

ADDIS ABABA UNIVERSITY
COLLEGE OF HEALTH SCIENCES
SCHOOL OF MEDICINE
DEPARTMENT OF SURGERY COLORECTAL
SURGERY UNIT



**RECURRENCE AFTER FISTULA IN ANO SURGERY AND ITS
ASSOCIATED FACTORS, AT TIKUR ANBESSA SPECIALIZED
HOSPITAL AND ZEWDITU MEMORIAL HOSPITAL IN ADDIS ABABA
ETHIOPIA, A TWO-YEAR RETROSPECTIVE MEDICAL RECORD
REVIEW STUDY.**

BY:

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JULY, 2025

Addis Ababa, Ethiopia

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ETHIOPIA, A TWO-YEAR RETROSPECTIVE MEDICAL RECORD
REVIEW STUDY FROM JULY 1,2022-JUNE 30,2024.**

A THESIS SUBMITTED TO THE DEPARTMENT OF SURGERY, COLLEGE OF HEALTH SCIENCES, ADDIS ABABA UNIVERSITY, IN PARTIAL FULFILLMENT OF THE REQUIREMENT FOR THE CERTIFICATE OF **SUBSPECIALITY IN COLORECTAL SURGERY.**

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Declaration

This is to certify that this thesis entitled “**recurrence after Fistula in Ano surgery and its associated factors, a retrospective medical record review study**” at Tikur Anbessa Specialized Hospital and Zewditu Memorial Hospital, submitted in partial fulfillment of the requirements for certificate of “**subspecialty in colorectal surgery**” of Department of Surgery, AAU-CHS. It is a record of original work carried out by me and has never been submitted to this or any other institution to get any other degree or certificates. The assistance and help I received during the course of this research have been duly acknowledged.

Dr. DESTAW BIADGIE

SIGNATURE _____

Name of the candidate

Date _____

Approval for thesis defense

I hereby certify that I have supervised, read, and evaluated this research entitled “**recurrence after Fistula in Ano surgery and its associated factors, a retrospective medical record review study** at Tikur Anbessa Specialized Hospital and Zewditu Memorial Hospital” Addis Ababa, **Ethiopia**, prepared under my guidance. I recommend this thesis to be defended at the department of surgery, CHS-AAU.

1. Professor Berhanu Kotisso

Advisor's name

Signature

Date

Approval of Thesis Evaluators

We hereby certify that we have examined this thesis entitled “**recurrence after fistula in Ano surgery and its associated factors, a retrospective medical record review study**” at Tikur Anbessa Specialized Hospital and Zewditu Memorial Hospital, Addis Ababa, Ethiopia. We approve this thesis for partial fulfillment for the requirements of the **Certificate of subspecialty in Colorectal Surgery** at Department of Surgery, Addis Ababa University college of health sciences.

Board of examiners

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Examiner's name	Signature	Date
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Examiner's name	Signature	Date.

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Acronyms and abbreviations

AAU: Addis Ababa University

ASCRS: American Society of Colon and Rectal Surgeons

CHS: College of Health Sciences

CT: Computed Tomography Scan

ERAUS: Endoscopic Rectal and Anal Ultrasound.

ETB: Ethiopian Birr

EMR: Electronic Medical Record

FIA: Fistula In Ano

FiLaC: **F**istula **L**aser **C**losure

FMOH: Federal Ministry of Health

GI: Gastro-Intestinal

IBD: Inflammatory Bowel Disease

LIFT: Ligation of Inter-Sphincteric Fistula Tract

MRI: Magnetic Resonance Imaging

MRN: Medical Record Number

RMAF: Rectal Mucosal Advancement Flap

TASH: Tikur Anbessa Specialized Hospital

TROPIS: TRans anal OPening of the Inter-sphincteric Space.

VAAFT: Video Assisted Anal Fistula Treatment.

ZMH: Zewditu Memorial Hospital.

Abstract

Background: Fistula-in Ano (FIA) is a benign disease and its surgical management is still challenging since antiquity. Recurrence and persistent of fistula continue to frustrate both patients and treating physicians and it affects quality of life of patients. The main objective of this study was to determine the overall recurrence rate after FIA surgery and to identify factors associated with it at Tikur Anbessa Specialized Hospital (TASH) and Zewditu Memorial Hospital (ZMH) in Addis Ababa, Ethiopia.

Method and Materials: We conducted a Retrospective medical record review of patients after surgery in two hospitals (TASH and ZMH) from July 1,2022-June 31,2024 the patient's medical record in electronic forms and hard copy of the medical record was reviewed to collect the variables (with a well-structured check-lists), the missed information was collected through phone calls. Data was entered to SPSS version 25. Descriptive statistics was performed to characterize socio- demographics, characters of fistula, procedure types, surgical outcomes. Bivariable and multivariable logistic regression was performed to determine the factors that affect the rate of recurrence. Adjusted odds ratio (AOR) with 95% confidence interval (CI) was used to assess strength of associations and $p\text{-value} \leq 0.05$ was taken as significance to determine factors affecting recurrence.

Results: From the total 170 patients included in this study 138 were males and 38 years of median age (range 18-79 years) and median follow of 11 months (range 6-24 months. Thirteen (7.7 %) of patients had recurrence and 12(7.1%) patients had presentence of fistulas. Comorbidity significantly increased the odds of having persistence of FIA after surgery (AOR 31.786 ;95% CI 1.924-352.630; $p\text{-value}=0.005$) whereas patients who had **non-sphincteric sparing procedure** were protective form developing persistence of FIA by 84.5% (AOR 0.155;95% CI 2.4%-84.7 %); $p\text{ value}= 0.050$) but no predictors found to affect the recurrence rate on multi-variable logistic regression.

Conclusions: Recurrence and persistence of the FIA were 7.7 and 7.1 respectively in our study. Comorbidities increased the persistence of the FIA but non-sphincteric sparing surgical procedure prevents it. No significant predictors were found for the recurrence after FIA surgery. Strategies that optimize preoperative patient selection, addressing the medical comorbidities and tailor procedure choice to fistula anatomy my reduce the persistence of fistula and recurrence.

1. Introduction

1.1. Background

Anorectal fistula, or Fistula in Ano (FIA), is the communications of two epithelialized structures: the perianal skin and anorectum. It is one of the common anorectal problems which has been recognized since ancient times. Fistula persistence is the re-appearance of symptoms within 6 months while recurrence is defined as the appearance of symptoms beyond 6 months at its original place after healing was confirmed. Though FIA is a benign disease, persistence or recurrence is common, and it remains a significant cause of disappointment for both the patient and the surgeon [1-3]. In a systematic review and metaanalysis, the recurrence rate was estimated to range from 9.5 to 69 %, depending on the surgical approach used [4].

The primary goal of anal fistula surgery is to eliminate the fistulous tract while minimizing the risk of recurrence and preserving anal continence. Surgical options vary depending on the type of fistula (simple vs complex) [5,6]. According to literatures, there is no universally accepted **“gold standard” surgical procedure** for the optimal treatment of FIA. As such there is no superior surgical treatment options for FIA, so surgeons who are involved in treatment of FIA should be familiar with all available options. The surgical treatment outcomes depend on the etiology, complexity and multiple other factors. For simple inter-sphincteric fistulas, fistulotomy is the procedure of choice. For simple low trans-sphincteric fistulas selective fistulotomy or sphincter sparing surgery is treatment options. For complex fistulas, only sphincter sparing surgical techniques are recommended including procedures such as LIFT (ligature of the inter-sphincteric fistula tract), RMAF (rectal mucosal advancement flap), TROPIS (trans anal opening of the inter-sphincteric space), FiLaC (Fistula Laser Closure), and VAAFT (Video Assisted Anal Fistula Treatment) [7].

Recurrence after surgical intervention for anal fistula is common, challenging and often requires additional surgeries and affecting the patient's quality of life [8]. Despite advances in surgical techniques, recurrence rates remain high and the factors predicting recurrence are not well understood. However, a literature review conducted in Great Britain identified several factors that increase the likelihood of recurrence after fistula surgeries. These include Park's type III and IV fistulae, horseshoe-type fistulas, inter-sphincteric fistulas with high tract openings,

high inter-sphincteric fistula without perianal opening or with pelvic extensions, presence of comorbidities, unidentified internal opening, presence of proctitis (e.g. IBD), improper surgical techniques, lack of surgeon's experience, and failure to completely excise the fistulous tract [4]. Another meta-analysis conducted in China regarding risk factors for recurrence after fistula surgery showed high trans-sphincteric fistula, internal opening an unidentified, and horse shoe extensions, prior anal surgery, seton placement surgery, multiple tracts are significantly associated with recurrence [9].

1.2 statement of the problem

Fistula in Ano (FIA) is a common and challenging condition that often requires surgical treatment. Despite advancements in surgical techniques, recurrence rate remains significant which impacts on patient quality of life and health care costs [8,10]. FIA is a benign proctologic disease encountered in colorectal surgery practice.

Limited data is found in Ethiopia and Africa that compares recurrence rate and factors affecting it. There is no research done regarding recurrence after surgery for FIA and its associated factors in TASH as well as ZMH. Hence the importance of an accurate data regarding recurrence after FIA surgery and associated factors is indisputable. A retrospective study conducted at Menelik II Hospital in Addis Ababa, Ethiopia, on the pattern and outcomes of colorectal and perianal surgery, found that FIA was the commonest among perianal conditions requiring admission, with fistulotomy was the most common procedures performed [11].

Another study conducted at Adma Hospital Medical College in Ethiopia reported an operative failure rate (recurrence) of 8.3%. The failure rate is associated with patients having a previous history of surgery and high type FIA [12]. In Africa, a study done in Ghana revealed an overall recurrence rate 22.5%, with recurrence after surgery being significantly associated with multiple curved tracts and fistulas with comorbidities [13]. Therefore, this study aims to fill the gap by systematically investigating the recurrence rates following surgery of FIAs and identifying the associated factors. By doing so, it will contribute to a deeper understanding of the condition, and guiding surgeons in improving surgical out comes and patient care.

1.3 Significance of the study

Knowing about the outcome of FIA surgery has paramount importance to the institutions as well as the practicing surgeons to design proper strategic plan and patient management plan for this ancient devastating disease which has a great impact on patients' health and quality of life.

By conducting this study, we determine the overall recurrence rate and persistence of the fistulas after surgery and identify factors which are related to these recurrence rates. The result helps to evaluate the experiences of the two hospitals and analyze the magnitude of the problem. It also helps to compare the results from other studies and to design an appropriate surgical treatment outline as well as preventive measures.

Understanding the recurrence rate and the associated factors provides practicing surgeons with insights into their current practice helping them assess whether their approach aligns with latest surgical treatment options. The findings may also help for the two institutions to develop strategies to address the problem. Furthermore, the results of this study can serve as a baseline for future research and may be used in systematic reviews and metanalysis.

