



Endoscopic Retrograde Cholangiopancreatography Utilisation and Outcomes in Mater Misericordiae Hospital, Nairobi: A retrospective cohort study

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Abstract

INTRODUCTION

Endoscopic management of hepatobiliary conditions is becoming increasingly important. This includes the use of endoscopic retrograde pancreatography (ERCP) and endoscopic ultrasound. The objective of this retrospective review was to report on the utilisation and outcomes of Endoscopic Retrograde Cholangiopancreatography. These include the success rate, incidence and risk factors for procedure-related complications and outcomes in Mater Misericordiae Hospital, Nairobi, for the first 122 cases since the introduction of ERCP, from August 2023 to January 2025.

METHODOLOGY

This is a retrospective review of records made before, during and after ERCP procedures between October 2023 and January 2025. Data on the clinical status of patients before the procedure, the procedure conducted, complications and patient treatment outcomes after 48 hours and at two weeks following the procedure were abstracted using a standardised tool. Statistical significance was set at $p < 0.05$ and confidence interval at 95%.

RESULTS

Records for 122 patients were recovered. There was a male-to-female ratio of 1:1.39, where males were 51 and females 71. The mean age was 51.38 years, with the mean age for males as 54.67 years and 49.01 years for females. The procedure success rate was 95%, while reported complications were less than 5%. Biliary duct strictures were the most common condition observed, and most patients with this condition were older than 50 years. The average time taken for the procedures was 64.79 minutes ($SD \pm 37.11$), with a minimum of 25 minutes and a maximum of 220 minutes.

CONCLUSIONS

These findings report early outcomes from the first 122 Endoscopic Retrograde Cholangiopancreatography (ERCP) procedures conducted at the Mater Misericordiae Hospital in Nairobi, Kenya. A procedural success rate of 95% was achieved, with complication rates reported at under 5%. Biliary duct strictures were the most common indication, particularly among patients over 50 years. The findings reflect safe and effective service initiation at the facility, within the study period.

Keywords: Endoscopic Retrograde Cholangiopancreatography (ERCP), Procedure Outcomes, Mater Misericordiae Hospital, Kenya.

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Introduction

The endoscopic procedure, Endoscopic Retrograde Cholangiopancreatography (ERCP) is an advanced procedure used for both diagnostic and therapeutic purposes. It requires specialised training and experience. ERCP was first introduced in 1968 by McCure and colleagues who performed the first ERCP using a novel fiberoptic duodenoscope (1). Endoscopic sphincterotomy (ES) was introduced in 1974 in Germany and Japan (2), (3). Since then, ERCP has gained widespread acceptance in interventional endoscopy. It is considered a safe and effective procedure. However, it carries the highest morbidity and complications among most endoscopic procedures, despite technological advancements and observance of safety standards and programmes.

ERCP has been available in Kenya for less than 18 years. Initially, ERCP was only available in the Nairobi Hospital and the Kenya Medical Research Institute, but later became available in other hospitals, mainly located in Nairobi. ERCP was introduced to the Mater Misericordiae Hospital in 2023. Since then, the facility has consistently provided 20-25 ERCP procedures per month.

Like many other gastroenterology centres, the ERCP service in Mater Misericordiae Hospital is now largely used for therapeutic purposes. This has been facilitated by the introduction of less invasive tools like Magnetic Resonance Cholangiopancreatography, ultrasound, both transabdominal (TAUS) and endoscopic (EUS), and computed tomography. Although largely used for therapeutic purposes, diagnostic ERCP remains necessary in solitary dilated ducts, cholangiocarcinoma, primary sclerosing cholangitis, and autoimmune cholangitis (4).

Therapeutic procedures include Biliary and Pancreatic stent placement to relieve obstruction and maintain patency, biliary and pancreatic stone extraction, tissue biopsy,

brushing for cytology and sphincter of Oddi manometry. Despite advanced training and skill, some complications associated with ERCP do occur. These include post-ERCP pancreatitis (PEP), bleeding both early and delayed, local or systemic infections and cardiopulmonary complications (5, 6).

