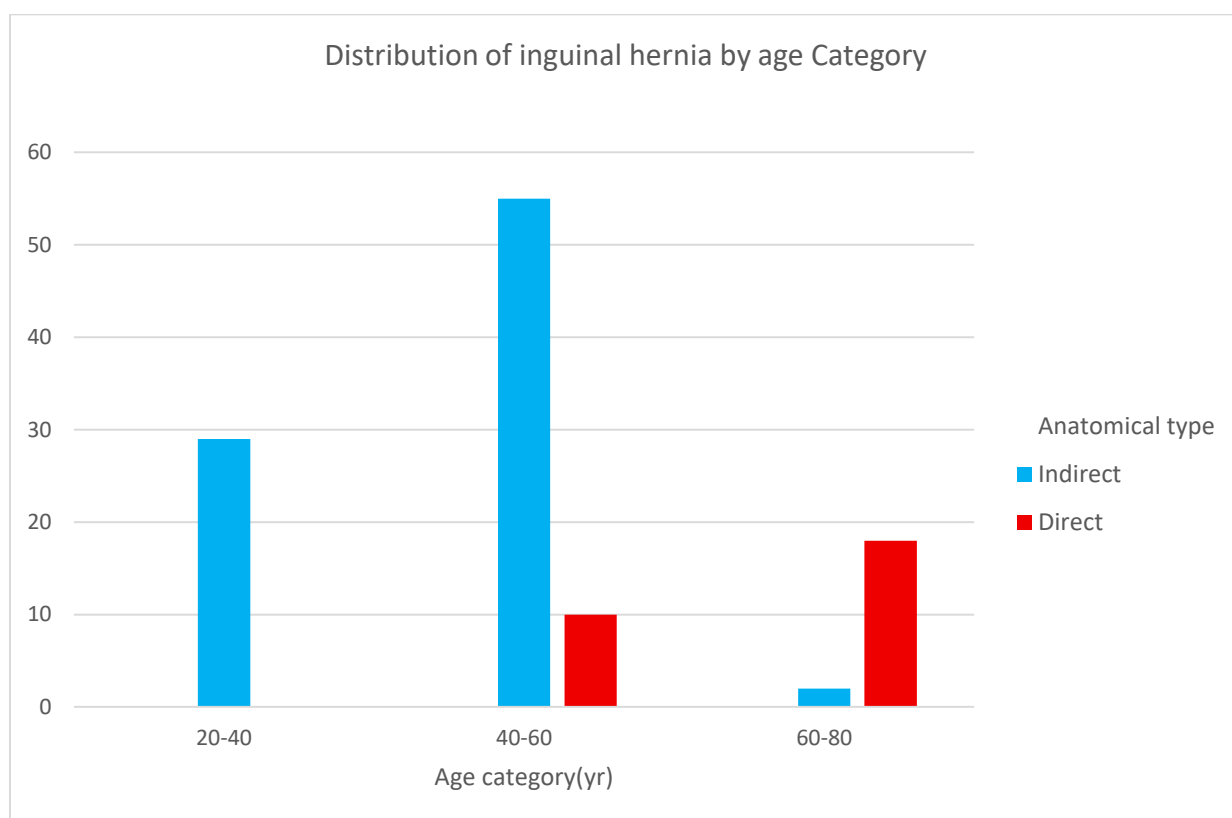


Figure 5.1: Age Distribution of Patients Underwent Inguinal Hernia Repair

Table 5.4: Duration of Symptoms and Duration of Acute Symptoms Among Patients Undergoing Inguinal Hernia Repair(n=114)

		Frequency	Percent %
Duration of symptoms	<1yr	57	50.3%
	1-5yr	49	43%
	>5yr	8	7%
	Total	114.00	100%

5.4 Admission Pattern, Anesthesia, and Surgical Technique

Most patients were admitted on an elective basis, accounting for 101 (88.6%) cases, while 13 (11.4%) patients were admitted as emergencies. Among the emergency cases, more than half, 7 (53.8%), presented within 24 hours of symptom onset, whereas 3 (23.1%) patients delayed presentation for more than 48 hours.

Spinal anesthesia was the most commonly used anesthetic technique and was administered to 100 (87.7%) patients. General anesthesia was used in 12 (10.5%) patients, while local anesthesia was used in 2 (1.8%) cases.