2.Literature Review

2.1. Epidemiology and pathogenesis of FIA.

The underlined causes of FIA remain incompletely understood. However, studies showed that multiple factors are associated with its formation, including histologic, microbiological, molecular and anatomical. Approximately 30-70 % of patients who undergo drainage of a cryptoglandular abscess will develop FIA. Patient and surgical factors, along with histological, microbiological and molecular factors, likely play role on its persistence or recurrence. Good understanding of the pathogenesis is crucial for the surgeon to effectively treat patients with FIA, achieve excellent outcomes and develop novel therapies [14,15].

The true prevalence of FIA is not known but in some European countries the overall prevalence of anal fistulas is 18.37 /100,000 individuals (ranges from 8.6 /100,000 individuals in Finland to 23.2 /100,000 in Italy). However, no further study done in other Continents regarding prevalence of FIAs [16]. The mean age for presentation of anal fistula disease is around 40 years (range from 20-60 years). Adult males are twice as likely to develop fistula -in-ano compared with females [17].

2.2. Diagnosis and work up of FIA.

Patients with fistula- in- ano can present with intermittent perianal discharge and swelling. Important information, such as baseline anal sphincter function, history of anorectal surgeries, family history of inflammatory bowel disease (IBD) and malignancy, obstetric history and any associated GI, genitourinary or gynecologic pathology should be included in the patient history. Digital rectal examination (DRE) is of paramount importance in the diagnosis of FIA. A meticulous DRE, including inspection of the perineum to look for an abscess (external opening), surgical scars, anorectal deformities, and gentle probing of an external opening (if tolerated) can help to confirm the diagnosis. However, care must be taken to avoid creating a false tract [18].

Though FIA is easily diagnosed clinically, certain types of fistulas require imaging modalities. Simple FIAs probably do not require preoperative imaging but complex fistulas require preoperative imaging. MRI is the preferred modality of imaging techniques for FIA but Endo Recta and Anal Ultrasound (ERAUS) may be also an option for imaging [5,19].

FIA's are classified based on Park's classification as inter-sphincteric, trans-sphincteric, supra-sphincteric or extra-sphincteric [20]. The ASCRS (American Society of Colon and Rectal Surgery) treatment guideline for fistula classification system is commonly used for management purposes, categorizing FIAs as either simple or complex. Complex fistula includes trans sphincteric fistulas >30 % of the external sphincter involvement, supra-sphincteric, extra-sphincteric, or horse shoe fistulas, as well as fistulas associated with IBD, radiation, malignancy, preexisting fecal incontinence, or chronic diarrhea, recurrent or branching fistula. Additionally, any fistula located anteriorly in females may be considered complex. Simple fistulas are inter-sphincteric and low trans-sphincteric fistulas (<30 %) [5].

Another system of classification is the St. James's university hospital (SJUH) classification, based on the MRI finding: Grade I=inter-sphincteric linear; Grade II=inter-sphincteric with multiple tracts or abscess; Grade III=trans-sphincteric linear; Grade IV=trans-sphincteric with multiple tracts or abscess; Grade V=supra-levator/extra-sphincteric [21].

2.3. Treatment of FIA

The primary goal of surgery for FIA is to eliminate the fistulous tract while minimizing the risk of recurrence and preserving anal continence. There are various surgical options depending on the type of fistula (simple vs complex) [5,6]. **Currently, there is no single recommended surgical technique for FIA, and** no surgical approach has proven superior. Therefore, surgeons who are involved in treatment of FIA should be familiar with all available options. The outcome depends on the etiology, complexity and multiple other factors. Surgical therapy of a specific FIA is influenced by the anatomic relationship of the fistulous tract, patients' presenting symptoms, the quality the surrounding tissue, and any history of previous fistula surgery.

For simple inter-sphincteric fistulas, fistulotomy is the preferred procedure. For simple low trans-sphincteric fistulas, selective fistulotomy or sphincter sparing surgery is treatment options. In the case of complex fistulas only sphincteric sparing surgical techniques are the treatment options. LIFT, RMAF, TRans anal OPening of the Inter-Sphincteric space (TROPIS), Fistula Laser Closure (FiLaC), Video Assisted Anal Fistula Treatment (VAAFT) are some of the sphincteric sparing surgical options for FIA [7]. Though several treatment options available, there is no standardized algorithm to guide the care of the patient with FIA. Therefore, the choice

of treatment depends on patient- related factors, the patient's surgical history, and surgeon's experience and familiarity with the various procedures.

2.3.1 Fistulotomy (lay open technique)

Fistulotomy is an appropriate and most effective surgical treatment for most fistula in ano with a healing rate of more than 90 % with good patient satisfaction and insignificant effect on continence mechanisms. The risk of significant fecal incontinence is minimal if patients are selected appropriately [22-24]. Fistulotomy is the commonest procedure performed for simple type of FIA [11,24-29]. Post-operative incontinence is caused by preoperative incontinence, recurrent disease, female gender, complex fistulas and prior fistula surgeries [30]. Fistulotomy may be accompanied with marsupialization of the wound edges which is associated with less post-operative bleeding and accelerated wound healing. Marsupialization may also reduce the need for post operative analgesics [31-33]. Complications in fistulotomy occurred in 9-25 % of cases, most often limited to minor infection, urinary retention or bleeding [22-24].

Staged fistulotomy involves the use of a draining or cutting seton to gradually divide the fistula tract is an alternative for upfront fistulotomy [24]. healing occurred in 94 % of patients with minor disturbance in incontinence. Horse shoe fistulas are treated with this procedure [34].

2.3.2 Setons

2.3.2.1 Draining seton

The setons primary goal is to drain infection and fell out overtime. There are different materials used as seton: nonabsorbable sutures, vessel loops Penrose drain, silastic catheter, rubber bands etc. Setons are two types based on their function which are draining or cutting. Draining seton is secured loosely. This type of seton is used where there is complex FIA with significant sphincter muscle involvement or significant inflammation. The primary goal of draining seton is adequate drainage and sepsis management as well as tract maturation [35,36].

2.3.2.2. Cutting setons

It is secured tightly such that there is tension and compression on the involved tissue. The seton is serially tighten in the clinic and slowly cuts through the intervening tissues until it fell out, leaving scar behind and preventing a tissue defect from developing. A systematic review

compared rate of recurrence and incontinence with or without division of internal anal sphincter showed similar recurrence rate 5%vs 3% where as there is significance difference in rate of incontinence (5.6 % vs 25.2%) [37,38]. Currently it is not usually recommended unless in the setting of recurrent with exhaustion of other options or when the anatomy is not amenable to other options.

2.3.4 LIFT

Mainly used for the treatment of trans sphincteric FIA [39]. Draining seton may be used before LIFT procedure to promote fibrosis of the tract [36]. According to Rojanasakul, the LIFT procedure pioneer, noted that closure of the tract close to internal opening is the key for success [40]. Meta analysis of published data report that the standard LIFT has resulted in fistula healing 61-94 % of patients with little morbidity, and only rare alterations in fecal continence [41]. It can be used for both simple and complex trans-sphincteric fistulas [22].

2.3.5 Rectal mucosal advancement flap

It is a sphincteric sparing procedure used for the treatment of complex fistulas. It involves curettage of the fistula tract, suture closure of the internal opening, and mobilization of the proximal healthy anorectal mucosa, submucosa, and part of the muscle to cover the site, reported healing rate 66-100% [22,41-43]. Successful healing is also good in repeat procedures [38], factors like prior radiation, underlying CD, active proctitis, rectovaginal fistula, malignancy, obesity and the number of prior attempts is related to failure [44,45]. Incontinence is reported in the range of 0-35 % of patients with average incidence of 12 % [46].

2.4. Recurrence and its associated factors.

The overall recurrence rate after FIA surgery ranges from 7-50%, with recurrence rate varying between 1.5 % and up to 69 % across different types of surgical procedures [4,9 ,10,12,47-51].

A retrospective analysis of the surgical management of anal fistulas at university hospital in Brazil, assessing outcomes and predictors of relapse and anal incontinence, showed an overall recurrence rate of 13 %. However, no significant difference in recurrence rate across different surgical procedures. On the same study, the trans-sphincteric and extra-sphincteric fistula has an association for the recurrence [47].

A study conducted in Spain at two proctology centers (Hospitals of Sagunto and the cl'ínico Universitario de Valencia) from a total of 279 who underwent surgery for FIA of cryptoglandular origin revealed extra-sphincteric and supra-sphincteric fistulas, and unidentified internal opening had significant effect on the recurrence rates [49]. Similar study done in Poland on the identification of internal opening on FIA recurrence found that unidentified internal opening has significant contributed to recurrence [52].

A retrospective electrical review of patients treated surgically at university of Minnesota and affiliated hospitals only for cryptoglandular origins, recurrence occurred in 31 patients (8%), with increases rates associated with the complexity of the fistula, unidentified internal openings, lateral location internal opening, and horseshoe extensions [30].

Factors contributing to recurrence include complex types of fistulas, horseshoe extensions, unidentified internal opening or lateral location of internal openings, previous fistula surgery, the experience of the surgeon performing the procedure. A metanalysis conducted in China identified risk factors for recurrence after anal fistula surgery, including high trans-sphincteric fistulas, unidentified internal opening, and horse shoe extensions, prior anal surgery, seton placement surgeries, and presence of multiple tracts. Poorer healing of FIA was associated with Crohn's disease, high trans-sphincteric fistulas, extra-sphincteric fistulas, and steroid usage [4,10,53,54]. A retrospective case control study of patients with high trans-sphincteric fistula treated with draining seton and predictors for recurrence at Mansoura University Hospital Egypt, showed that anterior location of fistula tract, previous surgical intervention, supra-levator extension and horse shoe fistulas significantly predicted the recurrence of FIA after seton removal [50].