Post-ERCP pancreatitis is the most common and serious complication associated with ERCP and often develops within 24 hours of the procedure. It occurs in an estimated 5-7% of patients and more often in therapeutic procedures, compared to diagnostic procedures (5-7). However, complications may occur in 4-15% of ERCP cases (5-10).

The objective of this study was to evaluate the utilisation and outcomes of ERCP, success rates, incidence and risk factors for procedure-related complications in Mater Misericordiae Hospital, Nairobi among the first 122 cases conducted since the introduction of ERCP in the Mater Misericordiae Hospital, Nairobi, Kenya.

Methods

This was a retrospective review of all ERCP cases conducted at Mater Misericordiae Hospital, Nairobi, from August 2023 to January 2025. Sequential sampling was conducted to include all patients who had undergone the ERCP procedure at Mater Misericordiae Hospital, Nairobi.

All procedures were conducted by a dedicated team comprising endoscopy nurses, an endoscopy technician, a radiographer on duty for fluoroscopy, an anaesthesiologist on call and a gastroenterologist. All patients were reviewed by the gastroenterologist and anaesthesiologist, and informed consent was obtained before the procedures were conducted. All procedures were conducted under general anaesthesia and with endotracheal intubation, in a dedicated theatre specifically for ERCP. All patients undergoing the procedure had normal INR: 0.8-1.4, normal

haemoglobin levels and a platelet count of or above 50,000/ μ l.

All patients had a clinical history taken, a full physical examination conducted, and demographic information captured during admission and history taking.

All patients met the following requirements:

1. Clear indication for procedure-ERCP.
2. Medically fit to undergo general anaesthesia as assessed by an anaesthesiologist.
3. Haemoglobin \geq 10g/dl.
4. INR between 0.8-1.4
5. Platelet count \geq 50 x 10⁹/ μ l.

Informed consent for ERCP was given by the patient or a competent guardian in case the patient was not able to give consent due to cognitive dysfunction or severe illness. All patients had prophylactic diclofenac suppository for post-ERCP pancreatitis and intravenous antibiotic (preferably ceftriaxone or cefazolin) for post-ERCP sepsis, especially cholangitis.

Endoscopes used were the Olympus duodenoscope 240 with a corresponding Olympus video processor and monitor. Both the long wire and short wire systems were used, and the accessories used were from the Boston Scientific or Olympus brands.

All procedures were conducted by a single team, which comprised three endoscopic nurses, an experienced endoscopy technician and a gastroenterologist.

Study data were collected using a standardised data abstraction tool designed to extract relevant clinical and procedural information from hospital records.

The following were recorded:

- Time taken to do the procedure.
- Procedure done.
- Any complications encountered, especially bleeding and perforation.

All patients were seen within 30 hours to assess any epigastric pain with radiation to the back suggestive of pancreatitis, increased fluid

requirement and fall in BP suggestive of post-ERCP delayed bleeding.

Data analysis

Data were analysed using STATA version 15. Descriptive analyses were conducted by calculating percentages and their corresponding standard deviations. Inferential analyses were done using Pearson's chi-square to determine associations between categorical variables.

The One Way Analysis of Variance (ANOVA) was used to test for associations between numerical variables (age and time). Logistic regression was conducted to assess the influence of age on each ERCP procedure. Multivariate analysis was conducted to determine the predictors of ERCP procedure outcomes. Statistical significance was set at $p < 0.05$ and confidence interval at 95%.

Ethical Considerations

To maintain patient privacy and uphold ethical standards, all data were fully de-identified before analysis. No names, personal identifiers, or contact details were recorded. Strict confidentiality was observed during the process of data abstraction, with access limited to the research team. As this manuscript was developed using secondary data without direct patient contact, informed consent was waived, and permission to report the findings was obtained from the Research Committee of Mater Misericordiae Hospital.

