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Original Research Article

Laparoscopic common bile duct exploration with primary closure over an ante-grade biliary stent-our experience

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ABSTRACT

Background: Aim of study was the assessment of laparoscopic common bile duct (CBD) exploration with primary closure over an ante-gradely placed endo-biliary stent for CBD stones in terms of operating time, rate of conversion to open procedure, hospital stay, postoperative complications and residual disease.
Methods: Our data was analysed retrospectively over a period of 5 years (2015-2020) on all the patients who underwent laparoscopic CBD exploration with primary closure over an ante-gradely placed endo-biliary stent followed by cholecystectomy at SMHS hospital, Srinagar, J and K, India. Total of 30 such patients were identified.
Results: The mean procedure time was 93.5±23.16 minutes. There were no intra operative complications encountered in the study. Four patients were converted to open (13.33%). The mean duration of hospital stay was 4.56±1.99 Days. The total number of patients that developed post-operative complications was 7 (23.33%). The most frequently encountered post-operative complication was stent migration (13.33%). The next most common post-operative complication was minor biliary leak (10%) which resolved spontaneously. There was no mortality experienced during the study. Two patients (6.66%) had residual stones and 28 (93.33%) patients had complete clearance of the CBD.
Conclusions: Laparoscopic CBD exploration with primary closure over an ante-gradely placed endo-biliary stent is a feasible option and is a safe procedure. Endoscopic removal of the stent can safely be done after an interval of 6-8 weeks.

Keywords: Laparoscopic, Antegrade, Stent, CBD, Primary, Closure, Biliary

INTRODUCTION

Cholelithiasis is one of the most common medical conditions leading to surgical intervention and affects approximately 10% of the adult population. The incidence of choledocholithiasis (stones in common bile duct) is approximately 10-20% in patients with symptomatic cholelithiasis. Bile duct stones form one of the most important indications of CBD exploration and have a high incidence of complications like pancreatitis, cholangitis and jaundice, whether they are symptomatic or not, they should be removed.[1] The vast majority of the common bile duct calculi initially form in gall bladder and then migrate to common bile duct via the cystic duct. These stones are called secondary calculi to distinguish from primary calculi which form within the common bile duct.[2]

In surgical practice ductal calculi are encountered in four different clinical settings: complicated, subclinical obstructive, unsuspected and discovered during cholecystectomy or post cholecystectomy. Although majority these patients can be managed by endoscopic retrograde cholangiopancreatography (ERCP), surgical exploration remains one of the important modalities in the management of CBD stones. The indications of surgery in CBD stones include: failed ERCP, previous gastric surgery with deranged anatomy, multiple large

and impacted calculi. Surgical approach used to manage CBD stones can be open or laparoscopic. Laparoscopic CBD exploration has proved to be safe and effective for dealing with CBD stones.[3] Open bile duct exploration is used infrequently in the present age of minimally invasive surgery. The indications for open surgery include expected dense adhesions due to previous surgery, large and impacted bile duct stones and need for conversion from laparoscopic procedure.

With increasing experience in laparoscopic techniques and the demand for single procedure minimally invasive duct clearance, the use oflaparoscopic CBD exploration has gained greater acceptance among experienced biliary surgeons. Single stage laparoscopic treatment of gall stones and CBD stones has shown advantages. Primary closure of the CBD without the use of T-tubes during laparoscopic choledochotomies in the management of choledochotomy after achieving CBD clearance is being advocated.[4] Noted advantages of this technique include decreased morbidity from external biliary drainage (as high as 15%), decreased incidence of bile leak, convenience to patients and shorter length of hospital stay. Additionally, with t-tube there are chances of tube displacement and tube site infections. The primary closure of choledochotomy alone can result in high pressure biliary system and more chances of bile leak. Closure of CBD over laparoscopic placed antegrade endo-biliary stent creates a low-pressure biliary system and less chances of complications.[5] A plastic stent, typically 10 French, is advanced into the duodenum until the proximal end is positioned distal to the lower edge of the choledochotomy.

In our study, laparoscopic CBD exploration was performed on patients with indications for the procedure. A choledochotomy was done and after clearance of CBD was achieved, an endo-biliary stent was placed ante-gradely across the papilla followed by primary closure of choledochotomy. The procedure was completed by performing cholecystectomy.