Conceptual frame-work

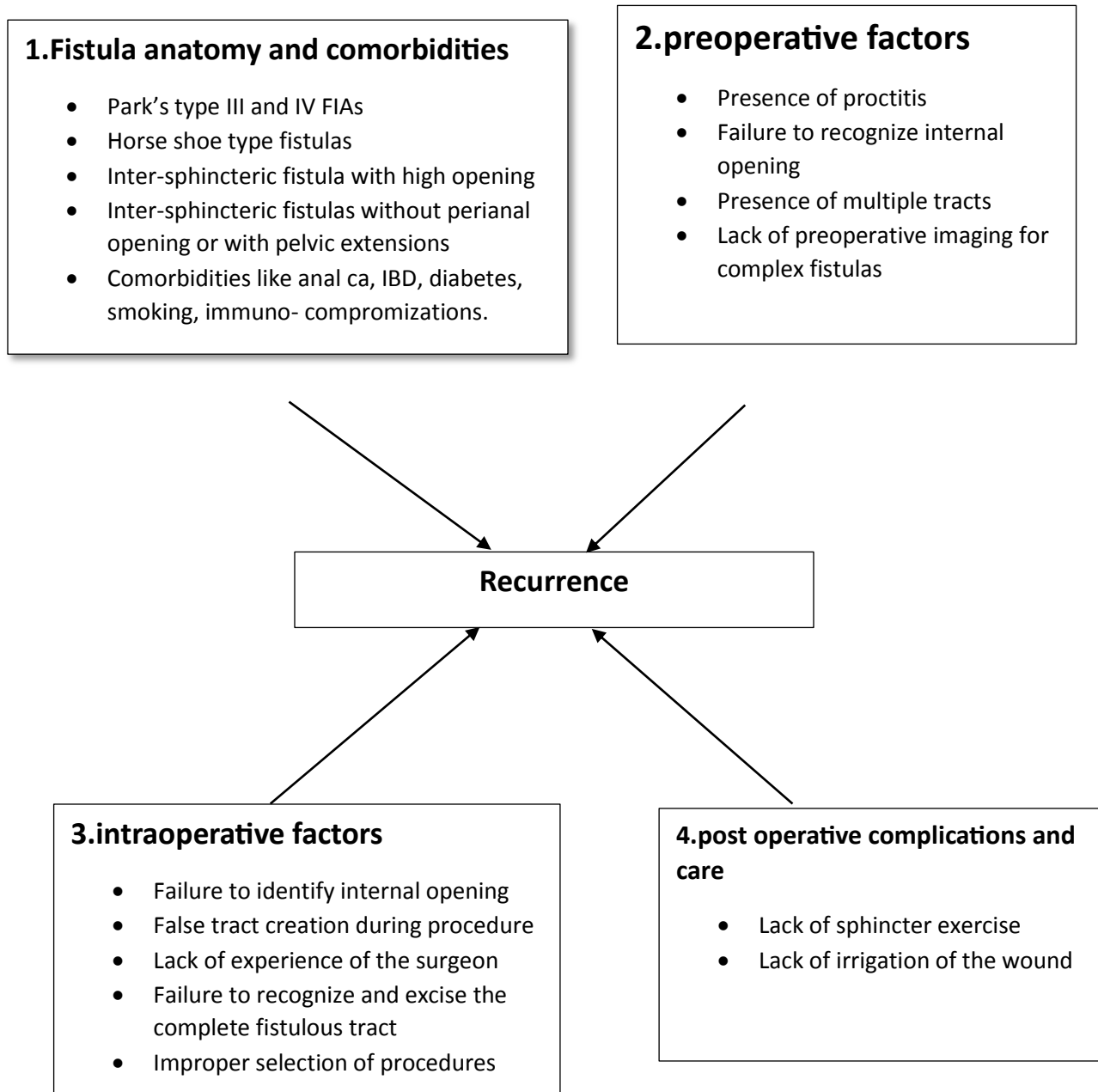


FIGURE 1: CONCEPTUAL FRAME WORK FOR THE STUDY ENTITLED “RECURRENCE AFTER FIA SURGERY AND ITS ASSOCIATED FACTORS IN TASH AND ZMH RETROSPECTIVE MEDICAL RECORD REVIEW STUDY.

3. Objectives

3.1 General objective

- ✓ Assess the overall recurrence /persistence rate after FIA surgery and its associated factors.

3.2 Specific Objectives

- ✓ Determine the overall recurrence after surgical treatment of FIA.
- ✓ Determine the rate of the persistence of fistula after surgical treatment of FIA.
- ✓ Determine factors affecting recurrence/persistence of FIA.

4. Methods and Materials

4.1 Study design and period

A retrospective cross-sectional hospital-based study (retrospective medical cord review) was conducted

from March 1,2025 -May 31 ,2025.

4.2 Study Setting

The study was conducted at Tikur Anbessa Specialized Hospital and Zewditu Memorial Hospital which are located in the capital city of Ethiopia, Addis Ababa. TASH and ZMH (as affiliate of Addis Ababa university) are the two referral hospitals which are giving services for treatment of FIA.

TASH opened in 1972 G.C which was the only site for training of medical doctors.in 1998 G.C TASH, the largest referral hospital in the country ,with over 700 beds was transferred to school by Federal Ministry Of Health(FMOH),and it has since become a university teaching hospital.it is now the main teaching hospital for both clinical and preclinical training of most disciplines.it is also an institution where specialized clinical services that are not available in other hospitals or private institutions are rendered to the whole nation. TASH is one of the biggest hospitals in

Ethiopia which able to manage tertiary care services including the complex fistulas. It is the pioneer institution which has started colorectal surgery fellowship in the country.

Zewditu Memorial Hospital (ZMH), located in Addis Ababa, Ethiopia, is one of the prominent public hospitals in the country. Named after Empress Zewditu, Ethiopia's first female ruler and the first reigning head of state in Africa. Initially set up in the 1970s, it serves as a referral center for general and specialized health care services primary focus on infectious diseases but also gives services like internal medicine, pediatrics, gynecologic and obstetric, surgical and neurosurgical cases. ZMH is also an affiliated hospital for AAU, CHS which is giving colorectal surgery services by general surgery residents, general surgeons, colorectal fellows and colorectal surgeons.

Patients with FIA are getting services at both hospitals. For FIA, different surgical options of treatment are given including fistulotomy, fistulotomy +marsupialization, fistulectomy, draining setons, LIFT and RMAF.

4.3 Population

4.3.1 Source population

All adult patients operated at the colorectal surgery units of TASH and surgical department of ZMH for the diagnosis of FIA from July 1,2022-June 30,2024 G.C.

4.3.2 Study population

All adult patients who are operated for fistula in Ano in TASH and ZMH from July 1,2022-June 30,2024.

4.4 Inclusion and Exclusion criteria

4.4.1 Inclusion criteria

All operated patients for FIA ≥ 18 years with complete charts and respond for phone calls.

4.4.2 exclusion criteria

All patients whose charts are incomplete or missed, obstetric related fistulas and recto vaginal or rectourethral fistulas, patient lost from follow up within 6 months, patients who had previous history surgery for FIA and patients on draining setons who did not have definitive surgery.

4.5 Sample Size Determination and Sampling Methods

The sample size for the recurrence rate after surgery of FIA was determined by a single population proportion formula, based on the 22.5% recurrence reported by Beijiga.G et al. Adma [11]

$$n = (Z_{\alpha/2})^2 * p(1 - p) / d^2 = (1.96)^2 * 0.083(1 - 0.083) / 0.05^2 = 116.9516 = 117$$

where:

n=sample size

$Z_{\alpha/2}$ =95 % confidence interval =1.96

p=estimated proportion = 8.3%=0.083

d=desired precision (margin error) =0.05

the total sample size is 117

non response rate of 10 % =117+(117*0.1) =**128.7=129**

All medical records of consecutive patients who were operated at TASH and ZMH in the period of July2022 -June 30,2024 G.C, by purposeful sampling methods were used to collect data for achieving the objective of the study. A full Coverage survey of twenty-four months records was employed to get minimum required sample size of **129**. During the study period total patients operated in TASH and ZMH, from which all patients' charts/cards met inclusion criteria was included in this study.

4.6 Variables

4.6.1 Dependent variable

Outcome after FIA surgery (persistence, recurrence or healed)

4.6.2 Independent variables

- ✓ Socio demographic characteristics (age, sex, address,)
- ✓ Follow up of patients in months

- ✓ Clinical characteristics (discharge, swelling, pain...)
- ✓ Type of fistulas (simple vs complex)
- ✓ Type of index and final surgery (fistulotomy, fistulotomy+ marsupialization, draining seton, fistulectomy, LIFT, RMAF, others).
- ✓ Types of index /final surgery (non-sphincter sparing vs sphincter sparing)
- ✓ Types of final surgery (non-sphincter sparing vs sphincter sparing)
- ✓ Previous history of abscess drainage
- ✓ Previous history of surgery
- ✓ Location of internal opening
- ✓ Location of external opening
- ✓ Number of external openings
- ✓ Presence of Comorbidities (DM, smoking, IBD, HIV, other).
- ✓ Investigation with MRI or not
- ✓ ASCRS FIA classifications
- ✓ Park's type FIA classifications

4.7 Operational definitions

Recurrence- Reappearance of symptoms(discharge) beyond 6 months of the definitive surgery at similar site from the previous surgery site after wound was confirmed healed.

Persistence of FIA: The continuation or reappearance of symptoms(discharge) within 6 months of the definitive surgery [9,27,28,29].

Sphincter sparing surgeries: Are surgeries which does not require muscle cutting like draining seton, RMAF, LIFT, TROPIS, FiLaC etc.

Non sphincter sparing surgeries: Some fibers of the sphincter muscles are scarified like in the case of fistulotomy, cutting seton and modified Hanley's procedure

Healed: The absence of clinical symptoms and failed to demonstrate an external opening at least at 6 months of the follow up.

Non -healing: Is the presence of discharge after the surgery within 6 months or beyond.

4.8 Data collection and data quality assurance.

Structured data extraction checklist was prepared after through reviewing of varieties of literatures for data abstractions. Two days training was given for the data collectors(interns). The study populations were first identified from registration books of surgical units and operation theatres. Then the patients' medical records were retrieved and data was collected using a pre-prepared checklist by interns. The completeness and consistency of each checklist was done with close supervision by the principal investigator. All the collected data was checked and rechecked and necessary correction was made each day.

4.9 Data processing and analysis

Data was entered into the Statistical Package for the Social Sciences (SPSS) version 25.0(IBM, Statistics, Chicago, IL, USA) for analysis. Descriptive statistics like frequency tables, graphs and descriptive summaries were used to describe the variables. The relationship between the outcome variable with different predictive factors were also determined using Chi-square analysis. Multinomial logistic regression was used to assess the presence of any association between independent variable and persistence of a disease and recurrence rate. Variables with a **p- value <0.2** in the bivariable logistic regression was included in the final multivariable logistic regression analysis. **Crude and adjusted odds ratio** were used to assess and ascertain any association between the independent and dependent variables. **Adjusted Odds Ratio (AOR)** with 95%CI and P-value less than **0.05** were considered as statically significant in this study

4.10. Ethical consideration

Ethical clearance was obtained from research and ethics committee (REC) of department of surgery, CHS, AAU (**protocol No. DOS/REC/122/2024/2017**) and Addis Ababa Health bureau (**REF.N.O. A/A/H /1063/227**) and formal letter was written to ZMH by Addis Ababa health bureau ethical committee. The identifying data found in the patient medical record was kept secured or confidentiality and the personal identifiers such as name was not extracted. Information was kept in SPSS form after analysis of whole data. Finally, after the whole process of data collection, the checklist was kept safe throughout the whole process of the research work until the paper is published.