Results

ERCP procedures were conducted on 122 patients between August 2023 and January 2025, with patients coming from all the counties in the country. There were 51 males and 71 females, giving a ratio of 1:1.39. The majority of participants were females younger than 51 years. Males had a mean age of 54.67 SD \pm 16.07 while the females had a mean age of 49.01 SD \pm 16.65, most of the patients were females below 50 years, as shown in Table 1.



Procedural characteristics

The most common procedure carried out was ERCP for Biliary stricture stenting at 40.98%, followed by ERCP for stone removal at

36.07%, then pancreatic duct strictures. The least performed procedures were ERCP for Cholangioscopy and Electrohydraulic Lithotripsy (EHL), as shown in Figure 1.

Table 1
Demographic Characteristics

Age (Years)	≤40		41-50		51-60		61-70		≥71		Total
Gender	F	M	F	M	F	M	F	M	F	M	
Frequency	22	11	22	13	11	6	7	10	9	11	122
Percentage	27.05%		28.69%		13.93%		13.93%		16.39%		100%

Table 2
ERCP Procedures Distribution by Age and Gender

ERCP PROCEDURE	≤40		41-50		51-60		61-70		≥71		Total
	F	M	F	M	F	M	F	M	F	M	
Cholangioscopy and EHL	1	1	0	0	0	0	0	0	0	0	2
Main Pancreatic Duct Stricture Stenting	3	5	1	1	1	1	0	0	0	0	12
ERCP for Stent Removal	0	1	1	2	2	0	1	0	0	0	7
Biliary stricture Stenting	6	1	6	6	3	2	4	8	6	8	50
Stone Removal	12	2	13	4	4	2	2	1	2	2	44
Stent Exchange	0	1	1	0	1	0	0	1	1	1	6
Stone removal & Stenting	0	0	0	0	0	1	0	0	0	0	1
Total	22	11	22	13	11	6	7	10	9	11	122