METHODS

This study is a single centre retrospective case study and comprised of patients admitted for elective surgery with indications for CBD exploration in various surgical wards of SMHS hospital Srinagar. Our data was analysed retrospectively on all the patients who underwent laparoscopic CBD exploration with antegrade stenting from 2015 to 2020, to access operating time, rare of conversion to open procedure, hospital stay, postoperative complications, and residual disease after surgery. Non random sampling method was used. All the patients who had undergone the procedure from 2015 to 2020 were included in the study. A total of 30 such patients were identified. The recorded data was compiled and analysed with the help of statistical software SPSS version 21 and Microsoft excel. Continuous variables were summarized in the form of means and standard deviations (Descriptive statistics). Graphically the data is represented by line diagram.

All surgeries were performed on routine elective basis. After detailed history and clinical examination, all patients were subjected to thorough diagnostic work up. Pre-anaesthetic check-up was done in all cases. Written consent was taken before performing the procedure. Prophylactic antibiotics and tetanus toxoid dose were administered and part was prepared before the procedure.

Operative technique

All the cases were done under general anaesthesia, an orogastric tube was placed to decompress the stomach. Meticulous part preparation with 10% povidone-iodine and draping was done. A standard 4 port approach was adopted. After creation of pneumoperitoneum a 10 mm optical port was placed at the umbilicus and the laparoscope inserted via this. Other ports were placed under direct laparoscopic vision. Dissection was carried out and Calot's triangle was exposed. Then cystic artery and cystic duct were separated and both were ligated. Continuity of the cystic duct with the gall bladder and CBD was maintained. This is essential for traction, exposure, and manipulation. The supra-duodenal CBD was visualized and dissection was carried out to expose an area approximately 2 cm long and 1 cm wide of the CBD. Aspiration was done to confirm in order to avoid injury to portal vein and hepatic artery. Two stay sutures were placed on the anterior wall of the CBD. A choledochotomy was made longitudinally into the duct between these two-stay sutures with endo-knife. Atraumatic grasping forceps was used for stone retrieval. Normal saline flush irrigation of CBD via a feeding tube was done which aided in stone extraction.[6] A nephroscope with a working channel was then introduced into the CBD via choledochotomy with continued normal saline irrigation and stone extraction was done using stone holding forceps under direct vision (Figure 1 and 2). Complete clearance of the duct was ensured by examining firstly the distal part of the duct and subsequently the proximal part of the duct (Figure 3).

Figure 1: Stone in CBD visualised via nephroscope.

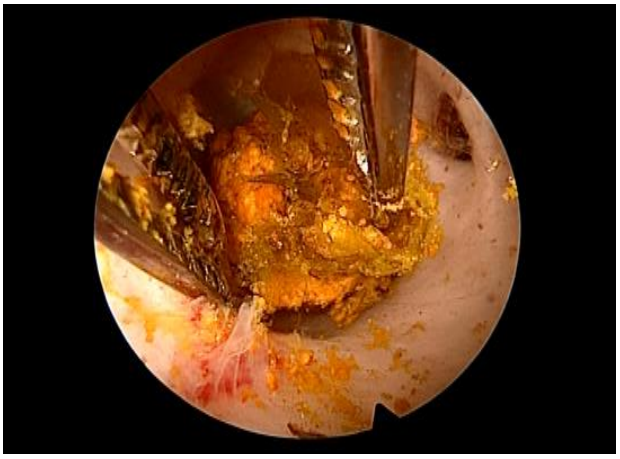

Figure 2: Extraction of stone.

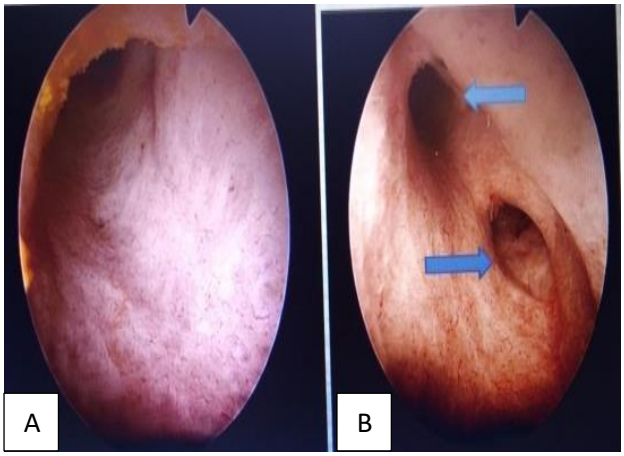

Figure 3: (A and B) Distal and proximal clearance of the duct.