5. Results

5.1 Patient flow chart

A total of 354 patients were scheduled for FIA surgery at Tikur Anbessa Specialized Hospital (TASH) and Zewditu Memorial Hospital (ZMH) between July 1 ,2022-June 30,2024. Of these,184 patients were excluded from the study and the remaining 170 underwent definitive surgery and included in the final analysis (Figure.2).

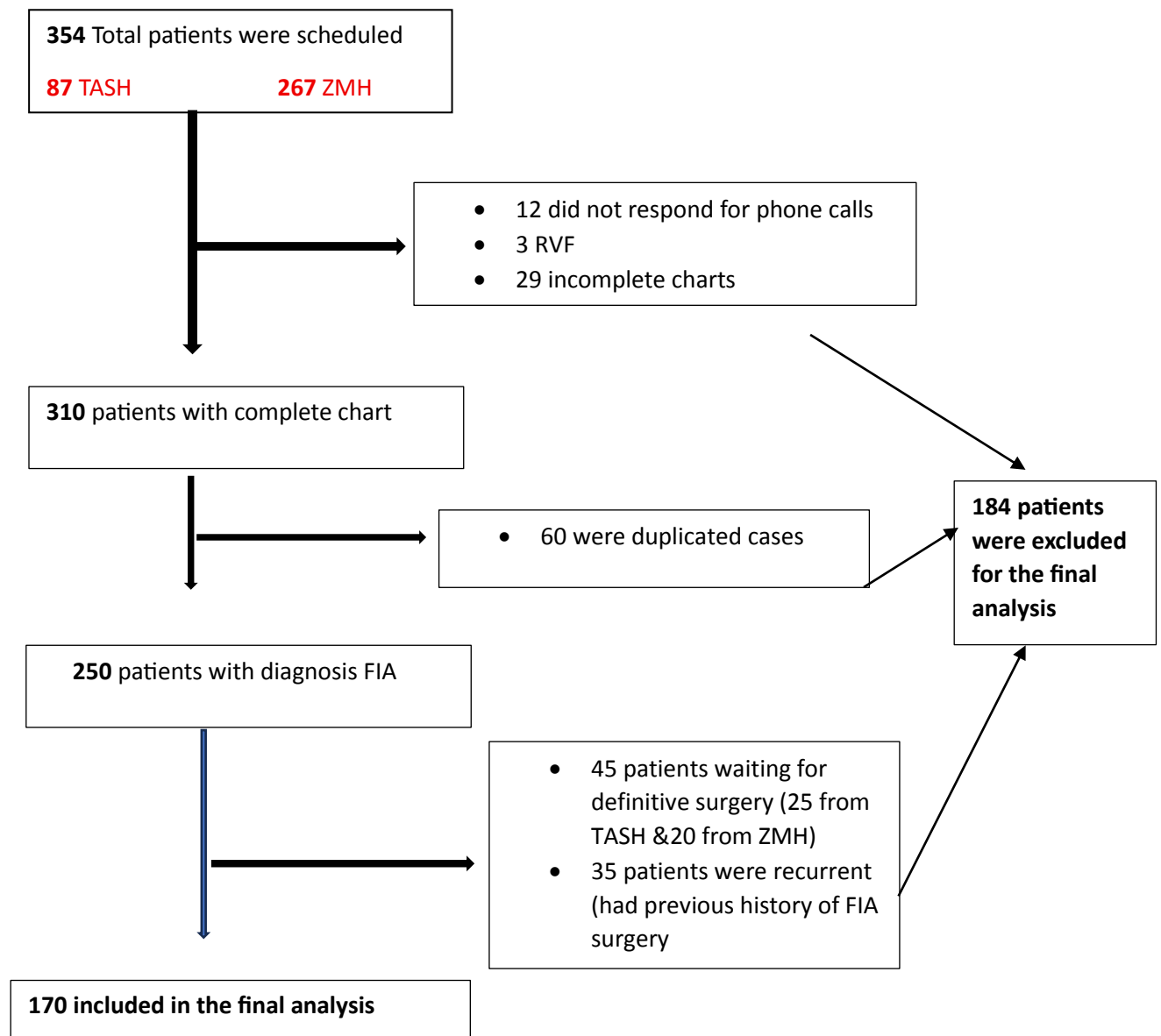


FIGURE 2: PATIENT FLOW CHART OPERATED FOR FIA FROM JULY 1, 2022-JUNE 30 ,2024 AT TASH AND ZMH FROM JULY 1,2022-JUNE30,2024.

5.2. Sociodemographic characteristics of patients.

One hundred seventy (170) patients were included in our study, the median ages of patients were 38 years (range 18-79), males were 138(81.2%). Patients were followed post-operatively with the median follow up of 10 months (range 6-24) and majority of the patients were from Addis Ababa 142(83.5%) and 23(13.5%) from Oromia. Majority of the patients were presented with discharge 102(60%) and the next common clinical presentation were discharge and pain 32 (18.8 %). Twenty-eight **(16.8%)** of patients were having comorbid illnesses. HIV was the commonest 12 (7.1) comorbidities identified. five (2.6%) patients were having IBD(CD). (Table 1).

TABLE 1: SOCIO-DEMOGRAPHIC DATA OF PATIENTS OPERATED AT TASH AND ZMH FROM JULY1,2022-JUNE 30,2024.

Variables	Categorization	N (%)
Age (median, R)		38(18-79)
Sex		
	Male	138(81.2)
	Female	32(18.8)
Hospital		
	TASH	35(20.6)
	ZMH	135(79.4)
Address		
	Addis Ababa	142(83.5)
	Oromia	23(13.5)
	Amhara	4(2.4)
	Other	1(0.6)
Clinical presentation		
	Discharge	102(60)
	Discharge and swelling	29(17.1)
	Discharge and pain	32(18.8)
	Discharge, swelling and pain	4(2.4)
	Swelling	1(0.6)
	Pain	2(1.2)
Follow up in months (median, Range)		10(6-24)
Comorbidities		
	None	142(83.5)
	IBD	5(2.9)
	HIV	12(7.1)
	DM	8(4.7)
	Smoking	2(1.2)
	HIV& DM	1(0.6)

5.3.FIA characteristics.

Among the 170 patients,85(50%) was complex FIA by ASCRS classification. Inter-sphincteric fistula were the commonest type of Park's classification 98 (56.7%). Majority of the fistulas had their internal opening in the posterior aspect of anal opening 115(67.6%) and also the commonest site of external opening was on posterior aspect 87(51.2%). **Seventy-six (44.5 %)** patients were imaged with MRI (magnetic resonant image) (either it was ordered or brought with them from the referral centers). Fifty-six (32.9%) patients had previous abscess drainage (Table 2). Among the study participants of complex fistula by ASCRS (N=35 (41.2%) was diagnosed with MRI and (N=41(48.2 %) of patients from simple FIA had MRI. (Table 3).

TABLE 2: FIA CHARACTERISTICS OF PATIENTS OPERATED AT TASH AND ZMH FROM JULY 1,2022-JUNE 30,2024.

Variables	Categories	N (%)
Location of internal opening	Anterior	32(18.8)
	Lateral	19(11.2)
	Unidentified	4(2.4)
	Posterior	115(67.6)
	Total	170(100)
Location of external opening	Anterior	39(22.9)
	Lateral	23(13.5)
	Multiple	21(12.4)
	Posterior	87(51.2)
	Total	170(100)
MRI	No	94(55.3)
	Yes	76(44.5)
	Total	
ASCRS FIA classification	Simple	85(50)
	Complex	85(50)

	Total	170(100)
Park's classification		
	Inter- sphincteric	98(57.6)
	Trans-sphincteric	18(10.6)
	Supra-sphincteric	1(0.6)
	Extra-sphincteric	3(1.8)
	Horse-shoe type	6(3.5)
	Mixed	1(0.6)
	Unclassified	43(25.3)
	Total	170(100)
Previous history of abscess drainage		
	No	114(67.1)
	Yes	56(32.9)

TABLE 3: MRI REQUEST FOR PATIENTS OPERATED AT TASH AND ZMH FROM JULY 1,2022-JUNE 30,2024.

ASCRS fistula classification	MRI performed			Frequency
	MRI REQUESTED			
	Yes	No	Total	
Complex	35	50	85	35/85(41.2)
Simple	41	44	85	41/85(48.2)
Total	76	114	170	76//170(44.4%)

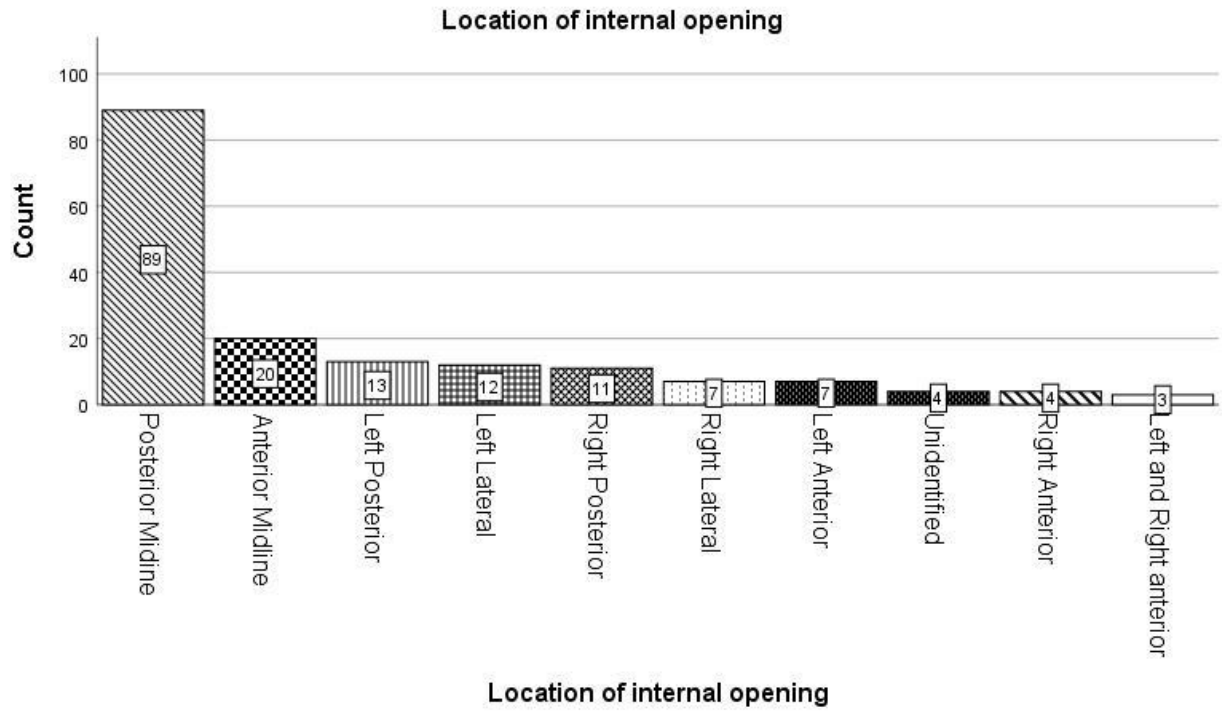


FIGURE 3: LOCATION OF INTERNAL OPENING FOR PATIENTS OPERATED AT TASH AND ZMH FROM JULY1.2022-JUNE 30,2024.

