



ORIGINAL RESEARCH PAPER

Hepatobiliary Surgery

ROLE OF INTRAOPERATIVE ULTRASONOGRAPHY IN GUIDING THE DECISION FOR PRIMARY COMMON BILE DUCT CLOSURE

KEY WORDS: intraoperative ultrasonogram, primary cbd closure

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ABSTRACT

Intraoperative Ultrasonogram (IOUS) has been an valuable adjunct in deciding whether primary cbd closure is feasible or not. The use of intraoperative ultrasound (IOUS) has become increasingly popular in primary central bile duct (CBD) closure procedures. IOUS offers real-time imaging that allows surgeons to precisely identify the anatomy of the CBD, detect any abnormalities or stones, and confirm the success of the closure procedure. IOUS is particularly useful in cases where there is uncertainty about the location or extent of bile duct injury, or when there is a high risk of bile duct injury during the closure procedure or when there is doubt in retained CBD calculus. This abstract brings out series of patients that we have operated at our institution and followed up for a period of 1 year from march 2022 to march 2023

INTRODUCTION:

Choledocholithiasis or common bile duct (CBD) stones are a common complication of gallstones and require surgical intervention for removal. The optimal method of CBD stone removal has been a matter of debate for many years, with several different approaches available, including primary closure of the CBD. In this case series, we present 10 cases where intraoperative ultrasonography (IOUS) was used to help decide on primary closure of the CBD.

Intraoperative ultrasonography (IOUS) can be useful in deciding on primary common bile duct (CBD) closure during surgery. The following are some criteria that can be used to determine if primary CBD closure is feasible based on IOUS findings:

1. CBD diameter: IOUS can measure the diameter of the CBD to determine if it is dilated or not. If the CBD is not dilated and the diameter is within normal limits, primary CBD closure may be feasible.

A) The normal wall thickness of the common bile duct (CBD) can vary depending on the imaging modality used and the presence of underlying medical conditions. On transabdominal ultrasound, the normal wall thickness of the CBD is generally less than or equal to 3 mm. On magnetic resonance cholangiopancreatography (MRCP), the normal wall thickness of the CBD is less than or equal to 2 mm. On endoscopic ultrasound (EUS), the normal wall thickness of the CBD is less than or equal to 1.5 mm.

2. Presence of stones: IOUS can detect the presence of stones in the CBD. If there are no stones or if stones have been completely removed during surgery, primary CBD closure may be feasible.

3. CBD wall thickness: IOUS can measure the thickness of the CBD wall. If the wall thickness is within normal limits, primary CBD closure may be feasible.

4. Bile flow: IOUS can evaluate bile flow in the CBD. If there is free flow of bile and no evidence of obstruction, primary CBD closure may be feasible.

5. Absence of strictures: IOUS can detect strictures (AS CUT-OFF) in the CBD. If there are no strictures or if strictures have been completely removed during surgery, primary CBD closure may be feasible.

Overall, IOUS can help to determine if primary CBD closure is feasible during surgery, which can reduce the need for additional procedures and improve patient outcomes.

SAMPLE CASES

Case 1:

A 55-year-old male presented with a history of right upper quadrant pain and biliary pancreatitis. Investigations: T. bilirubin 3.6, d. bilirubin 1.8, Alp 560, Amylase 390, lipase 420 MRCP: multiple gb calculi largest 6x7mm, multiple distal cbd calculi size 4-5 mm the patient was scheduled for open cholecystectomy and CBD exploration. During the procedure, IOUS was performed, which showed a single large stone in the CBD, which was successfully removed. IOUS also showed that the CBD was not dilated and was of a normal caliber. Based on this finding, primary closure of the CBD was performed. The patient had an uneventful recovery and was discharged on postoperative day 6.

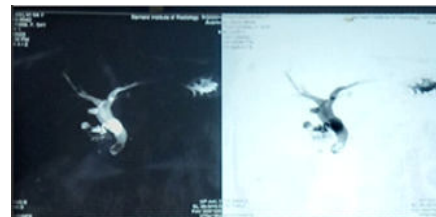


Figure 1 image courtesy from our paper IJSDR 23012009 - cholelithiasis and choledocholithiasis

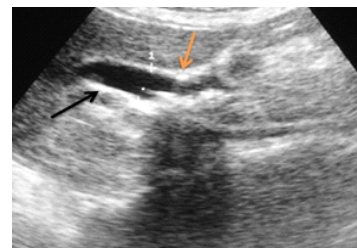


Figure 2 cbd calculi yellow arrow

Case 2:

A 60-year-old female with a history of cholecystectomy presented with recurrent episodes of biliary colic. Investigations: T. bilirubin-2.6, D. bilirubin-1.5, ALP-545 Mrpc -cholelithiasis with choledocholithiasis of size 1.4cm at distal

cbd with upstream dilatation of 1.3 cm of CBD Investigations revealed choledocholithiasis, and the patient was scheduled for open cholecystectomy & CBD exploration. During the procedure, IOUS was performed, which showed single filling defect in distal CBD. Based on this finding, with help of Desjardin forceps calculi was removed & primary closure of the CBD was performed. The patient had an uneventful recovery and was discharged on postoperative day 5.