Regarding surgical technique, Desarda repair was the most frequently performed procedure, accounting for 77 (68.4%) patients, followed by Modified Bassini repair in 27 (23.7%) patients. Mesh repair was performed in only 10 (8.8%) cases.

Antibiotic prophylaxis was administered to 61 (53.5%) patients, while 9 (7.9%) patients did not receive prophylaxis. Documentation regarding antibiotic prophylaxis was missing in 44 (38.6%) patient records.

In the majority of patients, 78 (68.4%), the duration of surgery ranged between 1 and 2 hours. Surgical procedures lasted less than 1 hour in 19 (16.7%) patients, while in 17 (14.9%) patients the duration exceeded 2 hours.

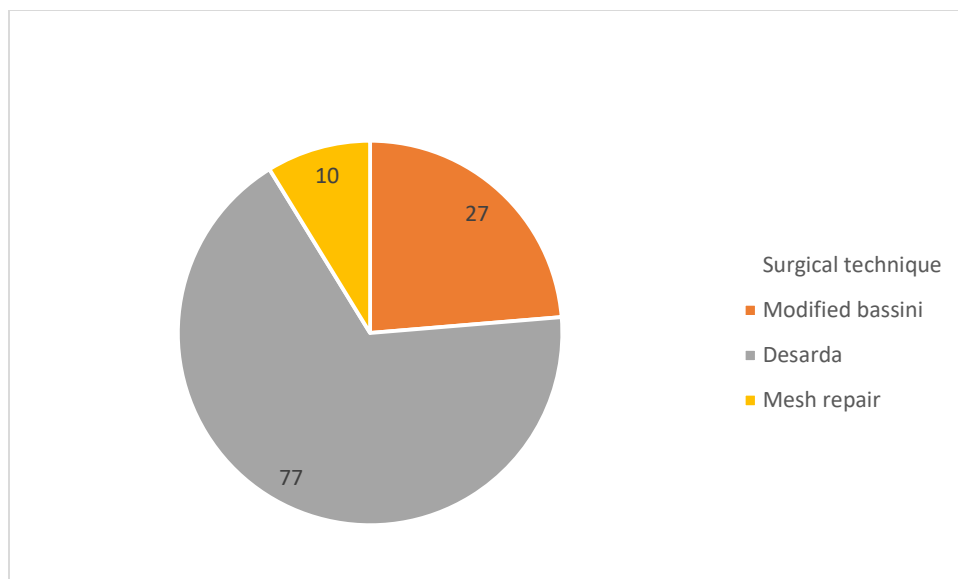


Figure 5.2: Types of Inguinal Hernia Repair Techniques Performed

5.5 Hernia Sac Content and Intra-operative Findings

Intra-operatively, the hernia sac was found to be empty in 84 (73.7%) patients. Among those with identifiable sac contents, omentum was the most common, observed in 17 (14.9%) patients, followed by viable bowel in 6 (5.3%) patients and gangrenous bowel in 7 (6.1%) patients.

Reduction of hernia sac contents was performed in 23 (20.2%) patients, while bowel resection with primary anastomosis was required in 7 (6.1%) patients. No patient required stoma formation.

The majority of patients with strangulated hernias presented more than 24 hours after the onset of symptoms. No cases of bowel strangulation were observed among patients who presented within the first 24 hours. Among patients presenting after 24 hours, only one patient had viable bowel at the time of surgery.