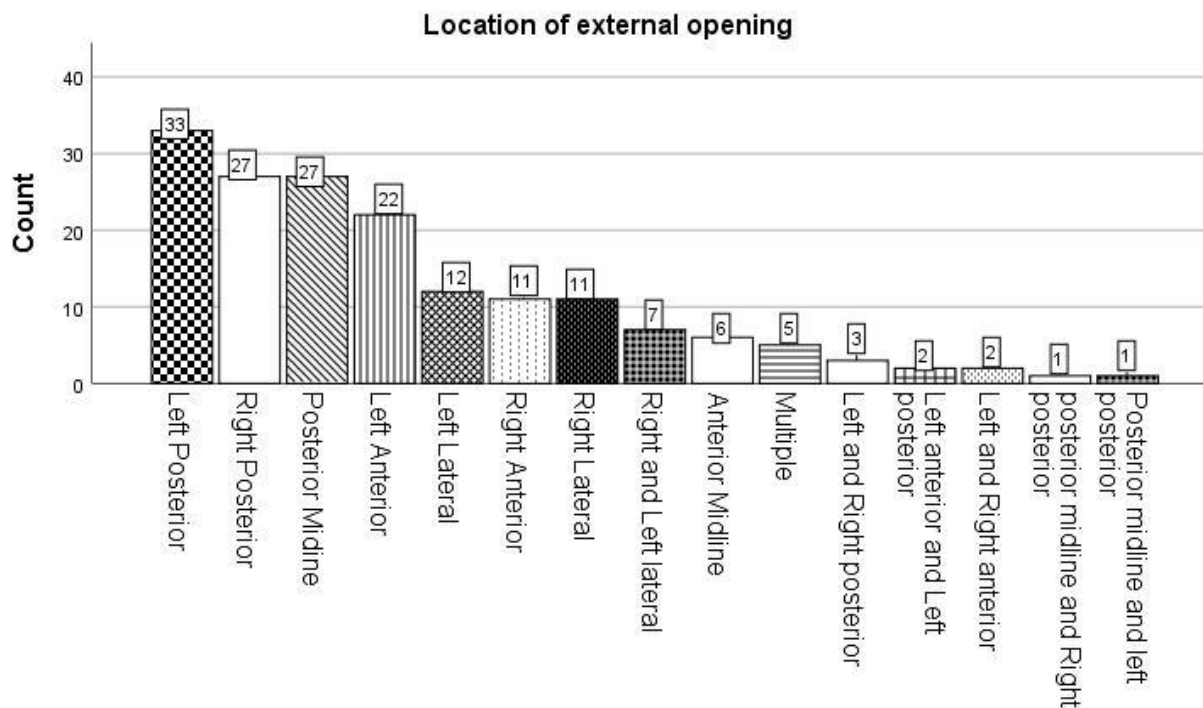


FIGURE 4: LOCATIONS OF EXTERNAL OPENING FOR PATIENTS OPERATED AT TASH AND ZMH FROM JULY 2022-JUNE 30,2024.

5.4 Types of definitive surgery for FIA

The commonest procedure performed for FIA patients were fistulotomy, fistulotomy with marsupialization **120(70.6 %)** as a definitive surgery and **54(31.8 %)** patients underwent draining seton as a bridging procedure. In general, 136 (80 %) patients had non sphincteric sparing surgery and rest underwent sphincteric sparing surgery 34(20%). Among the sphincteric sparing procedures, Rectal Mucosal Advancement Flap (RMAF) was commonly performed procedure (N=29(17.1%) and there was a little experience of the ligation of inter-sphincteric tract (LIFT) 4(2%) and the modified Hanley's procedures 3(1.8%) (Table 4). Among patients who had draining seton as bridging procedure finally 32(59.3 %) patients underwent non-sphincter sparing surgery ,22(40.7 %) of patients underwent fistulotomy and marsupialization (Figure 5)

TABLE 4: TYPES OF FINAL SURGERY FOR PATIENTS OPERATED AT TASH AND ZMH FROM JULY 1,2022-JUNE 30,2024.

Type of final definitive surgery		N (%)
Non-Sphincteric sparing		
	Fistulotomy	46(27.1)
	Fistulotomy +marsupialization	74(43.5)
	Fistulectomy	13(7.6)
	Modified Hanley's procedure	3(1.8)
	Total	136(80)
Sphincteric sparing		
	Rectal mucosal advancement flap (RMAF)	29(17.1)
	Ligation of inter-sphincteric tract (LIFT)	3(1.8)
	Other	2(1.2)
	Total	34(20%)
Grand Total		170(100)

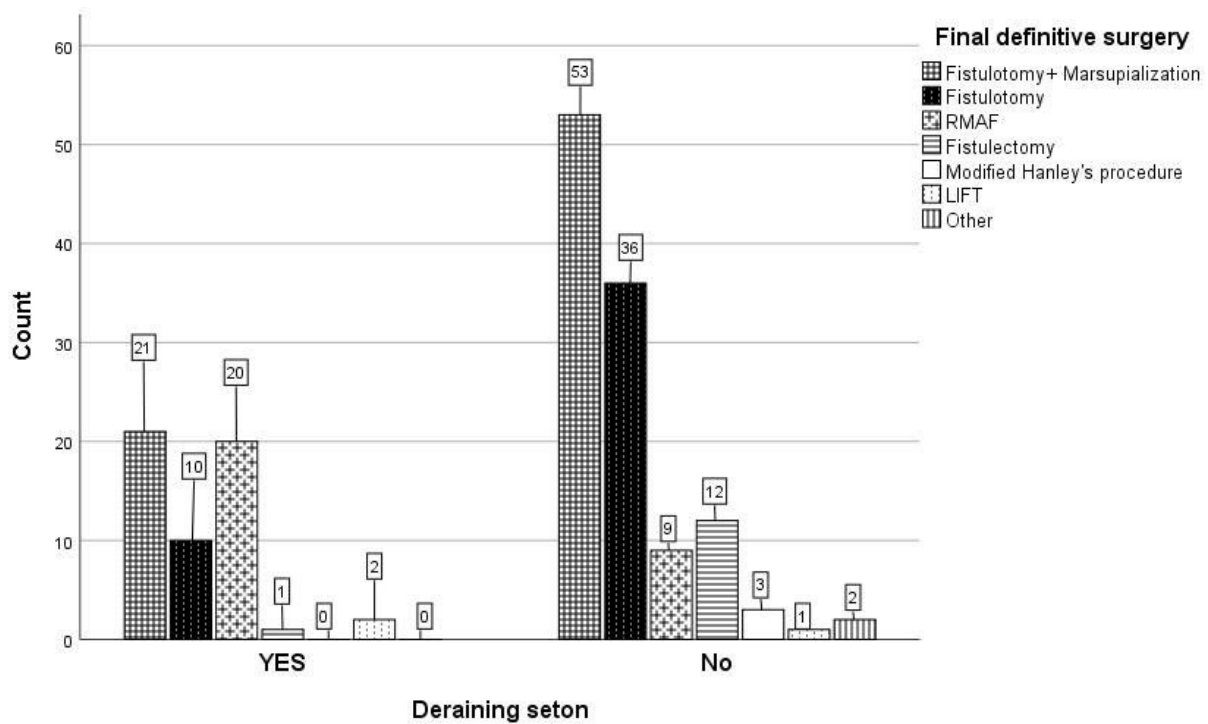


FIGURE 5: TYPES OF FINAL DEFINITIVE SURGERY AFTER DRAINING SETON FOR PATIENTS OPERATED AT TASH&ZMH FROM JULY1,2022-JUNE 30,2024.

5.5 Surgical treatment out-comes of FIA surgery.

Of the total number of 170 patients ,13(7.7 %) had recurrence and 12(7.1%) patients were having persistent fistula in ano after the definitive final surgery were done that makes the total failure rate of the FIA surgery 25(14.8%) (figure 6).

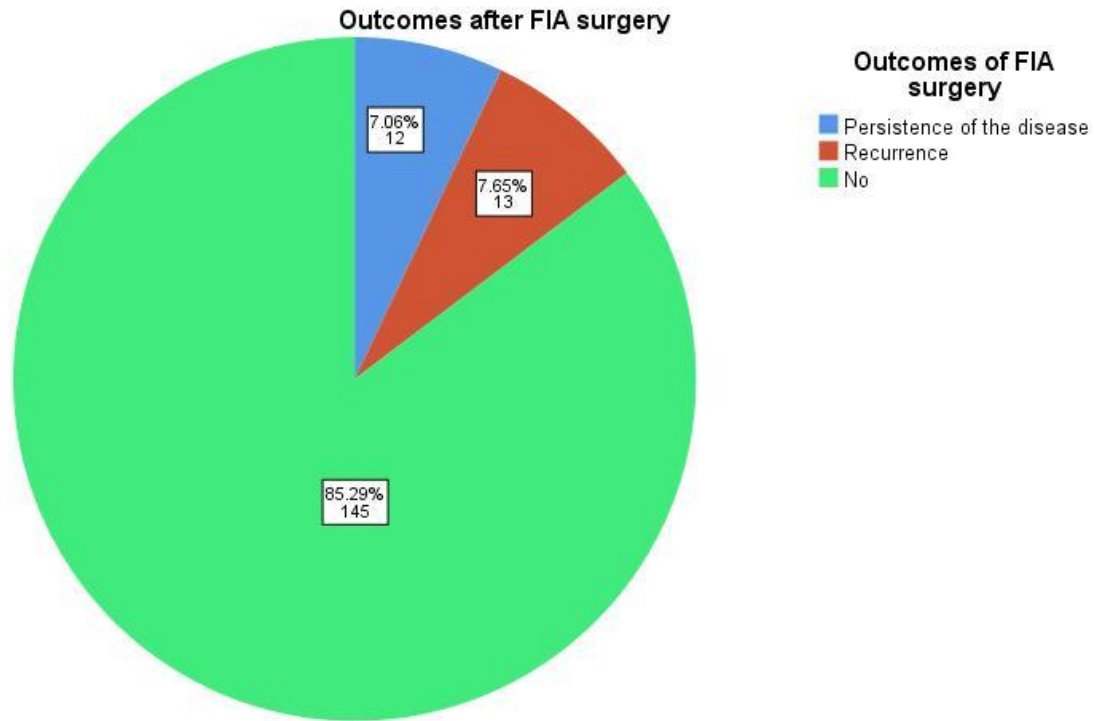


FIGURE 6: SURGICAL TREATMENT OUTCOMES OF FIA SURGERY OPERATED AT TASH AND ZMH FROM JULY 1,2022-JUNE 30,2024.

