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Analysis of Index ERCP Outcomes for Choledocholithiasis Cases in a Tertiary Care Hospital

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Author`s Contribution

[1]Substantial contributions to the conception or design of the work or the acquisition, methodology, analysis, Final approval of the version to be published. [2,3,4]Active Participation in active, Drafting the work or revising it critically for important intellectual content

Funding Source: None
Conflict of Interest: None

Received: Feb 11, 2024
Accepted: May 29, 2024

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ABSTRACT

Objective: To evaluate the outcomes of Endoscopic Retrograde Cholangiopancreatography (ERCP) for choledocholithiasis at a tertiary care hospital.

Methodology: This is a retrospective study conducted from January, 2021 to December 2023. All patients with choledocholithiasis diagnosed on ultrasound abdomen or magnetic cholangiopancreatography with clinical symptoms were selected for ERCP. The primary objective was to assess the success rate of bile duct stone (BDS) clearance during the initial procedure and identify factors contributing to procedural failures. Data was collected from ERCP database.

Results: Total 1878 ERCP procedures were performed whereas, 866 were for choledocholithiasis, with 763 being index ERCPs for this condition. Among these index ERCPs, 562 achieved successful stone retrieval and confirmed CBD clearance with occlusion cholangiogram in a single procedure (73.65%). In remaining 201 index ERCP for choledocholithiasis, biliary plastic stenting was carried out in 184 (24.11%) due to different reasons.

Conclusions: In this study, clearing BDS rate at first ERCP is 73.65%. The difficult stones and common bile duct size are predominant factors responsible for index ERCP stone removal failure.

Key words: Choledocholithiasis, ERCP, index

Cite this article as: Hussain T, Abbas A, Khar B, Umar M, Naseer A, Khan JZ, Ahmad S, Noureen M Analysis of Index ERCP Outcomes for Choledocholithiasis Cases in a Tertiary Care Hospital. Ann Pak Inst Med Sci. 2024; 20(3):326-330. doi. 10.48036/apims.v20i3.1093

Introduction

Bile duct stones (BDSs) are an important problem. The European Society of Gastrointestinal Endoscopy (ESGE) revealed that10 -15 % of adults have gallbladder stones and about18 % of them will have BDS.[1] BDS complications may include biliary colic, obstructive jaundice, cholangitis or hepatic abscesses and acute pancreatitis. About 25% of patients with BDS will become symptomatic over time, so BDS clearance is recommended, irrespective of symptoms.[1–3] The BDS has two steps management, stone clearance from the biliary tree and cholecystectomy (if not previously performed) to remove the pool. The commonly used method of clearing BDS is endoscopic retrograde cholangiopancreatography (ERCP). BDS is the only indication for approximately 50 % of the ERCPs performed. [4, 5] With the advancement in gastroenterological procedures, biliary stones can be removed with ERCP, utilizing some more advance techniques like sphincterotomy, sphincteroplasty and lithotripsy under guidance of cholangioscope. Standards of BDS clearance at ERCP have already been set. The British Society of Gastroenterology (BSG)[6] set minimum standard of 75 % BDS clearance rate at first ERCP. The American Society of Gastrointestinal Endoscopy (ASGE) and ESGE have higher levels of BDS clearance. According to ASGE and ESGE, stones less than 1 cm, more than 90 % should be cleared at index ERCP.[1, 7]

Variation of BDS clearance at ERCP observed throughout the world, ranging from 62.3 % to > 96 %. [4, 8,9] There are many factors responsible for difference in success rate like previously attempted ERCPs, anatomy of biliary tree, CBD strictures, shape of papilla, expertise of endoscopist, availability of ERCP resources and work burden of ERCP Centre. A Dutch registry study observed the success rate for procedures was 85.2%, but included both first and

repeat procedures.[9] Cotton et al. reported Stone clearance rates were extremely high (99 % for stones < 10 mm, 96 % for stones > 10 mm).[8]