After complete stone clearance of the common bile duct, a double pigtail plastic endo-biliary stent (10 Fr., 10 cm) was placed in the duodenum across papilla via choledochotomy over a guide wire through a working channel of a nephroscope (Figure 4).

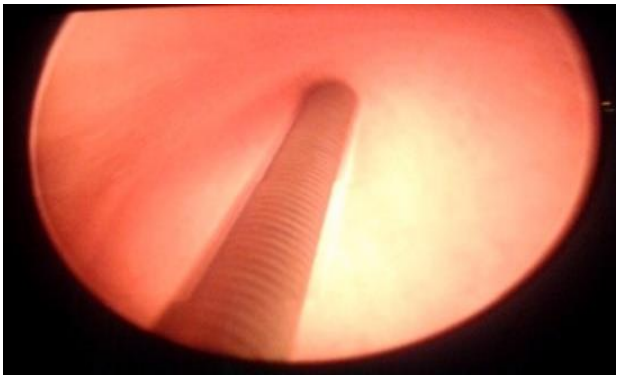

Figure 4: Guide wire passed via nephroscope.

The choledochotomy was closed by primary closure using 3-0 vicryl (Figure 5 and 6). This was followed by cholecystectomy and placement of tubal drain.

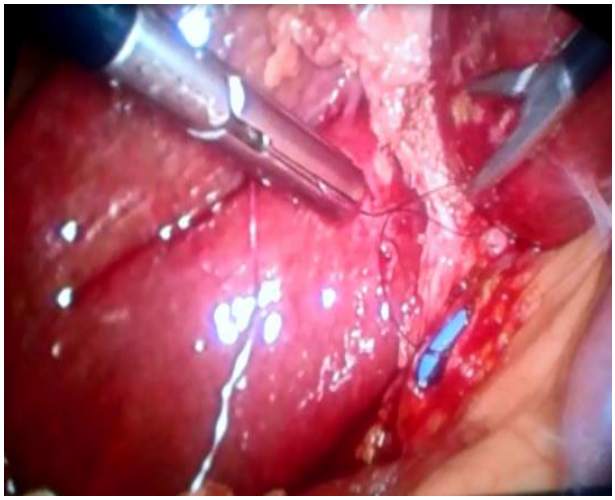

Figure 5: Closure of duct over stent.

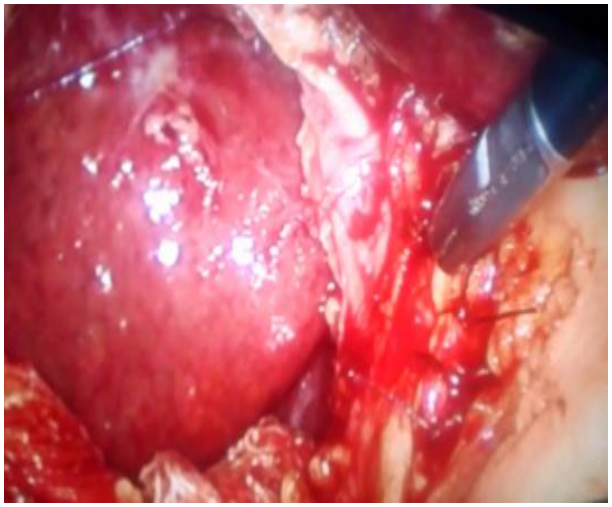

Figure 6: Duct closed by interrupted sutures.

Follow up

Regular follow up was made to record any complications that the patient may develop following surgery and drain output was measured. Regular blood tests were also performed in the post-operative period. After the drain removal as determined by amount and content, patients were subsequently discharged. Further follow up was done on OPD basis. Removal of endo-biliary stent was done endoscopically usually at 6-8 weeks post-operatively.

RESULTS

In this study, a total of 30 patients were identified. Mean age 41.7±8.32 years, (range=25-62 years). The most common age group involved was 41-50 years (43.33%). Female:Male ratio was 1.5:1. Females constituted 60% of the study population**.** The average procedure time was 93.5±23.16 minutes with the range from 60-150 minutes. The most predominant time period taken fell in range of 71-80 minutes (30%) (Figure 7).

