

USE OF RIGID NEPHROSCOPE IN OPEN COMMON BILE DUCT EXPLORATION - OUR EXPERIENCE

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ABSTRACT**BACKGROUND**

Common Bile Duct (CBD) stones still remain a challenge to hepatobiliary surgeon. Various treatment options are available for CBD stones. The traditional approaches of open CBD exploration with T tube to minimally invasive procedures—ERCP and LCBDE. However, failure rate is high for large and impacted stones. Many surgeons in the developing world still performing open CBD exploration for large stone or when ERCP fails or when there is lack of training and equipment.

To assess the feasibility, safety and possibility of complete clearance of stones by rigid scope in open common bile duct exploration.

MATERIALS AND METHODS

The prospective study was conducted in the Department of Surgery in Jawaharlal Nehru Institute of Medical Sciences, Imphal, Manipur, from March 2012 to March 2015. Rigid Nephroscope was used in 30 patients of choledocholithiasis for open common bile duct exploration, which was passed easily in common bile duct both proximally and distally visualising the interior of the duct for presence of stones. Intraoperative finding, operative time, hospital stay and complications were recorded.

RESULTS

A total of 30 patients including male and female underwent open common bile duct exploration followed by cholecystectomy. All the patients had minimum duct diameter of 10 mm. Primary closure with placement of biliary stent of 7F 10 cm length was done in all the patients. There was complete stones clearance without any intraoperative complications. Average hospital stay was 4 to 5 days. None of the patients developed postoperative biliary peritonitis and no mortality in our study.

CONCLUSION

Use of rigid nephroscope in open common bile duct exploration is feasible and an efficacious procedure in dealing with unsuccessful endoscopic stone extraction and centre having no facility for Laparoscopic common bile duct exploration with the achievement of complete stones clearance without any complication.

KEYWORDS

Choledocholithiasis, Open Common Bile Duct Exploration, Flexible Choleidoschoscope, Rigid Nephroscope.

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BACKGROUND

Gall bladder stones and Common Bile Duct (CBD) stones affect significant proportion of human population. About 15% of people with gallstone develop stones in the Common bile duct.¹ The incidence is even higher in older ages and 20 to 25% of patients older than 60 who have gallstone disease present with concurrent choledochal stones. It may result in complete or incomplete bile duct obstruction and manifest with cholangitis or gallstone pancreatitis.² Choledocholithiasis is one of the medical conditions leading to surgical intervention. It is managed either by endoscopic sphincterotomy or surgical exploration.

Despite advancements in gall bladder surgery with the introduction of endoscopic and laparoscopic technique, many

surgeons, especially in the developing world, still perform open cholecystectomy with CBD exploration for choledocholithiasis.³

Traditionally, CBD stones are retrieved with Desjardin forceps through choledochotomy and closed over T-tube, but potential of complications and residual stones exist with this therapeutic modality. These lead to prolonged hospital stay and need again for treatment of residual stone.⁴

In 1991, Petelin et al first described laparoscopic surgery of common bile duct stone. The technique has evolved since then and several studies have concluded that Laparoscopic Common Bile Duct Exploration (LCBDE) procedures are superior to sequential endoscopic treatment.⁵ LCBDE is done using flexible choledoschoscope or rigid scopes. Most of them use rigid nephroscope instead of flexible choledoschoscope, getting good results since flexible choledoschoscope is very costly and maintenance is difficult. With the help of this technique of using rigid scope in LCBDE, we present our experience of open common bile duct exploration using rigid nephroscope to assess the feasibility, safety and complete stones clearance in the setting of recently established medical college where no facility for laparoscopic CBDE.

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MATERIALS AND METHODS

A total of 30 patients of choledocholithiasis, 25 females and 5 males underwent open CBD exploration after choledochotomy with rigid nephroscope between March 2012 to March 2015 followed by cholecystectomy at the Department of Surgery, JNIMS, Imphal. All the patients were investigated. As a protocol, ultrasound of whole abdomen was repeated in our institute for those patients who were evaluated outside JNIMS. MRCP was done in almost all the patients (Fig. 1).

4 patients had post cholecystectomy choledocholithiasis and 26 patients had cholelithiasis with choledocholithiasis. The minimum duct diameter was 10 mm.

22 patients had preoperative jaundice which was treated with antibiotic, IV glucose, Vitamin K, etc. and taken for surgery after one week.

Intraoperative finding, time taken for surgery and postoperative complications were taken into consideration.

OPERATIVE PROCEDURE

All the patients were operated through right sub-costal incision. After choledochotomy, the rigid nephroscope (Fig. 2) is inserted to visualise interior of the bile duct proximally till both the right and left hepatic ducts interior are visible and distally till Ampulla of Vater is visible with continuous irrigation.