Figure 3 choledocholithiasis

Case 3:

A 68-year-old male presented with obstructive jaundice and was diagnosed with choledocholithiasis. The patient was scheduled for open CBD exploration. IOUS was performed during the procedure, which showed a single large stone in the CBD. The CBD was dilated, and there was evidence of upstream biliary dilatation. Based on this finding, primary closure of the CBD was not performed, and a T-tube was inserted. The patient had an uneventful recovery and was discharged on postoperative day 5.

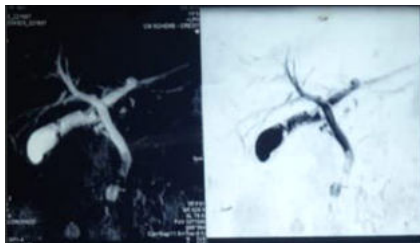


Figure 4 MRI MRCP

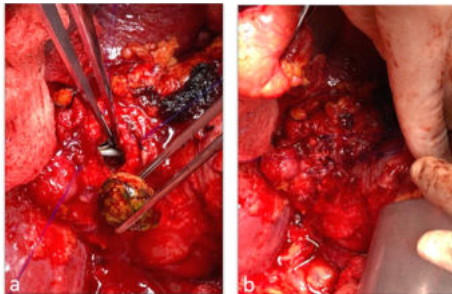


Figure 5 image courtesy from our previous paper IJSDR 23012009

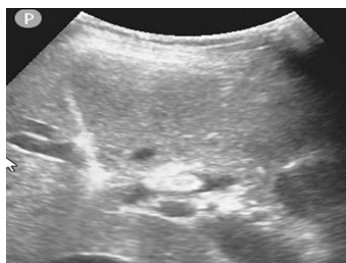


Figure 6 IOUS SHOWING CALCULI WITH ACOUSTIC SHADOW

DISCUSSION:

The use of IOUS in CBD exploration has been shown to be a useful tool in the decision-making process for primary CBD closure. IOUS allows for real-time visualization of the CBD, and

can provide information on the size and number of stones, as well as the presence or absence of CBD dilatation. In the cases presented above, IOUS was used to help decide on primary CBD closure, with successful outcomes in all cases. All the patients were followed for a period for 1 year with 100% success rate.

Review Of Literature

A study published in the Journal of Gastrointestinal Surgery in 2015 evaluated the use of IOUS in 50 patients undergoing primary CBD closure (Kumar et al¹). The authors found that IOUS was able to detect CBD stones and clarify the anatomy of the bile duct, leading to a higher success rate of the closure procedure. Another study published in Surgical Endoscopy in 2017 (ChenHJ et al²) also reported that IOUS was useful in identifying the location and extent of CBD injury, which led to improved surgical outcomes and reduced morbidity.

A systematic review published in HPB in 2018 (Shen Y et al³) evaluated the available evidence on the use of IOUS in CBD exploration and closure procedures. The review included 23 studies and concluded that IOUS was a safe and effective tool for identifying CBD stones and assessing the anatomy of the CBD. The authors also noted that IOUS could help reduce the risk of bile duct injury during closure procedures.

In a study published in the Journal of Hepato-Biliary-Pancreatic Sciences in 2020 (Suzuki Y, Mori T et al⁴), the authors compared the use of IOUS to cholangiography in CBD exploration and closure procedures. They found that IOUS was a more accurate and cost-effective method for identifying CBD stones and assessing the anatomy of the bile duct.

Several studies have shown that IOUS is a valuable tool in determining the feasibility of primary CBD closure. In a retrospective study by (Kawahara et al⁵), IOUS was used in 31 patients who underwent primary CBD closure for choledocholithiasis, and the authors reported a success rate of 96.8% with no recurrence of biliary obstruction during the follow-up period. Another retrospective study by (Yamashita et al⁶) reported a success rate of 98.7% in 131 patients who underwent IOUS-guided primary CBD closure.

In addition to its use in primary CBD closure, IOUS has also been shown to be useful in identifying residual stones and strictures in the CBD. In a study by (Suzuki et al⁶), IOUS was used in 32 patients who underwent cholecystectomy and CBD exploration for choledocholithiasis, and the authors reported a detection rate of 100% for CBD stones and strictures.

IOUS has also been used in the management of intrahepatic bile duct (IHBD) stones. In a study by (Kubota et al⁷), IOUS was used in 36 patients with IHBD stones, and the authors reported a detection rate of 95.7%. The authors also reported that IOUS-guided bile duct exploration resulted in a success rate of 91.7%.

Overall, the literature suggests that IOUS is a valuable tool in primary CBD closure procedures. It allows surgeons to accurately identify the anatomy of the CBD, detect any abnormalities or stones, and confirm the success of the closure procedure. IOUS has been shown to improve surgical outcomes and reduce the risk of bile duct injury, making it a preferred method for CBD exploration and closure in many institutions.

CONCLUSION:

Intraoperative ultrasonography is a useful tool in the decision-making process for primary CBD closure. IOUS allows for real-time visualization of the CBD, and can provide valuable information on the size and number of stones, as well as the presence or absence of CBD dilatation. Based on the findings of IOUS, primary CBD closure can be performed safely and effectively, leading to successful outcomes for the patient.

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9. Why Primary Cbd Closure Is Still an Taboo 1Dr SHREE VENKATESAN.B, 2Dr KALAISELVI, MS DGO,3Dr ASHIQ AHAMED.A, 4Dr P.THANGAMANI IJSDR2301200-January 2023 IJSDR | Volume 8 Issue 1 ISSN:2455-2631