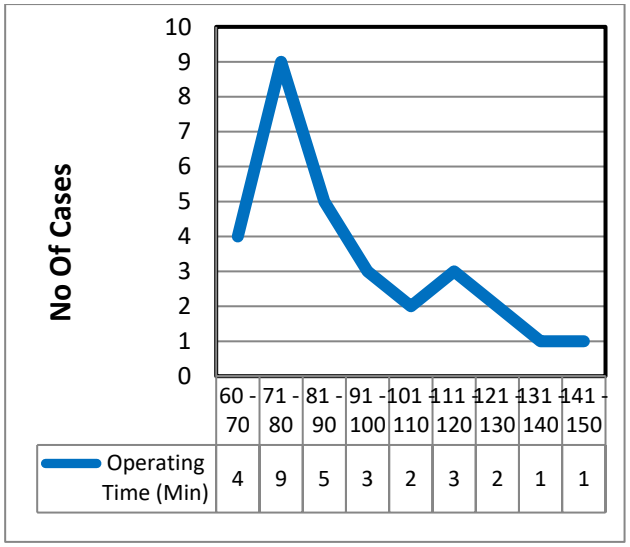

Figure 7: Operating time (minutes).

Although all the 30 patients were subjected to laparoscopic CBD exploration, four patients needed to be converted into open procedure (13.33%). All these patients were male and fell in the 40-62-year age group. (Figure 8).

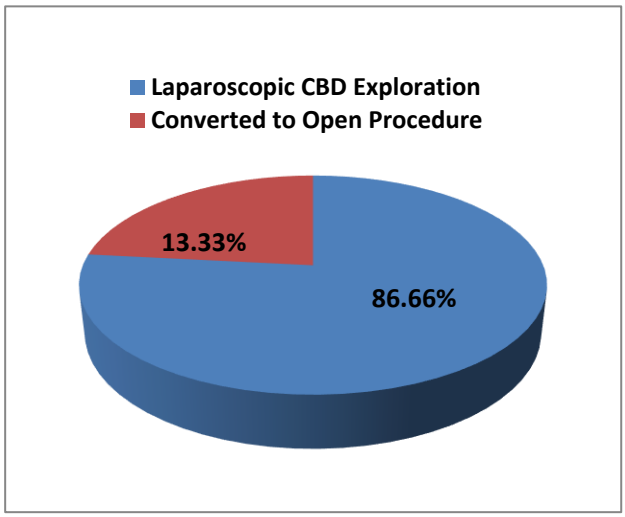

Figure 8: Rate of conversion to open procedure.

The range of duration of hospital stay was from a minimum of 2 days to a maximum of 9 days. The mean duration of hospital stay was 4.56±1.99 days. The majority of patients fell into the range of 4-6 days of hospital stay (43.33%) (Figure 9).

There was no mortality experienced during the study. The total number of patients that developed post-operative complications was 7 (23.33%). The most frequently encountered post-operative complication was stent migration (13.33%). The next most common post-operative complication was minor biliary leak (10%) which resolved spontaneously on 4th to 5th day (Figure 10).

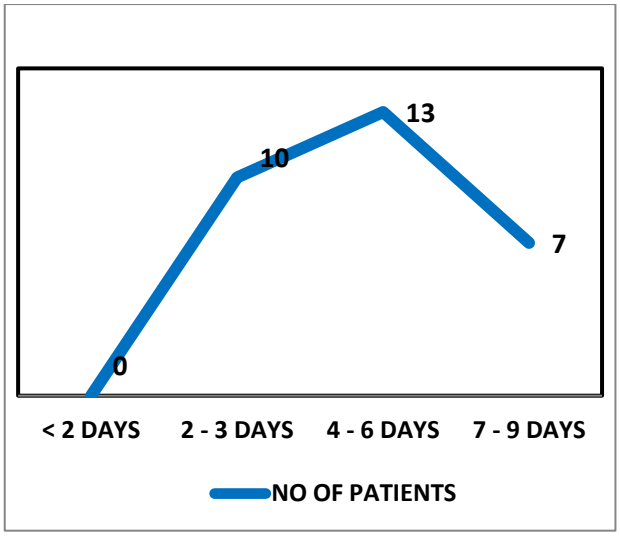

Figure 9: Duration of hospital stay (days).