TABLE 5: SURGICAL TREATMENT OUTCOMES BASED ON THE SPECIFIC TYPES OF SURGICAL PROCEDURES FOR PATIENTS OPERATED AT TASH &ZMH FROM JULY 1,2022-JUNE 30,2024.

Types of final surgery		Outcomes of FIA surgery		
Non -sphincter sparing	Total	Persistence of FIA	Recurrence	Healed
	N	N (%)	N (%)	N (%)
Fistulotomy	46	3(6.5)	1(2.2)	42(91.3)
Fistulotomy with	74	1(1.3)	9(12.2)	64(86.5)
Marsupialization				
Fistulectomy	13	0(0)	1(7.7)	12(92.3)
Modified Hanely's procedure	3	0(0)	0	3(100)

Sphincter sparing				
RMAF	29	7(24)	2(7)	20(69)
LIFT	3	1(33.3)	0(0)	2(66.7)
Other	2	0(0)	0(0)	2(100)
Total	170	12(7.1)	13(7.6)	145(85.2)

TABLE 6: TYPES OF DEFINITIVE SURGERY FOR PATIENTS OPERATED AT TASH & ZMH FROM JULY 1,2022-JUNE 30,2024.

Final definitive surgery	ASCRS FIA classification	
	Simple N (%)	Complex N (%)
Fistulotomy	27(47.4)	32(52.6)
Fistulotomy	43(51.8)	40(48.2)
+marsupialization		
Fistulectomy	13(81.2)	3(18.8)
Cutting seton	0(0)	1(100)
RMAF	1(2.9)	34(97.1)
LIFT	0(0)	5(100)
Modified Hanley's procedure	1(20)	4(80)
Other	0(0)	3(100)

5.6. Factors affecting persistence of diseases and recurrence after FIA surgery

Bi-variable analysis was done and $P\text{-value} \leq 0.2$ was taken as significant to determine the variables that should be included in multivariable multinomial logistic regression. Age, Female sex, previous history of surgery, previous history of abscess drainage, number of external openings, comorbidities ASCRS FIA classifications and park's type of FIA classifications were significantly having the odds of persistence of fistula and recurrence after FIA surgery. These **gender, types of index surgery, types of final surgery, previous history of surgery, previous history of abscess drainage, number of external openings, comorbidities, ASCRS FIA classifications and Park's type of FIA classification** which were having a significant effect on

the outcomes after FIA surgery on bivariable multinomial logistic regression were analyzed by multivariable multinomial logistic regression.

On multi variable multinomial logistic regression, patients with comorbidities had the odds of having more persistence FIA after surgery (AOR 31.786 ;95% CI 2.865—352.630; p-value=0.005) whereas patients who had **non-sphincteric sparing procedure** were protective form developing persistence of FIA by **84.5% (AOR 0.148;95% CI 0.020-0.994; p value= 0.05.)**. But no associated factors were found for recurrence after surgery of FIA. (Table 7and 8).

TABLE 7: BIVARIABLE AND MULTIVARIABLE MULTINOMIAL LOGISTIC REGRESSION ANALYSIS FOR THE OUTCOME OF FIA SURGERY (PERSISTENCE OF FIA) FOR PATIENTS OPERATED AT TASH AND ZMH FROM JULY1.2022-JUNE 30, 2024.

Variables	Bivariable analysis		Multivariable analysis	
	COR (95% CI)	P-value	AOR (95% CI)	P-value
Age	1.029(0.988-1.071)	0.163	1.018(0.957-1.082)	0.578
Gender				
Female	3.269(0.962-11.113)	0.058	2.491(0.460-13.491)	0.290
Male	1		1	
Hospital				
TASH	2.089(0.587-7.433)	0.255	NA	-
ZMH	1			-
Index surgery				
Non sphincteric sparing	0.376(0.113-1.245)	0.109	61.275(0.867-4330.186)	0.058
Sphincteric sparing	1		1	
Final surgery				
Non sphincteric sparing	0.099(0.028-0.356)	<0.000	0.148(0.020-0.994)	0.050
Sphincteric sparing	1		1	
Previous history of abscess drainage				
Yes	2.222(0.679-7.268)	0.187	2.497(0.365-17.072)	0.351
No	1		1	
Number of external openings				
More than two	4.082E-8(4.082E-8)	-	2.061E-6	None

	Two	3.075(0.847-11.170)	0.088	1.890 (0.273-13.069)	0.519
	One	1		1	
MRI					
	Yes	1.231(0.379-3.997)	0.730	-	-
	No	1			
Comorbidities					
	Yes	7.667(2.162-27.183)	0.002	31.786 (2.865-352.630)	0.005
	No	1		1	
ASCRS FIA classification					
	Complex	5.821(1.232-27.504)	0.026	1.173 (0.110-12.502)	0.895
	Simple	1	1	1	
Park's FIA classification					
	Other	8.800(0.678-114.292)	0.096	37.881 (0.717-2001.475)	0.073
	Unclassified	0.178(0.181-5.273)	0.979	0.352 (0.039-3.182)	0.353
	Horse- shoe	4.400(0.412-47.037)	0.220	5.422 (0.094-312.187)	0.414
	Trans-sphincteric	3.520(0.760-16.297)	0.108	5.008 (0.279-89.919)	0.274
	Inter-sphincteric	1	1	1	

NA=Not Applicable

TABLE 8: BIVARIABLE AND MULTIVARIABLE MULTINOMIAL LOGISTIC REGRESSION ANALYSIS FOR THE OUTCOME OF FIA SURGERY (RECURRENCE) FOR PATIENTS OPERATED AT TASH AND ZMH FROM JULY1.2022-JUNE 2024.

Variables		Bivariable analysis		Multivariable analysis	
		COR (95% CI)	P-value	AOR (95% CI)	P-value
Age		1.002(0.960-1.047)	0.910	0.990 (0.941-1.041)	0.694
Sex					
	Female	0.381(0.047-3.064)	0.365	0.394 (0.044-3.516)	0.404
	Male	1		1	
Hospital					
	TASH	1.254(0.324-4.287)	0.744	-	-
	ZMH	1		-	-

Index surgery					
	Non sphincteric sparing	0.614(0.196-1.926)	0.403	-	-
	Sphincteric sparing	1			
Final surgery					
	Non sphincteric sparing	1.091(0.227-5.238)	1.913	1.635 (0.275-9.724)	0.589
	Sphincteric sparing	1		1	
Previous history of abscess drainage					
	Yes	1.389(0.430-4.481)	0.583	1.108 (0.291-4.221)	0.880
	No	1		1	
No. of external openings					
	More than two	3.538E-8(-----)		2.130E-8	
	Two	1.845(0.467-7.290)	0.382	1.218 (0.241-6.147)	0.811
	One	1		1	
MRI					
	Yes	0.769(0.240-2.434)	0.659	-	-
	No	1	1	-	-
Comorbidities					
	Yes	1.704(0.491-5.924)	0.401	2.217 (0.509-9.657)	0.289
	No	1		1	
ASCRS FIA classification					
	Complex	1.863(0.582-5.966)	0.295	1.636 (0.285-9.379)	0.581
	Simple	1		1	
Park's FIA classification					
	Other	11.000(0.816-148.278)	0.071	20.047 (0.915-439.222)	0.054
	Unclassified	3.056(0.776-12.034)	0.110	4.623 (0.667-32.051)	0.121
	Horse- shoe	5.500(0.494-61.208)	0.166	9.310 (0.479-180.917)	0.141
	Trans-sphincteric	2.933(0.493-17.455)	0.237	4.990 (0.602-41.355)	0.136
	Inter-sphincteric	1		1	

6. Discussion.

Fistula in Ano (FIA) is one of the common benign proctologic pathologies known since antiquity till now there is no standardized surgical procedures adopted for different types of FIA. This study was done in a center where colorectal pathologies were managed by the colorectal surgical teams. Most of the FIA surgeries were done by either colorectal surgeons or fellows in recent times unlike other centers where FIA was managed by general surgeons.

As to our knowledge this was the first study done regarding the outcomes of FIA surgeries in Ethiopia as well as in TASH and ZMH where most of the patients were cared by a colorectal surgery unit with variety of procedure mixes, similar study was done in **Adma ,Ethiopia** but procedures done there were less in number and surgeries were performed by general surgeries so this study designed to revise the outcomes of FIA surgeries in one the tertiary centers, TASH and its affiliated hospital ZMH [12].

This a retrospective medical record review study to assess the overall recurrence rate and assessment of the effective ness of surgery for FIA surgery. On this study we found the over-all success rate 85.2 % and failure rate of 14.8% of which recurrence accounted 13 (7.7 %) and persistence of the FIA after surgery 12(7.1 %) .On multinomial logistic regression model, patients with comorbidities were having an increased risk of persistence of the FIA whereas the non-sphincteric sparing definitive final surgery were found to be protective for the persistence of FIA.

The surgeon who is involved in the treatment of FIA should focused on the reduction of minimize recurrence/persistence after surgery and at the same time due attention should be given for preservation of the continence mechanisms so these will challenge the treating surgeon.

The median age of the patients in our study was 38 years old (range 18-79), which is comparable to findings from previous studies [1, 24,47,51, 54]. Similar to many studies, males were more frequently affected with a male-to-female ratio of 4.7:(M: F) 4.7 :1. This is the close to the ratio reported in studies from Adma, Ethiopia and South Africa. (5.8:1,2.8:1) [12, 29,49], but higher than in most of the studies around the world, M: F=2:1(2). The median follow-up in our study was 11 months (range 6-24), which is shorter than that reported in a Spanish study, where the

median follow-up was 18.3 months and Netherlands with median follow up of 76 months (range 7-134) [28,51].

The most clinical presentation in our study was discharge (60%), which is consistent with findings from other studies [54,]. Inter-sphincteric fistulas were the most frequent, accounting for (N=98(57.6 %)) of cases, which is consistent with previous literature [20]. A relatively high proportion of patients (25.3%, N=43) were categorized as having an unclassified fistula, likely due to the absence preoperative MRI or incomplete documentation in operation notes or follow-up notes. As in other studies, extra-sphincteric and supra-sphincteric fistulas were rare, with 3 cases (1.8 %) of extra-sphincteric and only 1 case (0.6 %) of supra-sphincteric fistula reported [54]. In our study complex FIA was comparable to simple FIA types 85 (50%) vs 85 (50%) this could be as a result of our institution which is the pioneer institution who has started specialization in colorectal surgery and complex types of FIA were referred to us. This is in contrary to other equivalent institutions in USA and Europe where two third of their cases are simple FIA [27, 28]. In one study done in Spain by Jordan.J et.al showed 42.5 % complex fistulas in their studies which was lower than in our study. In our study the commonest types of final definitive surgery fistulotomy, fistulotomy with marsupialization 120(70.6%) almost similar to studies done in other areas (Australia)[54].