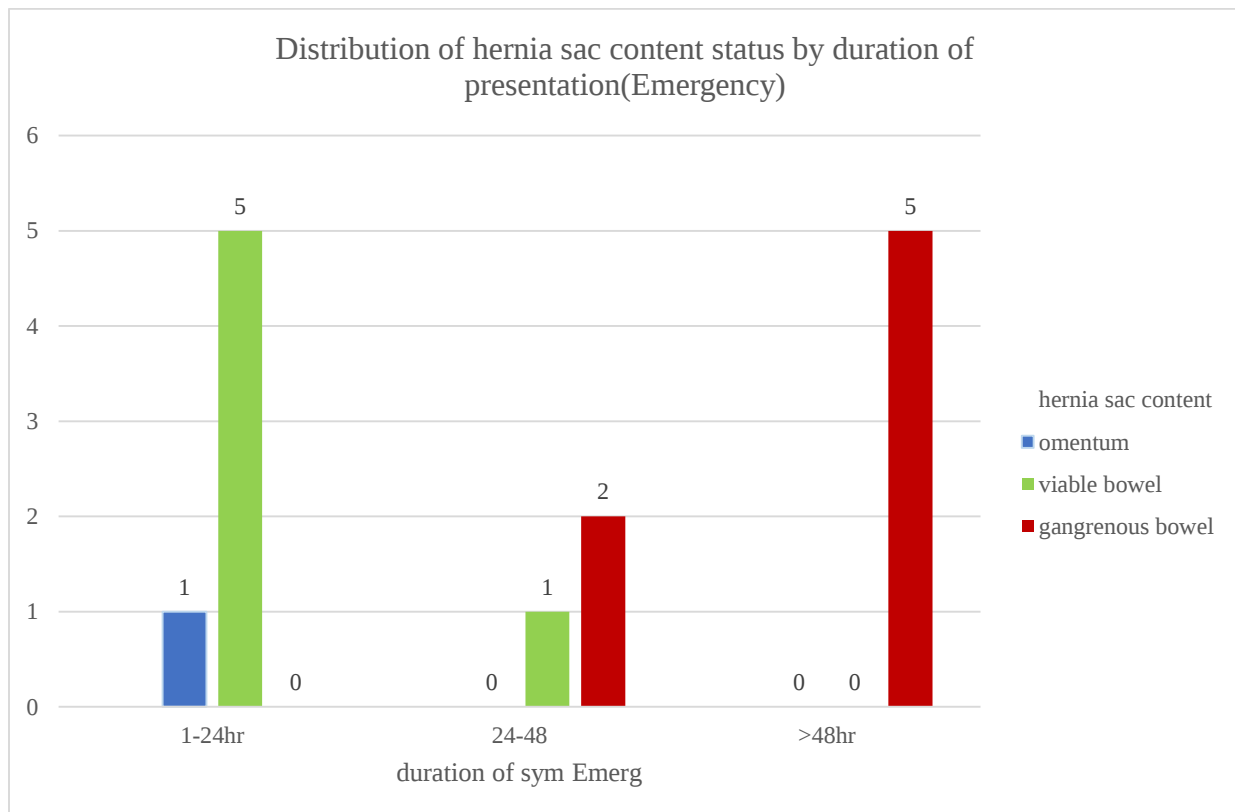


Figure 5.3: Hernia Sac Content in Relation to Duration of Symptoms Among Emergency Cases

5.6 Surgical treatment outcomes, length of hospital stays and follow up

In this most of patients have good postoperative outcome accounts for 95 (83.3%) patients. Bad postoperative surgical treatment outcomes occurred in 19 patients (16.7%). From these, surgical site infection was the most common, affecting 5 patients (4.3%), followed by seroma in 4 (3.5%) and paralytic ileus in 3 (2.6%). Hematoma and recurrence each occurred in 2 patients (1.8%). Reoperation was required in two patients (1.8%), one due to anastomotic leak and another due to groin numbness with ilioinguinal nerve entrapment.

The mean length of hospital stay was 2.66 days (range: 2–13 days). Majority of patients 89 (78.1%) were discharged within 2 days and most of patients 93(82.3%) had once visit during post operative period of 30 days. One patient died so no follow-up possible.