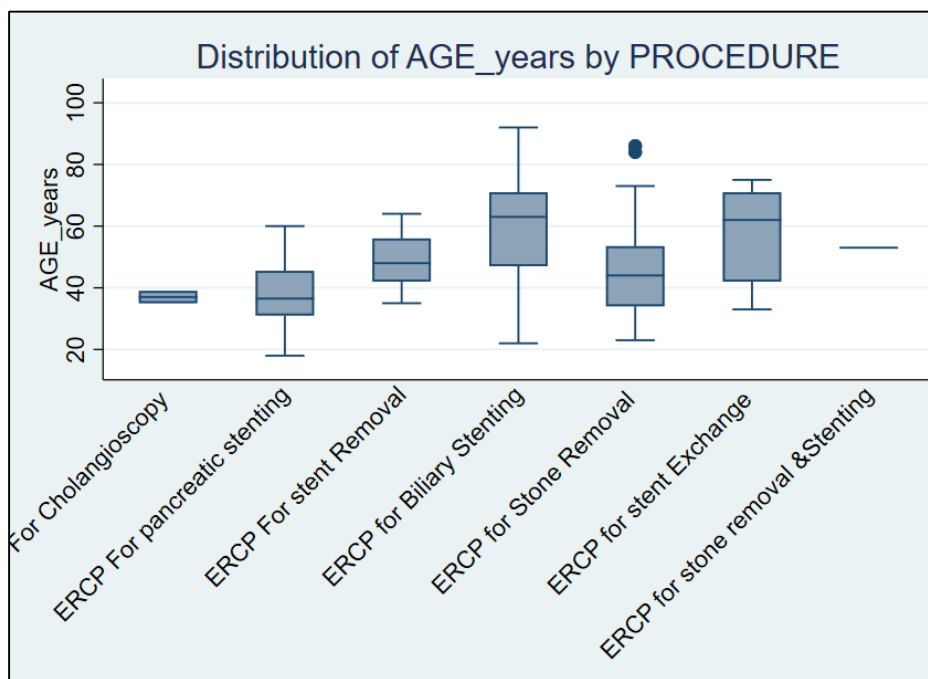


Figure 1
Distribution of Age by Procedure

Younger patients with a lower median age range (30-50 years) are likely to undergo pancreatic stenting and stone ERCP for stone removal due to clinical conditions such as acute and chronic pancreatitis and gallstones, which are more common in the younger demographic. Older patients, with median age ranges (60-70 years), were likely to undergo biliary stenting, stent exchange and stone removal, likely due to malignant biliary obstruction common in older patients (Figure 1).

The scatter plot in Figure 2 shows the relationship between age in years, the different ERCP procedures, and gender in colour code: blue for males and red for females. Main Pancreatic Duct (MPD) stricture stenting, Cholangioscopy and EHL ERCP were common among the younger demographic, while Biliary stricture stenting, stent exchange, and stone removal were common among the older patients. The most common procedures were ERCP for stone removal and ERCP Biliary duct stenting, suggesting that these may be routine procedures.

The indications for the procedure were: Obstructive jaundice, biliary stones and blockage of the main pancreatic duct from stones or chronic pancreatitis.

Indicators for ECRP procedures

All patients had undergone prior radiological imaging with clear indications for ERCP. Sphincterotomy was done in all patients. Precut sphincterotomy was performed in ten patients, and the rest were done from the ampulla using standard Sphincterotomy.

Outcomes of Procedure

The procedures took a relatively short time, with a mean of 64.79 minutes (SD±37.11), ranging from 25 to 220 minutes. The procedures were successful in 119 patients; two patients had invasive tumours in D2, making it difficult to reach/see the ampulla with a duodenoscope. One patient had a previous metallic biliary stent, with the main pancreatic ducts (MPD) stenting required later on. MPD could not be cannulated.