In our study the recurrence rate was 7.7 %(N=13) and persistence of the FIA was 7.1 %(N=12). The out -come of FIA surgery in our study was 85.2 % healing rate and failure rate of 14.8 % which was in line with study done Brazil(overall success of 87%) and (persistence and recurrence) ,study done in USA at Pitturrsberg medical center (failure rate 12.5%) but our success rate was lower than study done in Spain (failure rate 7.2%) but better than study done in Australia (failure rate=22.1) and Ghanaian study (failure rate of 22.5%) study done in Spain in 51 hospitals with total number of 1628 patients and where the failure rate (24.1 %). [47, 26,49,54 28,11]. Fistulotomy is the commonly performed procedures for FIA patients with success rate of more than 90% and in our study fistulotomy with its modification is the commonest procedures performed 120(70.6%) with success rate **88.33%** and in line with world standard [24-29]. In previous studies factors contributing to recurrence were complex types of fistulas, horseshoe extensions, unidentified internal opening or lateral location of internal openings, previous history of fistula surgery, the experience of the surgeon performing the

procedure. A metaanalysis conducted in China identified risk factors for recurrence after anal fistula surgery, they found high trans-sphincteric fistulas, unidentified internal opening, and horse shoe extensions, prior anal surgery, seton placement surgeries, and presence of multiple tracts were strongly associated with recurrence. Poorer healing of FIA was associated with Crohn's disease, high trans-sphincteric fistulas, extra-sphincteric fistulas, and steroid usage [4,10,53,54]. But we found that only **comorbidities** strongly associated with persistence of the FIA after surgery and non-sphincter sparing surgeries were preventive whereas no factor is strongly affected recurrence after surgery in FIA.

7. Strength and limitations of the study

The strength of this study is that the treatment of FIA surgery was done by a colorectal surgeon or attending fellow so that the treatment is comparable with the world standard, and had a better variety of procedures and had better follow up most of the time the patients were appointed to the colorectal unit at two institutions. In our study there was a good case mixes and different variety of surgical procedures unlike the previous study done in Ethiopia.

Limitations are being retrospective by itself is deemed for risk bias, inconsistency investigation of patients where MRI was ordered for simple fistula patients whereas most of complex FIA did not have MRI and this might be as result of poor documentation by the physician and the difficulty of tracing the imaging as result of retrospective by nature, poor documentation on patients' chart and their EMR (electronic medical records).

8. Conclusions and recommendations

The recurrence and persistence of FIA rate were 7.7% and 7.1% respectively. Persistence of FIA was significantly associated with the presence of comorbidities and the type of final definitive surgery. On sphincter sparing surgery were found protective for the persistence of FIA No significant predictors of recurrence were identified by multivariable analysis

Since we had conducted a retrospective chart review study, we recommend to have prospective study with longer follow-up time, large sample size and the effect of our surgeries on continence mechanisms. We also recommend to screen and manage comorbidities preoperatively to reduce the risk of fistula persistence and consider non-sphincter sparing procedures in selected cases to

lower persistence of fistula rate and to have standardize follow up protocols for detection and management of recurrence. We also recommend to the proper documentation on EMR and patient charts by treating physicians and proper investigations of patients according to the need.

References

1. Zubaidi AM. Anal fistula. Past and present. *Saudi Med J*. 2014;35(9):937-944.
2. Solomon, Hargest.R. anal fistulae: an ancient problem a challenge today.
3. Ortega AE, Gesek A, Linnebur M, Cologne KG. Selected Techniques of Anal Fistula Surgery from Antiquity Through the Early 20th Century Illustrated. *Dis Colon Rectum*. 2017;60(6):636-646. doi:10.1097/DCR.0000000000000833
4. Bakhtawar N, Usman M. Factors Increasing the Risk of Recurrence in Fistula-in-ano. *Cureus*. 2019;11(3):e4200. Published 2019 Mar 7. doi:10.7759/cureus.4200
5. Gaertner WB, Burgess PL, Davids JS, et al. The American Society of Colon and Rectal Surgeons Clinical Practice Guidelines for the Management of Anorectal Abscess, Fistula-in-Ano, and Rectovaginal Fistula. *Dis Colon Rectum*. 2022;65(8):964-985. doi:10.1097/DCR.0000000000002473
6. Iqbal N, Machielsen AJHM, Breukink SO, et al. Living with cryptoglandular anal fistula: a qualitative investigation of the patient's experience through semi-structured patient interviews. *Qual Life Res*. 2022;31(8):2505-2518. doi:10.1007/s11136-022-03098-y
7. Charalampopoulos A, Papakonstantinou D, Bagias G, Nastos K, Perdikaris M, Papagrigoriadis S. Surgery of Simple and Complex Anal Fistulae in Adults: A Review of the Literature for Optimal Surgical Outcomes. *Cureus*. 2023;15(3):e35888. Published 2023 Mar 8. doi:10.7759/cureus.35888.
8. Owen HA, Buchanan GN, Schizas A, Cohen R, Williams AB. Quality of life with anal fistula. *Ann R Coll Surg Engl*. 2016;98(5):334-338. doi:10.1308/rcsann.2016.0136
9. Mei Z, Wang Q, Zhang Y, et al. Risk Factors for Recurrence after anal fistula surgery: A meta-analysis. *Int J Surg*. 2019;69:153-164. doi:10.1016/j.ijssu.2019.08.003
10. Lundqvist A, Ahlberg I, Hjalte F, Ekelund M. Direct and indirect costs for anal fistula in Sweden. *Int J Surg*. 2016;35:129-133. doi:10.1016/j.ijssu.2016.09.082.

11. Ashebir DZ, Gebreselassie HA. Pattern and Outcome of Colorectal and Perianal Surgery in a Referral Hospital, Addis Ababa, Ethiopia. *Ethiop J Health Sci.* 2021;31(5):985-992. doi:10.4314/ejhs.v31i5.10
12. Beijiga.G, Adilo.A, Genemo.E. surgical management out come in fistula in Ano in Adama General Hospital ,Ethiopia .international journal of surgery .2023;53????
13. Bediako-Bowan AAA, Naalane N, Kumassah PK, Dakubo JCB. Clinicopathological determinants of recurrence after surgical treatment of fistula-in-ano in a Ghanaian teaching hospital. *Colorectal Dis.* 2022;24(10):1197-1203. doi:10.1111/codi.16168
14. Abcarian H. Anorectal infection: abscess-fistula. *Clin Colon Rectal Surg.* 2011;24(1):14-21. doi:10.1055/s-0031-1272819
15. Włodarczyk M, Włodarczyk J, Sobolewska-Włodarczyk A, Trzeciński R, Dziki Ł, Fichna J. Current concepts in the pathogenesis of cryptoglandular perianal fistula. *J Int Med Res.* 2021;49(2):300060520986669. doi:10.1177/0300060520986669
16. Sarveazad A, Bahardoust M, Shamseddin J, Yousefifard M. Prevalence of anal fistulas: a systematic review and meta-analysis. *Gastroenterol Hepatol Bed Bench.* 2022;15(1):1-8.
17. Sainio P. Fistula-in-ano in a defined population. Incidence and epidemiological aspects. *Ann Chir Gynaecol.* 1984;73(4):219-224.
18. Klein JW. Common anal problems. *Med Clin North Am.* 2014;98(3):609-623. doi:10.1016/j.mcna.2014.01.011
19. Sharma, A., Yadav, P., Sahu, M. *et al.* Current imaging techniques for evaluation of fistula in ano: a review. *Egypt J Radiol Nucl Med* **51**, 130 (2020). <https://doi.org/10.1186/s43055-020-00252-9>
20. Parks AG, Gordon PH, Hardcastle JD. A classification of fistula-in-ano. *Br J Surg.* 1976;63(1):1-12. doi:10.1002/bjs.1800630102
21. Morris J, Spencer JA, Ambrose NS. MR imaging classification of perianal fistulas and its implications for patient management. *Radiographics.* 2000;20(3):623-637. doi:10.1148/radiographics.20.3.g00mc15623

22. Hall JF, Bordeianou L, Hyman N, et al. Outcomes after operations for anal fistula: results of a prospective, multicenter, regional study. *Dis Colon Rectum*. 2014;57(11):1304-1308. doi:10.1097/DCR.0000000000000216
23. Hyman N, O'Brien S, Osler T. Outcomes after fistulotomy: results of a prospective, multicenter regional study. *Dis Colon Rectum*. 2009;52(12):2022-2027. doi:10.1007/DCR.0b013e3181b72378
24. Abramowitz L, Soudan D, Souffran M, et al. The outcome of fistulotomy for anal fistula at 1 year: a prospective multicentre French study. *Colorectal Dis*. 2016;18(3):279-285. doi:10.1111/codi.13121
25. Garg P. Is fistulotomy still the gold standard in present era and is it highly underutilized?: An audit of 675 operated cases. *Int J Surg*. 2018;56:26-30. doi:10.1016/j.ijssu.2018.06.009
26. Abbas MA, Jackson CH, Haigh PI. Predictors of outcome for anal fistula surgery. *Arch Surg*. 2011;146(9):1011-1016. doi:10.1001/archsurg.2011.197
27. Khan S, Kotcher R, Herman P, et al. Predictors of recurrence and long-term patient reported outcomes following surgical repair of anal fistula, a retrospective analysis. *Int J Colorectal Dis*. 2024;39(1):37. Published 2024 Mar 11. doi:10.1007/s00384-024-04602-1
28. Cano-Valderrama Ó, Miguel TF, Bonito AC, et al. Surgical treatment trends and outcomes for anal fistula: fistulotomy is still accurate and safe. Results from a nationwide observational study. *Tech Coloproctol*. 2023;27(10):909-919. doi:10.1007/s10151-023-02842-x
29. Dube GQ, Madiba TE, Naidoo M, Molla Z, Manzini V. Thirteen-year audit of the management of anorectal fistulae in a tertiary colorectal unit. *S Afr J Surg*. 2022;60(4):235-241. doi:10.17159/2078-5151/SAJS3191
30. Garcia-Aguilar J, Belmonte C, Wong WD, Goldberg SM, Madoff RD. Anal fistula surgery. Factors associated with recurrence and incontinence. *Dis Colon Rectum*. 1996;39(7):723-729. doi:10.1007/BF02054434
31. Ho YH, Tan M, Leong AF, Seow-Choen F. Marsupialization of fistulotomy wounds improves healing: a randomized controlled trial. *Br J Surg*. 1998;85(1):105-107. doi:10.1046/j.1365-2168.1998.00529.x
32. Pescatori M, Ayabaca SM, Cafaro D, Iannello A, Magrini S. Marsupialization of fistulotomy and fistulectomy wounds improves healing and decreases bleeding: a randomized controlled trial. *Colorectal Dis*. 2006;8(1):11-14. doi:10.1111/j.1463-1318.2005.00835.x