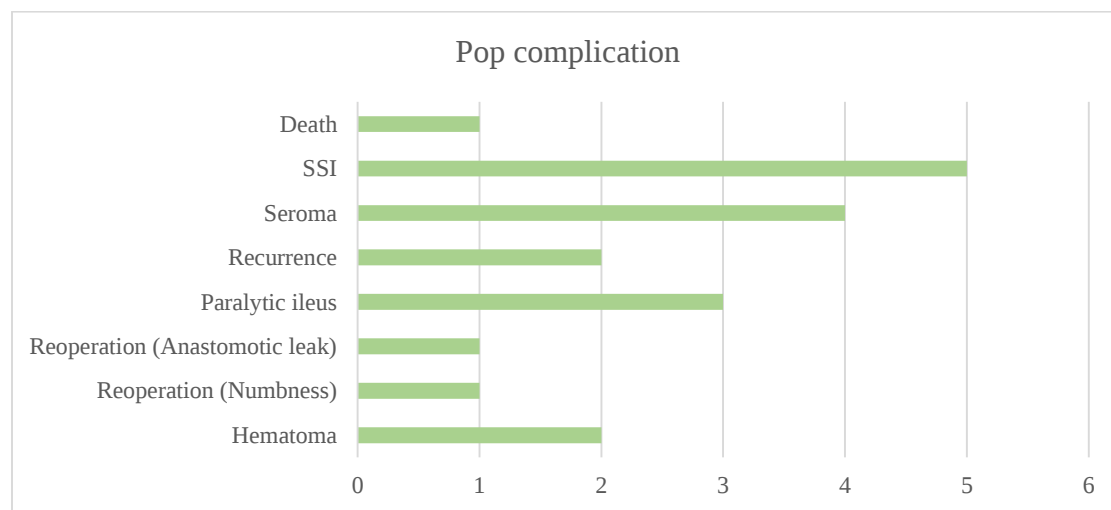


Figure 5.4: Frequency of bad surgical outcomes

Table 5.5: length of hospital stays and follow up visit of patients underwent inguinal hernia repair(n=114)

		Frequency	Percent %
Length of hospital stay (day)	≤ 3	100	87.7
	>3	14	12.3
	Total	114	100.00
follow up visit	Once	93	82.3%
	Twice	20	17.7%
	Total	113.00	99.90

5.7 Factors Associated with Post-Operative Complications

Bivariate analysis: Variables missed more than 10% were excluded from the analysis. In this study, independent variables such as age, sex, Smoking history, Comorbidities, Type of hernia, duration of symptoms, mode of presentation, surgical technique, type of anesthesia and duration of surgery were analyzed first by bivariable logistic regression.

Simple binary logistic regression was used to look for important factors for the development of post-operative complications. Variables having a p-value less than 0.25 were selected to be included in multivariable analysis. These were age category ($p = 0.18$), Emergency mode of presentation ($p = 0.001$), and comorbidity ($p = 0.001$).

Multivariable analysis: As shown in the table below, of the variables included in the multivariable analysis, two of them remain significant at a p-value of 0.05. This was due to the emergency mode of presentation ($p = 0.001$) and the presence of comorbidity ($p < 0.001$). After controlling for age category, the odds of having post-operative complications were 11.9 and 10.6 times higher among those with emergency presentation and comorbidities, respectively, than those with elective presentation and no comorbidities. That means the risk of developing post-operative complications in those presenting for emergency surgery and those with comorbidities was 11.9 and 10.6 times higher compared with those who had elective surgery and no comorbidities.

Table 5.6: Bivariate and Multivariate Logistic Regression Analysis of Factors Associated with Post-Operative Complications

Variables		Complication	Bivariate analysis COR (95% CI)	P-value	Multivariate analysis AOR (95% CI)	p-value
Age Category (yr)	20-40	3/29	1		1	
	40-60	10/65	1		1	
	60-80	5/20	1.7 (0.78-3.8)	0.18		
Mode of presentation	Elective	11/99	1		1	
	Emergency	7/15	7 (2.12-23.07)	0.001	11.9(2.89-49.48)	0.001
Comorbidity	No	10/95	1		1	
	Yes	8/19	6.18 (2.01-18.9)	0.001	10.6(2.6-43.3)	<0.001

6 DISCUSSION

This study assessed the pattern of presentation and early surgical outcomes of inguinal hernia repair among adult patients at Asella Teaching and Referral Hospital. The findings provide insight into patient characteristics, clinical presentation, surgical practices, and factors associated with postoperative complications in comparison with existing regional and international literatures.

In the present study, inguinal hernia predominantly affected males, who constituted 73.7% of the study population, with a male-to-female ratio of 2.8:1. This male predominance is consistent with findings from several studies conducted in Africa and other regions, including reports from Albania and Nigeria, where male-to-female ratios ranged from 4:1 to over 18:1(18,20). The higher incidence among males is largely attributed to anatomical differences in the inguinal canal, delayed closure of the processus vaginalis, and greater exposure of men to heavy physical labor (1)

The most affected age group was 40–60 years (57%). This is comparable with 40-60 years (47.5%) age group reported from Albania study(18). A majority of patients were from rural (67.0%) areas and farmers (45.1%) which aligns with previous African studies(16,20,26).

Majority of hernias in this study were primary (91.2%), indirect (75.4%) and right-sided (63.2%), aligning with Senegalese study reported Primary hernias (92.3%) and indirect hernias 75.9% as the most common subtype. Albania study also reported Indirect inguinal hernias (60%) and right-sided hernias (55.9%) which is also consistent with our study(18,19). right side predominance is due to failure of closure of the processus vaginalis and the later descent of the right testicle(2).