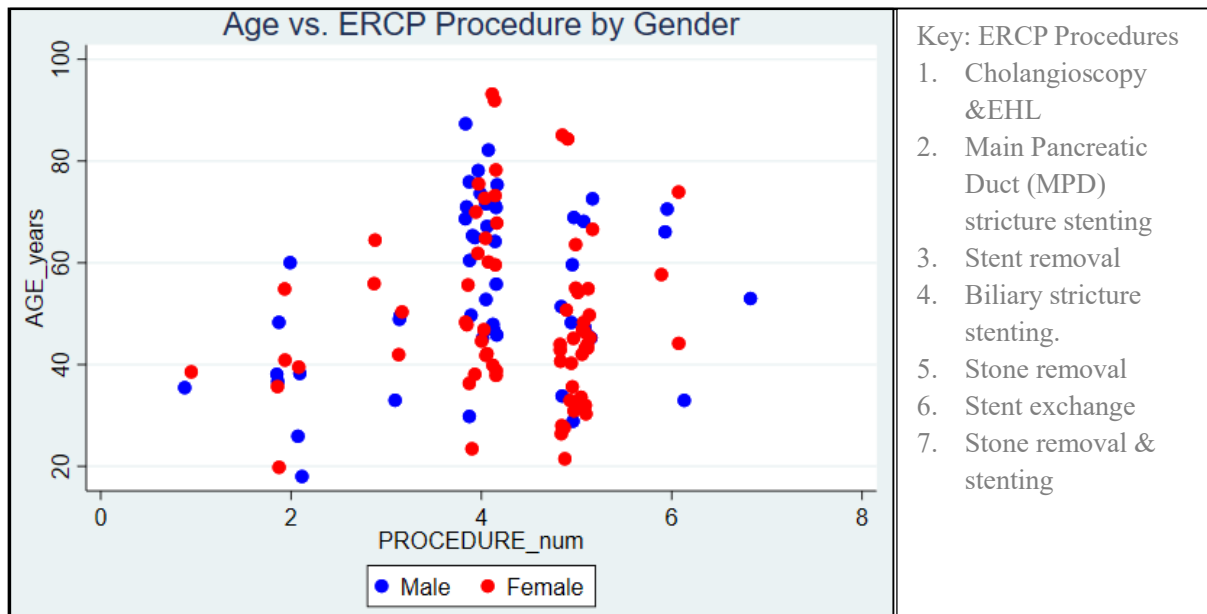


Figure 2
Distribution of ERCP Procedures by Age and Gender

Complications after ERCP

Post-ERCP complications were rare in this cohort. Only two patients developed post-ERCP pancreatitis after they underwent biliary stricture stenting, which is indicative of a less than 5% rate of post-operative complications. Additionally, only five patients developed pancreatitis that resolved within five or fewer days after the main pancreatic duct stenting. Notably, we observed no cases of duodenal perforation, post-ERCP bleeding, post-ERCP cholangitis or mortality and at the two-week review, all patients were stable and recovering well.

Bivariate Analysis

To test the significant difference in the outcome vis-à-vis the different procedures through a chi-square test (Pearson χ^2 (df =6) = 10.0265, P = 0.124), showing a lack of statistical significance, indicating that the outcomes were not statistically associated with the type of procedure carried out.

Upon testing for an association between the procedure carried out and genders by chi-square test, we similarly observed no statistical significance (Pearson χ^2 (d f=6) = 9.4515, P = 0.150), albeit the association approached statistical significance. Using the chi-square test, we examined whether gender was associated with the outcome of the procedures. There was statistical significance, Pearson χ^2 (df =1) = 6.5326, P = 0.011, suggesting that males had a higher likelihood of an unsuccessful outcome compared to females.

Using one-way Analysis of variance (ANOVA), we determined whether there were differences between age and the procedures carried out and the time taken to perform the different procedures. This is shown in Table 3 below. The findings indicate a statistically significant (P = 0.000) difference in mean age across different procedures, indicating that age impacts the type of procedure.

Logistic Regressions

We carried out logistic regressions to assess the influence of age as the sole indicator for an ERCP procedure. Age was significantly associated with the likelihood of undergoing ERCP for biliary duct stenting P< 0.000 OR 1.059, indicating that with any additional year, the odds of undergoing this procedure increase by 5.9%. Conversely, age significantly influenced the likelihood of undergoing an ERCP procedure for stone removal. P = 0.009 OR 0.967, for every additional year, the likelihood of undergoing ERCP for stone removal is reduced by 3.3%.

Similarly, the influence of age on the likelihood of having ERCP for main pancreatic duct stenting was significant at P = 0.005 OR 0.927, suggesting that for any additional year, the odds of undergoing this procedure are lowered by 7.3%. On assessing whether undergoing ERCP for stent removal, we noted that age was not a significant predictor, P = 0.713 OR 0.991, as shown in Table 4. Age alone in these regression models explained a low percentage of variance, suggesting that other factors, such as gender and the clinical presentation, are important indicators for a specific procedure.

Table 3:
One-Way ANOVA for Age and Time Taken by Procedures

Variables	Source	SS	df	MS	F	P value
Age by Procedure	Between Groups	7492.155	6	1248.692	5.57	0.000
	Within groups	25780.50	115	224.178		
Total		33272.656	121	274.980		
Time taken By procedure	Between Groups	224700.909	6	37450.1516	0.33	0.9209
	Within groups	13119389.1	121	114081.645		
Total		13344090	111	110281.736		

Multivariate Regressions.

We modelled the age, gender and time taken to complete procedures to assess whether, when considered together, they predicted ERCP outcomes. An additional minute taken for ERCP reduced the likelihood of a successful outcome by 1.8% OR=0.98, (P=0.022), which was statistically significant, and it might be of clinical significance. Similarly, gender was a significant predictor OR=0.127, (p= 0.024), suggesting that males are significantly less likely to have a successful procedure compared to females, with about 87% lower odds. Conversely, age was not a significant predictor of the success or failure of the procedure.