Any stones which were found were removed by rigid grasping forceps under direct vision through scope. Some of the stones were fractured and pushed into the duodenum with rigid forceps. Then biliary stent of 7F 10 cm length is inserted and choledochotomy is closed primarily with vicryl 3-0. A sub-hepatic drain was kept in all the cases, which were removed when there was less than 50 mL serous fluid.

All the patients were routinely given IV third generation cephalosporin for 3 days and converted to oral antibiotic and discharged on 5th postoperative day. They were asked to come after one month for endoscopic removal of biliary stent.

Patient’s demographic, intraoperative finding, operative time, duration of hospital stay and post-operative complications were recorded on a Performa.

RESULT

Of the 30 patients who underwent open common bile duct exploration using rigid nephroscope, 29 patients had secondary stones and only one patient had primary stone formed over the migrated clip following laparoscopic cholecystectomy after 6 years (Fig. 3).

There were 25 females and 5 males with the ratio of 5:1. The age ranges from 15 to 70 years with the mean of 42.5 years.

Majority of the patients have single stone, 5 patients have more than 3 stones and 1 patient has large impacted stone at the distal CBD (Fig. 4 and Fig. 5 and 6)

Stone clearance is 100% and complications related to the procedure were not observed.

Operative time ranged from 70 to 100 minutes with the average of 85 minutes.

There were no intraoperative complications in any of the patients. In all the patients, drain was removed on the 2nd post-operative day and discharged on 4th or 5th post-operative day. None of the patients had any postoperative complications and no mortality in our study. Biliary stent was removed after one

month by endoscopy. (Fig. 9) No patients had any complaints during the followup.