33. Jain BK, Vaibhaw K, Garg PK, Gupta S, Mohanty D. Comparison of a fistulectomy and a fistulotomy with marsupialization in the management of a simple anal fistula: a randomized, controlled pilot trial. *J Korean Soc Coloproctol.* 2012;28(2):78-82. doi:10.3393/jksc.2012.28.2.78
34. Hanley PH. Conservative surgical correction of horseshoe abscess and fistula. *Dis Colon Rectum.* 1965;8(5):364-368. doi:10.1007/BF02627261
35. Rojanasakul A, Pattanaarun J, Sahakitrungruang C, Tantiphlachiva K. Total anal sphincter saving technique for fistula-in-ano; the ligation of intersphincteric fistula tract. *J Med Assoc Thai.* 2007;90(3):581-586.
36. Subhas G, Singh Bhullar J, Al-Omari A, Unawane A, Mittal VK, Pearlman R. Setons in the treatment of anal fistula: review of variations in materials and techniques. *Dig Surg.* 2012;29(4):292-300. doi:10.1159/000342398
37. Raslan SM, Aladwani M, Alsanea N. Evaluation of the cutting seton as a method of treatment for perianal fistula. *Ann Saudi Med.* 2016;36(3):210-215. doi:10.5144/0256-4947.2016.210
38. Vial M, Parés D, Pera M, Grande L. Faecal incontinence after seton treatment for anal fistulae with and without surgical division of internal anal sphincter: a systematic review. *Colorectal Dis.* 2010;12(3):172-178. doi:10.1111/j.1463-1318.2009.01810.x
39. Rojanasakul A. LIFT procedure: a simplified technique for fistula-in-ano. *Tech Coloproctol.* 2009;13(3):237-240. doi:10.1007/s10151-009-0522-2
40. Hong KD, Kang S, Kalaskar S, Wexner SD. Ligation of intersphincteric fistula tract (LIFT) to treat anal fistula: systematic review and meta-analysis. *Tech Coloproctol.* 2014;18(8):685-691. doi:10.1007/s10151-014-1183-3
41. Stellingwerf ME, van Praag EM, Tozer PJ, Bemelman WA, Buskens CJ. Systematic review and meta-analysis of endorectal advancement flap and ligation of the intersphincteric fistula tract for cryptoglandular and Crohn's high perianal fistulas [published correction appears in BJS Open. 2020 Feb;4(1):166-167. doi: 10.1002/bjs5.50249]. *BJS Open.* 2019;3(3):231-241. Published 2019 Jan 21. doi:10.1002/bjs5.50129
42. Jarrar A, Church J. Advancement flap repair: a good option for complex anorectal fistulas. *Dis Colon Rectum.* 2011;54(12):1537-1541. doi:10.1097/DCR.0b013e31822d7ddd .

43. Jones IT, Fazio VW, Jagelman DG. The use of transanal rectal advancement flaps in the management of fistulas involving the anorectum. *Dis Colon Rectum*. 1987;30(12):919-923. doi:10.1007/BF02554276
44. Schouten WR, Zimmerman DD, Briel JW. Transanal advancement flap repair of transsphincteric fistulas. *Dis Colon Rectum*. 1999;42(11):1419-1423. doi:10.1007/BF02235039
45. Goos M, Manegold P, Grüneberger M, Thomusch O, Ruf G. Long-term results after endoanal advancement flap repair for fistulas-in-ano. How important is the aetiology?. *Int J Colorectal Dis*. 2015;30(3):413-419. doi:10.1007/s00384-015-2144-7
46. Jarrar A, Church J. Advancement flap repair: a good option for complex anorectal fistulas. *Dis Colon Rectum*. 2011;54(12):1537-1541. doi:10.1097/DCR.0b013e31822d7ddd
47. Neto IJFC, Wercka J, Rangel DP, da Silva Cecchini AR, Watté HH, Souza RFL, et al. Retrospective Analysis of the Surgical Treatment of Anorectal Fistulas in a University Hospital: Surgical Results and Predictive Factors of Relapse and Anal Continence. *Clin Surg*. 2018; 3: 1976.
48. Chaveli Diaz C, Esquiroz Lizaur I, Marzo Virto J, et al. Fistulectomy and endorectal advancement flap repair for cryptoglandular anal fistula: recurrence and functional outcome over 10 years of follow-up. *Int J Colorectal Dis*. 2021;36(4):841-846. doi:10.1007/s00384-021-03867-0
49. Jordán J, Roig JV, García-Armengol J, García-Granero E, Solana A, Lledó S. Risk factors for recurrence and incontinence after anal fistula surgery. *Colorectal Dis*. 2010;12(3):254-260. doi:10.1111/j.1463-1318.2009.01806.x
50. Emile SH, Elfeki H, Thabet W, et al. Predictive factors for recurrence of high transsphincteric anal fistula after placement of seton. *J Surg Res*. 2017;213:261-268. doi:10.1016/j.jss.2017.02.053
51. van Koperen PJ, Wind J, Bemelman WA, Bakx R, Reitsma JB, Slors JF. Long-term functional outcome and risk factors for recurrence after surgical treatment for low and high perianal fistulas of cryptoglandular origin. *Dis Colon Rectum*. 2008;51(10):1475-1481. doi:10.1007/s10350-008-9354-9
52. Sygut A, Mik M, Trzcinski R, Dziki A. How the location of the internal opening of anal fistulas affect the treatment results of primary transsphincteric fistulas. *Langenbecks Arch Surg*. 2010;395(8):1055-1059. doi:10.1007/s00423-009-0562-0

- 53.Karimian F. A Commentary on the article: "Risk factors for recurrence after anal fistula surgery: A meta-analysis", *Int J Surg* 2019;69:153-164. *Int J Surg*. 2019;71:79. doi:10.1016/j.ijssu.2019.08.038
- 54.Ng KS, Kwok AMF, Young CJ. Factors associated with healing, reoperation and continence disturbance in patients following surgery for fistula-in-ano. *Colorectal Dis*. 2020;22(12):2204-2213. doi:10.1111/codi.15372

Annexes

1.Socio-demographic data MRN_____Age _____Sex_____

Address_____Phonenumber_____

2.clinical presentation

- a. Discharge
- b. Pain
- c. Swelling
- d. Others(specify)_____

3.Imaging (MRI)

- a. yes
- b. no
- c. If yes Conclusion (description)_____

4.Procedures

Index surgery

- a. Fistulotomy
- b. Fistulotomy with marsupialization
- c. Fistulectomy
- d. Draining seton
- e. Cutting seton
- f. Mucosal advancement flap
- g. Others (specify)_____

Final surgery

- a. Fistulotomy
- b. Fistulotomy +marsupialization
- c. Fistulectomy
- d. LIFT
- e. RMAF

f. Other (specify)_____

5.Operation date(last)_____

6. Last follow up date_____

7.previous history of surgery

- a. None
- b. 01
- c. 02
- d. >02

8.Previous history of abscess drainage

- a. yes
- b. no

9. Fistula tract characterization

9.1 External opening Opening(number) _____

9.2 Location of internal opening

- a. anterior midline
- b. posterior midline
- c. left lateral
- d. right lateral
- e. left anterior
- f. left posterior
- g. right anterior
- h. right posterior

9.3 Branched tract if MRI is done

- a. yes
- b. no

10. Comorbid illness

- a. Diabetes
- b. HIV
- c. Smoking
- d. Steroid
- e. IBD history
- f. Cancer(specify)_____
- g. Others(specify)_____

11.classification of fistula

11.1 ASCRS classification

- a. Simple
- b. Complex

11.2 Park's classification

- a. Inter-sphincteric
- b. Trans-sphincteric
- c. Supra-sphincteric
- d. Extra- sphincteric
- e. unclassified _____

SPSS labelling

1.Sociodemographic Data

1.1 Age (in years) _____

1.2 Sex

1. 1=Male
2. 2=Female

1.3 Hospital

1. 1=TASH
2. 2=ZMH)

1.4 MRN (in numbers) _____

1.4 Address

1. 1=AA,
2. 2=Oromia,
3. 3=Amhara
4. 4=others

2.Clinical presentation

1. 1=discharge,
2. 2=swelling and discharge,
3. 3=pain and discharge

3.Symptom Reappearance (Recurrence)

1. 1=no,
2. 2=within 6 months
3. 3=beyond 6months

4.index surgery

1. 1=fistulotomy
2. 2=fistulotomy +marsupialization

3. 3=fistulectomy
4. 4=partial fistulotomy+ draining seton
5. 5=draining seton
6. 6=cutting seton
7. 7=RMAF
8. 8=LIFT

5.Other type of index surgery(type)_____

6. Final surgery

1. 1=fistulotomy
2. 2=fistulotomy +marsupialization
3. 3=fistulectomy
4. 4=partial fistulotomy+ draining seton
5. 5=draining seton
6. 6=cutting seton
7. 7=RMAF
8. 8=LIFT
9. 9=Waiting for definitive surgery

7.Other types of final surgery(type)_____

8.Intial operation date_____

9.Final operation date_____

10.Follow (in months) _____

11.. Previous history of surgery

1. 1=None
2. 2=01
3. 3=02
4. 4=greater than 2

12.Previous history of abscess drainage

1. 1=YES
2. 2=NO

13. Number of external opening_____

14.Location of internal opening

1. 1=anterior midline
2. 2=posterior midline
3. 3=left anterior
4. 4=left lateral
5. 5=left posterior
6. 6=right posterior
7. 7=right lateral
8. 8=right anterior

15.Location of external opening

1. 1=anterior midline
2. 2=posterior midline
3. 3=left anterior
4. 4=left lateral
5. 5=left posterior
6. 6=right posterior
7. 7=right lateral
8. 8=right anterior

16.MRI

1. 1=YES
2. 2=NO

17.MRI finding_____

18.Comorbid illness

1. 1=HIV
2. 2=DM
3. 3=IBD(CD)
4. 4=SMOKING
5. 5=HIV+DM

19.Other Comorbidities _____**20.ASCRS Fistula Classification**

1. 1=Simple
2. 2=Complex

21.Park's fistula classification

1. 1=inter-sphincteric
2. 2=trans-sphincteric
3. 3=supra-sphincteric
4. 4=extra-sphincteric
5. 5=horse-shoe type
6. 6=unspecified