ERCP has risk, whether at index or subsequent procedure. Bodger et al revealed 30-day post ERCP all-cause mortality rate of 5.3%, of which specific procedural complications were identified 1.2% of deaths, representing 0.06% of ERCPs.[5] Other studies showed all cause post ERCP mortality ranging from 2% to 5.9%[4,5,10-13], with deaths directly to the procedure ranging from 0.2% to 0.5%.[14-16] Biliary stenting without stone clearance carries significant adverse outcome risk[17,18] and about 15% biliary related mortality.[13]

This study is conducted to assess the outcome of index ERCP in patients of choledocholithiasis with or without symptoms and possible reasons for failure to clear the bile duct stones. This will help us to devise measures to achieve better results while opting different accessories and techniques to achieve standardized outcome.

Methodology

This retrospective, cross-sectional study was conducted at gastroenterology department of Holy Family Hospital, Rawalpindi from January 2021 to December 2023. All patients with choledocholithiasis and its complications were selected. Diagnosis of biliary stones was confirmed with ultrasound abdomen or magnetic resonance cholangiopancreatography along with clinical symptoms. Patient between the age of 18 to 89 years, of both genders with diagnosis of choledocholithiasis or its complications were selected. All patients with any contraindications to ERCP were excluded. Informed consent was taken from all candidates included in the study. All statistical analysis was performed by using the Statistics Package for Social Sciences version24.0 (SPSS-23.0). Mean and standard deviation for age were calculated. Percentage of gender and ERCP success and frequency of causes of ERCP failure were evaluated as well.

Results

A total of 1878 ERCP were performed from January 2021 to March 2024, out of which 866 were performed for choledocholithiasis. 763 were index ERCP, while 103 repeat ERCPs for choledocholithiasis. Out of 763, 259 were males and 504 were females. female to male ratio was 1.9:1 with mean age of 49 years ± 15.6 SD. In all successful procedures endoscopic sphincterotomy was performed, while other techniques used to achieve bile duct clearance are mentioned in table I.

Out of 763 index ERCP performed for choledocholithiasis, 562 were successful with complete stone retrieval and clearance of BD confirmed with occlusion cholangiogram. BDS clearance success rate was 73.65%, while procedures success rate was 97.77% in index ERCP. In remaining 201 index ERCPs, BDS clearance was not achieved. Out of these 201 ERCPs, biliary stenting was performed in 184 patients due to different reasons. 17 procedures failed due to cannulation failure. Reasons for failure to accomplish bile duct clearance in index procedure were documented in figure 1. The most common reason for index ERCP failure was multiple stones of variables size seen in 70 cases, large stones ranging in size from 1.5cm to 2.5cm documented in 38 ERCPs, was second common cause, Impacted stones were seen in 26 cases , 09 ERCP cases were with multiple stones and pus , biliary strictures in 27 cases involving distal , mid CBD, Common hepatic duct and multiple areas), narrow distal CBD in 09 cases, 17 cases have failed cannulation (10 cases excessive peristalsis, 02 cases have stomach full of food and 05 cases have technical problems), reasons for ERCP failure was not mentioned in 03 cases and fluoroscopic machine (C - arm) error is seen in 02 case. 27 biliary strictures were seen in cholangiogram requiring stenting, there distribution is mentioned in Table II.

Table: I Techniques used for Bile duct stone clearance at index ERCP.

Sphincteroplasty	198
Dormia basket to crush stones	06
Sohendra dilator to dilate CBD	06

Table: II Distribution frequency of strictures in biliary tree on cholangiogram.