At presentation, the majority of patients (73.7%) had reducible hernia. Hernia was incarcerated (irreducible) in 15% of patients, obstructed in 5.2%, and gangrenous in 6.1%. These findings are consistent with a Nigerian study, in which hernias were incarcerated in 9.6% of patients, obstructed in 8.9%, and strangulated in 5.2%(7). Contrary to this study, a Tanzanian study reported that at presentation, 208 (46.0%) patients had reducible hernia, 110 (24.3%) had irreducible hernia, 84 (18.6%) had obstructed hernia, and 50 (11.1%) had strangulated hernia(29). This difference may be explained by variations in mode of presentation, and duration of symptoms. In our study, emergency presentation accounted for 11.4%, and nearly half (50%) of patients presented within a year of symptom onset. By contrast, in the Tanzanian study, emergency admission was more common (38.5%), and most patients (44.7%) presented late (more than five years after onset), highlighting the burden of delayed diagnosis and intervention.

Overall, 19 (16.8%) patients had one comorbid condition. The most frequently observed comorbidities were heart disease and hypertension, each affecting 6 (5.3%) patients, followed by chronic cough in 5 patients (4.4%) and diabetes mellitus in 2 patients (1.8%).

The majority of patients were classified as ASA I, 86 (75.4%) cases. ASA III accounted for 5 (4.4%) and in 9 (7.9%) cases ASA status was not documented. This distribution is comparable to findings from other elective-dominant hernia repair series in Africa(26). This distribution suggests that the majority of patients undergoing hernia repair in this setting were relatively fit, which is consistent with the elective nature of most presentations. Lack documentation on ASA status of 7 highlights a gap in clinical documentation that warrants improvement.

In the present study, most patients (88.6%) underwent elective repair, while only 11.4% presented as emergencies. This emergency rate is lower than those reported in several African studies, where emergency presentations ranged from 25% to over 40%(12).

Spinal anesthesia was the most commonly used anesthetic technique, administered to 100 patients (87.7%). General anesthesia was used in 12 patients (10.5%), while local anesthesia was used in 2 patients (1.8%). General anesthesia was administered to 11 emergency cases out of thirteen and Local anesthesia was given for 2 patients, one patient had ASA class III and ischemic heart disease to be on safe side and in another patient, BP was raised significantly before anesthesia in the morning of surgery. Contrary to this Hernia Surge guideline 2023, recommends local anesthesia to be safe and effective for all uncomplicated cases (28).

Antibiotic prophylaxis was administered in just over half of the patients (53.5%), while 7.9% did not receive prophylaxis and documentation was missing for 38.6%. International hernia guidelines generally recommend prophylactic antibiotics for mesh repairs, given the risk of surgical site infection associated with foreign material implantation(30). In contrast, for tissue-based repairs, routine prophylaxis is often considered unnecessary unless patients present with comorbidities, contaminated fields, or emergency conditions. The variability in antibiotic use highlights inconsistencies in perioperative protocols. The relatively low rate of mesh use in this study may partly explain the moderate uptake of prophylaxis. However, the high proportion of undocumented antibiotic status underscores a gap in record-keeping and adherence to standardized perioperative protocols.

Desarda repair was the most commonly used technique in this study, performed in 68.4% of patients, followed by Modified Bassini repair in 23.2%. Mesh repair (Lichtenstein) was used in only 8.8% of cases (10 patients). Nine recurrent hernias (9 cases) and one patient with a primary bilateral hernia underwent mesh repair. Unlike many African studies where Modified Bassini repair is the most common technique(12,16,20,29), Desarda repair predominated here.

Intra-operatively, among those with identifiable sac contents, omentum was the most common, observed in (14.9%) patients, followed by viable bowel in (5.3%) patients and gangrenous bowel

in (6.1%) for which resection and anastomosis was done. Importantly, all patients with gangrenous bowel had presented more than 24 hours after the onset of acute symptoms. This finding reinforces the critical role of timely intervention in preventing ischemic complications.