Discussion

Since the invention of Endoscopic Retrograde Cholangiopancreatography (ERCP) in 1968 by McCure and colleagues, it has become an important intervention, an endoscopic procedure for treating biliary and pancreatic conditions. The need for ERCP has since grown rapidly in Kenya. Pre-procedure imaging, like ultrasound, both transabdominal and endoscopic magnetic resonance Cholangiopancreatography (MRCP) and computed tomography (CT scan), have made diagnostic ERCP largely unnecessary.

The less invasive ERCP compared to surgery makes biliary and pancreatic duct drainage for palliative treatment more preferable. It is also used in patients with non-operable malignant pancreatic head lesions, cholangiocarcinoma of distal ducts from hepatic ducts distally and extrinsic compression from portal hepatic mass, and an expanding gall bladder tumour with invasion of the biliary ducts.

ERCP is, however, technically more challenging, necessitating further training and taking more time to master. ERCP, therefore, carries a higher risk of complications, which may reach as high as 15% and mortality rates of 10% (8-9). The more frequent complications include pancreatitis, post-endoscopic sphincterotomy bleeding, post-ERCP cholangitis and visceral perforations. Fortunately, these are very rare in our setting. In the current study, there were more females in the younger age bracket, and this could imply gender differences in the epidemiology of certain diseases. Gender was evenly distributed among the older patients, a likely indication of chronic conditions such as malignancies in this demographic. Although the number of patients was modest, our cannulation rate was 95%, which compares very well with published studies. Complications were also relatively few; for example, bleeding did not occur post-ERCP

Table 4:
Logistic Regression of Age as a Predictor of ERCP Procedure

Variable	Odds Ratio	Std. Err	Z value	P value	95%CI
MPD stricture stenting	0.926	0.025	-2.81	0.005	0.878 - 0.977
Biliary Duct Stricture Stenting	1.059	0.014	4.21	0.000	1.031 - 1.087
Stone Removal	0.967	0.012	-2.62	0.009	0.943 - 0.992
Stent Removal	0.991	0.239	-0.37	0.713	0.945 - 1.039

Table 5:
Multiple Regressions to Determine Predictors of Successful ERCP Procedures

Variable	Odds Ratio	Std. Err	Z value	P value	95%CI
Time Taken (Min)	0.982	0.008	-2.30	0.022	0.967- 0.997
Age (Years)	1.001	0.024	0.41	0.679	0.964 - 1.059
sex	0.127	0.116	-2.26	0.024	0.021 - 0.759

Additionally, pancreatitis occurred in 5% of the patients, which compares well with an approximate 5% complication rate as reported by Richards et al and Lizcano (11-12) and as observed by Cotton and colleagues (13). Mortality did not occur, there was no perforation, and cholangitis was rare.

Some observations worth noting include that most of the patients who presented with recurrent upper abdominal pain and had pancreatic duct dilation with parenchymal changes on imaging (TAUS) consistent with chronic pancreatitis and distal duct narrowing were mainly females younger than 50 years. Biliary stricture suspected to be due to malignancy in the biliary ducts and head of the pancreas was more likely to be male. Also, choledocholithiasis leading to biliary obstruction was more likely in females aged between 40 and 60 years.

Strengths and Limitations

Relatively small sample size; however, the review shows the growing demand for advanced therapeutic/interventional endoscopic procedures in pancreaticobiliary conditions. The review also shows that we can achieve very low complication rates in ERCP in Mater Misericordiae Hospital, Nairobi.

Conclusion

The success rate of our procedures was high, and the average time taken for the ERCP was 65 minutes. The age distribution indicates that many of our patients were young, with about 70% aged 60 years or less, and there were more females than males. Post-ERCP complications were very few, and the treatment outcomes were good.

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