Role of Operative Choledochoscopy in Choledocholithiasis

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Summary :

Operative choledochoscopy is a simpler procedure that can be easily learned and practiced by many surgeons at the time of common bile duct exploration. It is now well established in biliary tract surgery and is considered as an integral part of common bile duct exploration. It provides a better evaluation of intracholedochal pathology. It also provides an effective, safe & easy method of dealing with problem of stones in the intrahepatic branches of the bile duct which results in an almost negligible incidence of retained ductal calculi. Choledochoscopy was done in 25 patients through choledochotomy incision. The choledochoscope was used after conventional common bile duct exploration. Complete stone clearance was confirmed by choledochoscopy in 21 patients and additional stones were found in remaining four patients. Dormia basket was used to extract those stones. Impacted common bile duct stones were found in two of the four patients in ampulary region and two in intrahepatic third generation duct. Post operative T-tube cholangiography done in twelve patients and no retained stone was found.

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Introduction :

Residual stone in common bile duct after choledocholithotomy is a difficult situation for surgeons and patients alike. Although techniques such as desolution[1,2], basket extraction[3] and endoscopic sphincterotomy[4] are available to deal with these stones. It is obviously desirable to ensure that the ducts are free of stones at the time of operation. Two techniques are available to examine the bile ducts after exploration: T- tube cholangiography and choledochoscopy. Post exploratory T- tube cholangiography can be unreliable because air bubble may be introduced into the ducts and sometimes spasm of the sphincter of Oddi may prevent flow of contrast media into the duodenum. Examination of the bile ducts under direct vision with a choledochoscope seems a certain method of ensuring that there are no residual stone. Choledochoscopy has been performed for over 70 years[2]. Subsequently flexible fibre-optic instruments have become available and experience with it has been reported[5]. Although satisfactory instruments have been available for almost 40 years, biliary endoscopy has not been widely used. Most surgeons probably underestimate the incidence of retained stones and may feel that there is no need for such an instrument. The cost of the instrument, particularly flexible scopes, is high and this has restricted the wide adoption of the technique. The common bile duct is explored in approximately 15% of all cholecystectomies and stones are removed in approximately 65% of these explorations. The incidence of concomitant choledocholithiasis with cholecystolithlasis varies between 8 and 10%[6]. The morbidity caused by the presence and removal of retained stones after cholecystectomy warrants the use of the most effective available means of common bile duct exploration. The use of choledochoscope offers many advantages during common duct explorations. This includes localization of impacted calculi, interpretation of cholangiogram abnormalities and extraction of intrahepatic calculi. In addition, it also delineates ductal anatomy and may assist in the diagnosis and biopsy of other ductal lesions[7].

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Materials and method :

A prospective study was done to determine the value of operative choledochoscopy using a flexible choledochoscope. Twenty five patients were included in the study between June 2002 to November, 2003 in

the department of surgery, Bangabandhu Sheikh Mujib Medical University, Dhaka. Preoperative investigations included routine examination like full blood count, blood glucose, urea, electrolytes; liver function tests (LFTs) and ultrasonogram of biliary system. Operative cholangiography was not routinely done prior to common bile duct exploration, Post operative T-tube cholangiography when carried out the contrast material used was 50% meglumine iothalamate solution or 50% sodium diatrizoate. The first film was taken after injection of 5 ml of contrast and second film after injecting another 15 ml. The decision to explore the common bile duct was based on clinical findings, ultrasound imaging and operative finding. Common bile duct was explored by a supraduodenal choledochotomy, although access through a transduodenal sphincterotomy or a combination of these was occasionally used. Conventional exploration was done with Desjardin's forceps to remove calculi. This was followed by flexible choledochoscopy (Pentax FCB-15H) to explore the biliary tract. Choledochoscope was introduced into the common bile duct and the proximal extra and intrahepatic ducts were examined first. Ducts were sequentially seen starting from right ductal system towards the left. The scope was advanced proximally until the secondary/tertiary biliary radicals were seen. The common bile duct was examined for stones, inflarnmatory signs of cholangitis, strictures or growth. Distally the common bile duct was visualized & the ampulla of Vater was identified. The sphincter of ampulla has a typical fish mouth appearance. A variety of accessories are available which can be inserted through the working channel of the scope for the removal of stones or biopsy of any suspicious lesion in the billiary tract. If stones were found, they were removed either by routine methods or by choledochoscopic instrumentation with a dormia basket. Biopsy of any growth in the biliary tract was carried out using biopsy forceps. The common bile duct was closed over a T- tube or a biliary enteric bypass was done according to the operative and choledochoscopic findings. The scope is introduced into the biliary tract by way of a standard choledochotomy incision. The stay sutures are crossed over to reduce leakage of saline solution around the instrument. A continuous flow of sterile normal saline solution from a drip set through the instrumentation channel of the scope under a pressure of some 30 mm of Hg allows adequate distension of the duct and permits clear vision. The tip of the scope is first directed towards the liver, and the proximal part of the common bile duct, common hepatic duct and bifurcations are visualized. Both the right and the left ducts can be entered and in instances of dilated ducts, secondary and tertiary branches can be seen. The position at the entrance of the irrigation channel of the scope indicates the position (right / left) of the tip of the scope. This is usually slightly flexed upward while performing the examination. After completion of the hepatic endoscopic examination, the scope is reinserted into the distal part of the common bile duct and advanced towards the papilla under direct vision. Inspection is continued during withdrawal of the instrument when the best views may be obtained. By inspecting the distal part of the common bile duct, better visualization of the whole length can be achieved by placing two fingers of the left hand in the foramen of Winslow and by applying slight traction in the direction of the liver, which will thus straighten the common bile duct. Mobilization of the duodenum using Kocher's maneuver was not used routinely.