The overall postoperative complication rate in this study was 16.7%. Surgical site infection was the most common complication (4.3%), followed by seroma (3.5%) and paralytic ileus (2.6%). These rates are comparable to those reported in studies from other low-income countries, although slightly higher than rates reported in elective-only series from high-income settings(7,8,29). The higher complication rate observed may be explained by the inclusion of emergency cases and patients with complicated hernias.

Early recurrence was documented in 1.8% of patients. However, given the short follow-up period, this figure should be interpreted with caution, as true recurrence rates are better assessed over long-term follow-up. One postoperative mortality (0.9%) was recorded, occurring in a patient with complicated hernia requiring bowel resection, which aligns with literature showing higher mortality among emergency and complicated hernia repairs.(7)

The mean length of hospital stay was 2.66 days, with the majority of patients discharged within two days. There were 2 complicated patients out of them one patient reoperated stayed 13 days in hospital and other patient was also patient who was died after 10 days hospital stay complicated by SSI and died of ischemic heart disease. This relatively short hospital stay reflects favorable postoperative recovery in most elective cases and aligns with findings from similar settings(18).

Multivariable logistic regression analysis identified emergency presentation and presence of comorbidity, as independent predictors of postoperative complications. These findings are consistent with previous studies from Africa. Tanzania study reported complication rate was significantly higher in emergency herniorrhaphy than in elective herniorrhaphy (34.6% versus 15.9%) ($p = 0.002$)(29). Large Swedish registry reported emergency (OR ≈ 408) and a 30-day mortality of 2.7% (OR ≈ 11.6) compared with elective operations(11).

Another Nigerian multicentric study reported pop complication significantly more frequently in association bowel resection ($P < 0.001$), emergency repair ($P < 0.001$), and delayed presentation (> 24 hours; odds ratio [OR], 13.42; 95% confidence interval [CI], 6.74-29.44; $P = 0.001$), strangulated hernias (OR, 3.34; 95% CI, 2.85-11.16; $P = 0.02$), comorbidities (OR, 6.72; 95% CI, 10.42-37.55; $P = 0.01$)(13).this highlighting late presentation in case of emergency increase morbidity.

7 CONCLUSION

This study was aimed at assessing the pattern and early surgical outcomes of inguinal hernia repair and its associated factors among adult patients at Asella Teaching and Referral Hospital.

The findings of this study showed that inguinal hernia predominantly affected male patients, who accounted.

The majority of patients were middle-aged adults, 40–60 year age group, accounted for (43%), Most hernias were primary and elective admission constituted the majority of cases.

Early postoperative outcomes were generally acceptable. However, emergency presentation and comorbid conditions significantly increased the risk of complications. Optimizing comorbidities and strengthening elective surgical services may improve outcomes in our settings.

STRENGTHS OF THE STUDY

This study provides valuable institution-based evidence on the pattern and early surgical outcomes of inguinal hernia repair in a resource-limited setting, where published data remain limited

Uses standardized operational definitions and a structured data extraction tool

Findings offer practical insights that are providing information on surgical care and serve as reference for future prospective and multicenter studies

8 LIMITATIONS OF THE STUDY

This study was based on a retrospective review of medical charts. Some clinical variables, including ASA classification and antibiotic prophylaxis, were inconsistently recorded, which limited detailed analysis of these factors.

The study was conducted in a single tertiary hospital, which may limit the applicability of the findings to other healthcare settings

Additionally, the study was based on a retrospective review of medical charts, detailed subgroup analysis of some clinical and operative factors such as surgeon/anesthesiologist experience was not difficult to be included.

Although the associations were statistically significant, small sample size resulted in wider confidence intervals.

9 RECOMMENDATIONS

Based on the findings of this study, the following recommendations are proposed:

Clinical Practice

- Early diagnosis and timely elective repair of inguinal hernias should be encouraged to reduce emergency presentations and associated complications.
- Patients with identified comorbid conditions should undergo careful preoperative evaluation and optimization to minimize postoperative morbidity.
- Increased use of local anesthesia for uncomplicated inguinal hernia repair should be promoted in line with international guidelines, where feasible.

Future Research

- Multicenter prospective studies involving larger sample sizes would provide more generalizable evidence on inguinal hernia management and outcomes in Ethiopia.