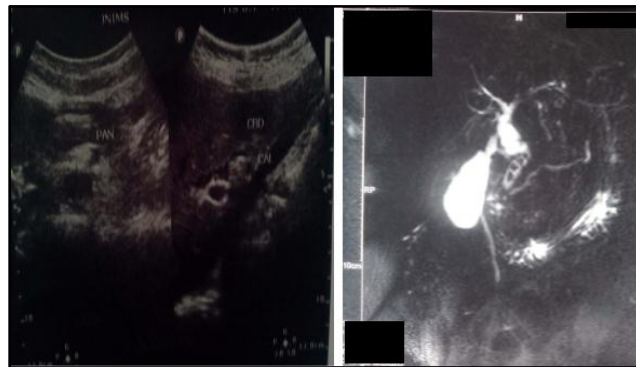


Figure 1. US and MRCP Findings of CBD Stones



Figure 2. Nephroscope and Biliary Stent



Figure 3. Stones form Over Clip, X-Ray Finding of Clips

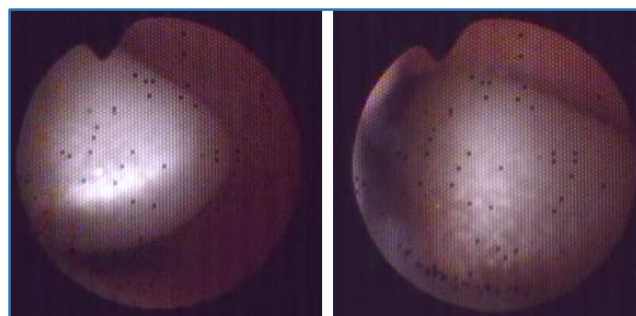


Figure 4. CBD Stones



Figure 5. Removed Stones, CBD Stones, GB Stones

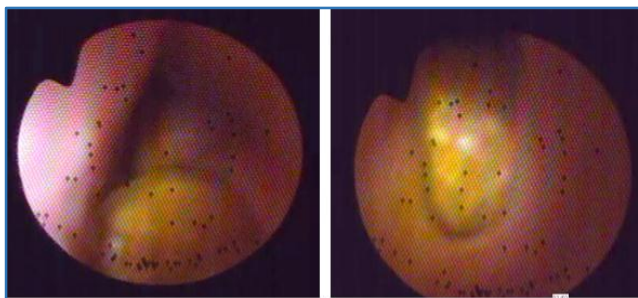


Figure 6. CBD Stones

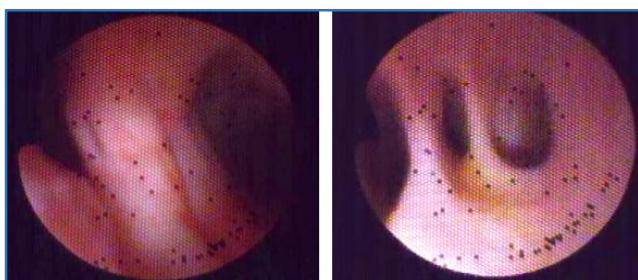


Figure 7. Proximal CBD Clearance

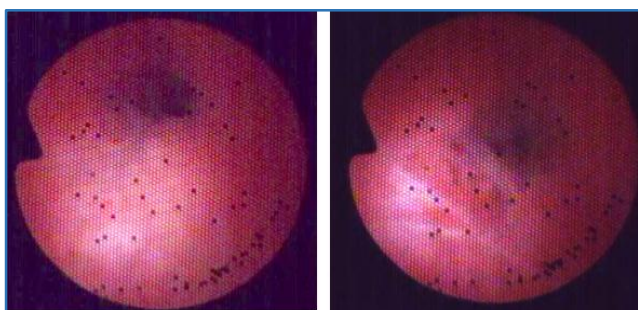


Figure 8. Distal CBD Clearance

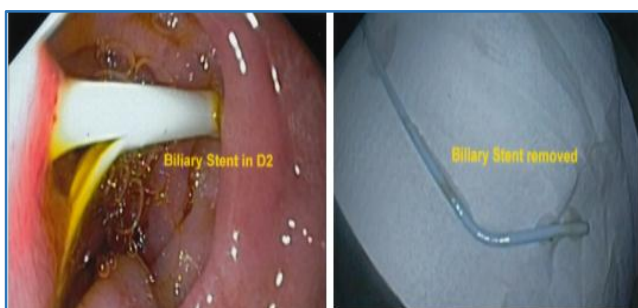


Figure 9. Endoscopic Removal of Biliary Stent

DISCUSSION

There is dispute regarding the optimal treatment for concomitant gallstones and CBD stone.^{6,7,8} The traditional approaches of open common bile duct exploration have been replaced by newer, less invasive procedures. The principle minimally invasive options in the treatment of CBD stones include ERCP with endoscopic stone extraction and laparoscopic CBD exploration.⁹

However, these minimally invasive approaches are not widely practiced in many developing countries due to the lack of equipment and trained endoscopists. Even in the developed world in rural settings, there is lack of equipment for these techniques.¹⁰ There are several drawbacks of this approach, even though this is effective and safe. Surgeons are often left with no option other than to continue the practice of open CBD exploration due to unavailability of trained Endoscopist in ERCP and lack of skill experience laparoscopic surgeons. Furthermore, a Cochrane database review published in 2006 has suggested that ERCP was less successful than open surgery in CBD stone clearance and was associated with a higher mortality.¹¹ There is also an increased recurrence rate of CBD stones following endoscopic removal.¹⁰ The success rate for stone clearance is 87% to 97%, but up to 25% of patients require two or more ERCP treatments.¹² ERCP was less successful compared with open surgery in CDB stone clearance.

LCBDE is a demanding technique with a long learning curve,¹³ which has replaced open CBD exploration. LCBDE has been proven to be a safe, reliable, effective and single stage procedure for the treatment for CBD stones. LCBDE has become the main treatment for CBD stones associated with cholelithiasis.¹⁴ The UK guidelines recommended LCBDE as the treatment of choice for patient with CBD stones undergoing laparoscopic cholecystectomy.¹⁵ However, successful stone clearance rates for LCBDE range from 85% to 95% with a morbidity rate of 4% to 16% and mortality of 0% to 2%.¹⁶ A major problem for patients who undergo LCBDE by choledochotomy are biliary leakage and biliary stricture. Biliary leakage occurred in only 6% of patients.¹⁷ In our study, common bile duct exploration with the use of rigid nephroscope, rate of stone clearance is 100% without any morbidity and mortality (Fig. 7 and 8).

For many years open CBD exploration has been the main treatment modality for CBD stones. It is also performed frequently at the present time.¹⁸ Our institute is also still performing open CBD exploration, as there is no facility for ERCP and Laparoscopic CBD exploration.

ERCP is difficult for removing a large stone. Open surgery is indicated for large stone and when ERCP fails, for which choledochoscope or any rigid scope is useful and easier to inspect CBD. With the use of mechanical lithotripsy, the success rate for removing CBD stone can be improved even with large or impacted stones. Garg et al, over a 4 years period achieved a success rate of only 79% for removing CBD stone even after using mechanical lithotripsy.¹⁹ Due to limitations of flexible choledochoscope like high cost and unable to retrieve very big stones, many surgeons using rigid nephroscope with good results. Sarkar et al and Khan et al have shown that rigid nephroscope is superior to flexible choledochoscope in removing large stones and is cost effective.^{20,21} We were also using rigid nephroscope in many patients for open CBD exploration with good results in terms of complete stone

clearance without any complications. This instrument is usually available at all surgical centres. It is robust, has large working channel and vision is excellent. One can pass stout forceps through it to remove calculi and thus ensure 100% stone clearance irrespective of size, hardness or degree of impaction of the stone. It has been reported that CBD stone clearance rate of traditional open CBDE is 83.3% to 88.8%.^{22,23} Our experience with the use of rigid scope is very encouraging and seems to be safe and highly effective.

CONCLUSION

Rigid nephroscope can also be used in open common bile duct exploration. It is safe and feasible with the achievement of complete stone clearance without any complication. It is an efficacious procedure in dealing with unsuccessful endoscopic stone extraction and centre having no facility for Laparoscopic common bile duct exploration.

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