It is advisable to repeat the inspection of the distal portion of the common bile duct twice. The choledochoscopy is complete only when both main intrahepatic ducts, the bifurcation of the common hepatic duct, the common bile duct throughout it's length and duodenal mucosa through ampullary or papillary orifice have been visualized and inspected.

Result :

All twenty five patients had undergone conventional common bile duct exploration with a Desjardin's forceps prior to scopy. Complete removal of all stones (blind clearance) were confirmed by choledochoscopy in twenty one patients (Fig- 1). The scope was passed proximally up to the tertiary intrahepatic biliary radicals and distally beyond the ampulla in all these twenty one patients. During choledochoscopy associated stricture of the lower end of common bile duct was found in two patients. Closure of choledochotomy with a T-tube drainage was carried out in twenty three patients and choledochoduodenostomy done in the remaining two

Fig.-1 : *Normal choledochoscopic view of biliary tree*

patients having stricture. Additional stones were detected in the four patients. Impected stone in the lower end of common bile duct were seen in two of them. Complete extraction with dormia basket was possible only in one and other needed transduodenal sphincterotomy. In other two patients, impected stones were seen in the third generation intrahepatic ducts (Fig-2). These intrahepatic stones were extracted with the dormia basket. Post operative T-tube cholangiogrram was done in twelve patients on the 10th post operative day to look for retained stone in the biliary system. No residual stone was found in these patients.

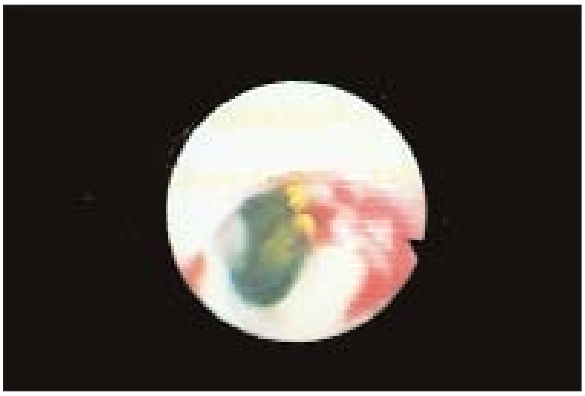

Fig.-1 : *Choledochoscopic view of biliary tree showing retained stone after traditional removal (blind clearance) of stone*

Table – I

Findings of different studies showing frequency of additional stones overlooked by instrumental exploration.

Reference	Year	Total Number of choledochoscopy	Additional stone recovered in patients	% of stones overlooked by instrumental exploration
Shore and Shore[9]	1970	100	22	22
Ottinger and Warshaw[12]	1974	30	9	30
Schein[13]	1975	117	6	5
Finnis and Rowntree [5]	1977	88	24	-27
Kappas et al [14]	1979	73	12	17
Yap et al [15]	1980	112	16	14
Escat et al [16]	1984	380	46	12
Present study	2003	25	4	16

Discussion:

Choledochoscopy is an indispensible tool in common bile duct surgery[8]. The choledochoscope is easy to sterilize and to use. The common duct is perfectly visualized and only basic endoscopic orientation is needed and no specific training is required. The length of the surgery is not increased and no complication related to its use has been reported. Choledochoscopy presents three major advantages:

1. It provides a reliable way to discover stones overlooked by classical methods (four cases in this series, 16%). The findings reported in different studies are shown in Table-I.
2. It visualizes common bile duct, the ampulla of Vater and the hepatic channels. This visualization decreases the rate of retained stone to 0% compared to (blind clearance) instrument exploration alone in which retained stone have been estimated to be 20%[9].
3. It improves operative technique because it gives direct visualization of the bilary tree confirming it's patency. This eliminates the necessity for sphincterotomy and biliary digestive anastomosis, which are reserved for impacted common duct stones. Therefore, endoscopy reduces operative morbidity and mortality.

It is reported that 96% of patients with overlooked stones required surgery within five years of cholecystectomy[10]. It is therefore, important to eliminate the problem of retained stone at the time of primary common bile duct exploration. Recent review of a large series of operative flexible choledochoscopy hilighted the benefits of this method over other methods of common bile duct exploration[11].

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