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Annex: Data Collection Tool

Pattern and Early Surgical Outcomes of Inguinal Hernia Repair among Adult Patients at Asella Teaching and Referral Hospital

Identification No: _____

Sociodemographic Data

1. Age (years): _____
2. Sex: ☐ Male ☐ Female
3. Residence: ☐ Urban ☐ Rural
4. Occupation: ☐ Farmer ☐ Merchant ☐ Government employee ☐ Private employee ☐ Daily laborer ☐ Housewife ☐ Other (Specify: _____)

Preoperative Data

5. Is comorbidity present? ☐ Yes ☐ No
6. Comorbidity (Tick all that apply): ☐ Diabetes mellitus ☐ Hypertension ☐ Chronic cough ☐ heart disease ☐ Other (Specify: _____)
7. Smoking history: ☐ Yes ☐ No ☐ Not documented
8. ASA Physical Status: ☐ ASA I ☐ ASA II ☐ ASA III ☐ ASA IV ☐ Not documented
9. Type of hernia: ☐ Primary ☐ Recurrent
10. Anatomical type: ☐ Direct ☐ Indirect ☐ Pantaloon
11. Side of hernia: ☐ Right ☐ Left ☐ Bilateral
12. Duration of symptoms (elective): ☐ <1 yr ☐ 1-5 years ☐ >5 years
13. Symptoms at presentation (Tick all that apply): ☐ Groin swelling ☐ Groin pain ☐ Irreducibility ☐ Vomiting ☐ Constipation ☐ Abdominal pain
14. Status of hernia at presentation: ☐ Irreducible (Incarcerated) ☐ Obstructed ☐ Strangulated ☐ Reducible

Intraoperative Data

15. Mode of presentation: ☐ Elective ☐ Emergency
16. Duration of symptoms (emergency): ☐ 1-24 hrs ☐ 24-48 hrs ☐ >48 hrs
16. Antibiotic prophylaxis? ☐ Yes ☐ No ☐ Not documented
17. Type of anesthesia: ☐ Local ☐ Spinal ☐ General
18. Surgical technique: ☐ Modified Bassini ☐ Desarda ☐ Open mesh ☐ Lichtenstein
19. Hernia sac content: ☐ Omentum ☐ Viable bowel ☐ Gangrenous bowel ☐ Other (Specify: _____)
20. Management if complicated: ☐ Reduction only ☐ Resection and anastomosis ☐ Stoma formation ☐ Omentectomy
21. Duration of surgery: ☐ <1hr ☐ 1-2hr ☐ >2hr

Postoperative Data

22. Postoperative complications? ☐ Yes ☐ No

23. Identification No: _____

24. If yes, specify (Tick all that apply): ☐ Surgical site infection ☐ Hematoma ☐ Seroma ☐
Urinary retention ☐ Numbness ☐ Reoperation ☐ Paralytic ileus ☐ Other (Specify:
_____)

25. Early mortality: ☐ Yes ☐ No

26. Length of hospital stay: _____ days

27. Follow up visit: ☐ Once ☐ Twice ☐ Three+

28. Recurrence documented? ☐ Yes ☐ No

If yes, time to recurrence: ☐ Week 1 ☐ Week 2 ☐ Week 3 ☐ Week

Declaration of Investigator

I, the undersigned student of specialty in general surgery, declare that this thesis proposal is my original work, submitted in partial fulfillment of requirement for the specialty degree of general surgery, to the best of my knowledge.

Name of investigator: _____

Signature: _____

Date: _____

Declaration of Advisors

We, the undersigned, hereby declare that we have carefully reviewed this proposal and provided guidance for its preparation. We confirm that this proposal is ready for defense with our approval as the university advisor(s), and to the best of our knowledge, the work presented meets the academic standards and is in partial fulfillment of requirement for the specialty degree of general surgery.

1. Name of Principal Advisor: Mr. Kabtamu Tolosie (MSc., Assistant Professor of Biostatistics)

Signature: 

Date: _____

2. Name of Co-Advisor1: _____

Signature: _____

Date: _____

3. Name of Head of department: _____

Signature: _____

Date: _____

Examiners' Declaration

We, the undersigned examiners, hereby declare that we have thoroughly examined the proposal presented for partial fulfillment of requirement for the specialty degree of general surgery . After careful review and defense of the proposal, we confirm that it meets the academic standards and requirements of the university. We hereby approve the proposal and consent to the student proceeding with the next steps toward completing the full thesis, which is required for the award of the degree.

Name of Examiner 1: _____

Signature: _____

Date: _____

Name of Examiner 2: _____

Signature: _____

Date: _____