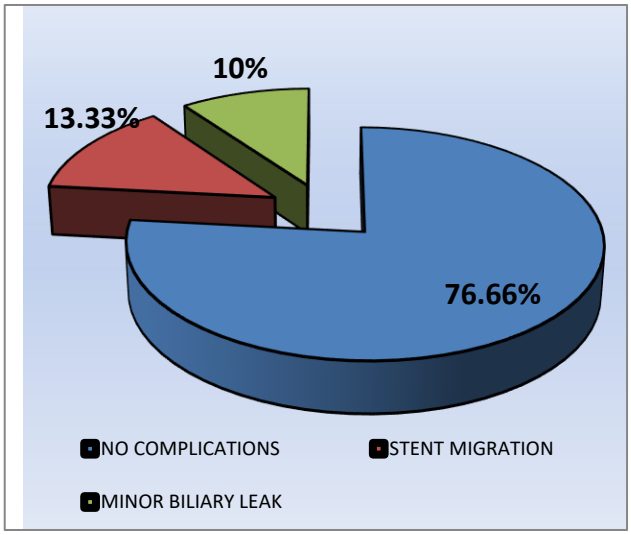

Figure 10: Post-operative complications.

Out of the 30 patients in the study 28 (93.33%) had complete clearance of the CBD. Two patients (6.66%) had residual stones which were managed by ERCP later on (Figure 11).

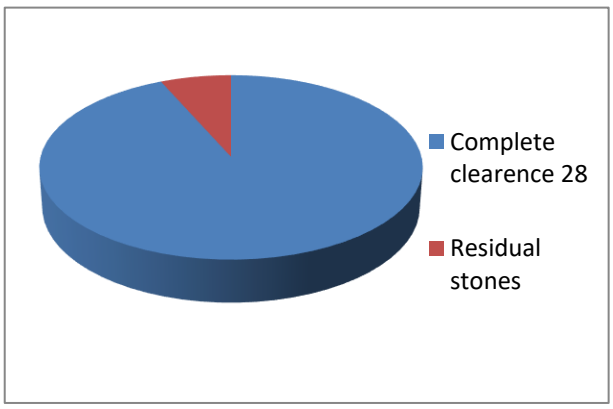

Figure 11: Residual stones.

DISCUSSION

This study was conducted at government medical college and SMHS hospital, Srinagar. A retrospective study, a total of 30 patients was identified who had undergone laparoscopic CBD exploration with antegrade stenting over a period of 5 years from 2015 to 2020. Although the sample size of our study is small which may be the limitation of this study, yet the results derived are similar to other large-scale studies.

The average procedure time in our study was 93.5 minutes. A study done by Jameel et al and Cecilia et al noted similar mean procedure time of 95.92 minutes and 90 minutes respectively.[7,8]

Four patients (13.33%) in our study needed to be converted to open, which is slightly higher than the conversion rate in a study by Jameel et al (7%) and Tang et al (9.47%). All these patients who needed conversion in our study were male and had dense adhesions.[7,9]

The mean duration of hospital stay in our study was 4.56 days. Similar mean duration of hospital stay is noted by Bandyopadhyay et al (4 days).[10] Jameel et al and Cecilia et al in their study also noted similar mean duration of hospital stay of 4.16 days and 4 days respectively.[7,8]

The total number of patients that developed post-operative complications in our study was 7 (23.33%). This is higher than the rate of complications in other studies, Tang et al (14.6%), Cecilia et al (7%) and Bandyopadhyay et al (7%).[7,9,10] The most frequently encountered post-operative complication in our study was stent migration that occurred in 4 patients (13.33%). This is much less than the results of Kim et al where stent migration was reported in 81.8%.[11] Occurrence of stent migration in our study was uneventful and stent was passed with stools in all the 4 patients. Stent migration in these patients could be attributed to previous papillotomy as all the four patients had history of failed ERCP. The next most common post-operative complication was minor biliary leak (10%) which resolved spontaneously.

In our study, two patients (6.66%) had residual stones. The rate of residual disease in a study by Jameel et al was 8.06% and Cecilia et al was 4.2%. Twenty-eight patients (93.33%) in our study had complete clearance of the CBD achieved.[7,8]

CONCLUSION

A single staged laparoscopic CBD exploration with primary closure over an ante-gradely placed endo-biliary stent is a feasible option and a safe procedure. The duration of hospital stays and time to return to work is less and the incidence of residual disease is low. The procedure may be performed safely without mortality and with negligible morbidity, but requires advanced skills in minimal access surgical techniques. Endoscopic removal of the stent after a safe interval of 6-8 weeks does not result in significantly added morbidity.

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Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

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