Distal CBD Stricture	19
Mid CBD stricture	01
Common hepatic duct stricture	03
Hilar stricture	01
Right hepatic duct stricture	01
Multiple intra and extra hepatic duct strictures	02

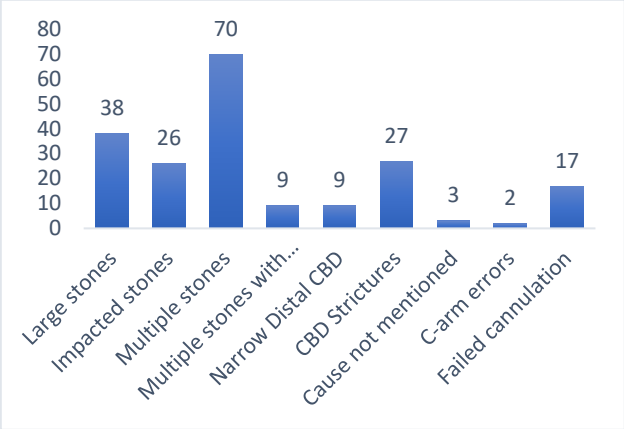

Figure 1. ERCPs Failure Reasons for Bile Duct Stone Clearance.

Discussion

Bile duct stone is a frequent clinical problem and major indication for ERCP all over the world.[4,5] Failure to clear stones at index ERCP not only exposes patients to further procedures, as well as risks related to retained stones. ERCP procedure is being carried out as intention to treat in our center with goal of bile duct clearance in order, not only to relieve patient's symptoms but also to reduce the risk of repeat ERCP and prevent complications of retained bile stones. ERCPs other than for choledocholithiasis, included cases of stent retrieval, stent exchange, benign biliary strictures or new stent placement for hepatobiliary malignancies. The aim of this local study was to capture every ERCP performed for BDSs in our center, and to provide an objective assessment of success rate of clearing BDSs at index ERCP. The success rate in our study for BDS clearance at index ERCP (73.65 %) does not meet the KPIs set by international endoscopic societies, although it is comparable to the overall success rate of first ERCP (97,77%).[27-29] In another local study, bile duct stones removal at first ERCP was around 80% but in that study reasons of index ERCP BDS clearance failure were different as compared to our data.[30] In a recent study by Ekkelenkamp et al[9], 51% ERCPs were performed for BDSs, with an overall 85 % stone clearance rate.

The term unsuccessful or failed ERCP used in our study was applied when a repeat ERCP was required following an index procedure. The reasons for failure to clear BDSs are unclear but may relate to a range of factors, including endoscopist experience, unit volume and referral practice.[19] But in our study majority of failed procedures were du to multiple, large >1.5cm, impacted stones and biliary stricture (87.5%). A number of predictors of failure of BDS clearance at index ERCP are known, including stones above strictures, unfavorable stone to distal duct diameter, stone size > 10 mm, stone impaction, multiple stones, Mirrizzi syndrome, and intrahepatic stones.[20–22] Advance techniques for stone clearance, including endoscopic papillary large balloon dilatation (sphincteroplasty)[23] and cholangioscopy with visually directed lithotripsy[24,1], can improve BDS clearance at index ERCP. Significant available evidence revealed that cholangioscopy increases the success rate for removal of BDSs. A recent large, international, multicenter analysis showed a 97 % duct clearance rate using single-operator cholangioscopy (SOC), and 77% of patients achieved BDS clearance in single session.[24] 86 % of patients undergoing cholangioscopy had a previous failed procedure. It clearly indicated that availability of cholangioscopy for the management of complex stones would be expected to reduce the burden of repeat procedures. Cholangioscopic guided lithotripsy is known to achieve 83-100% extra hepatic biliary stone clearance by ASGE.[25] Cotton et al reported extremely high rate of CBD stone depending on size of stone (99% for stone <10mm and 96% for stone >10mm) in a study conducted in USA in which more than 18000 ERCPs were performed by 63 endoscopists.[5] Studies have shown that early referral of difficult cases of biliary stones to specialist of pancreatobiliary multidisciplinary team will provide suggestion on management options.[26]

Conclusion

Our study showed that overall BDS clearance at index ERCP falls below expected international standards. It throws light on likely causes of failure to achieve BDS clearance, which will help us to devise different approaches to improve index ERCP outcome as well as patient experience and burden on ERCP capacity and health costs. It also emphasized the role of new technologies like cholangioscopic guided lithotripsy for index ERCP bile duct stones success.

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