Choledochoduodenostomy in the Present Era: Specific Indications and Outcomes

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ABSTRACT

Aim: To determine the specific indications and outcomes of patients undergoing choledochoduodenostomy (CDD) in the current era of endoscopy and interventional radiology.

Materials and methods: This retrospective study was conducted at Dr. Ram Manohar Lohia Institute of Medical Sciences, Lucknow, India, over a period of 6 years from January 2011 to December 2016. Twenty-six patients who underwent CDD within this period were evaluated. Preoperatively, all the patients underwent abdominal ultrasonography and magnetic resonance cholangiopancreatography along with routine blood investigations and were evaluated for medical comorbidities. The patients were followed up for a variable period of 6 months to 4 years.

Results: In our study, the indications for CDD included large impacted stones; choledocholithiasis with stricture; recurrent stones; and common bile duct stone with stricture and cholecystoduodenal fistula. The mean of length of hospital stay was 9.2 days. The overall morbidity was 30% without any mortality. There were no cases of residual stones, bile leak, or hemorrhage; and none developed alkaline reflux gastritis, sump syndrome, or cholangitis in the follow-up period.

Conclusion: Choledochoduodenostomy has a definite role in the management of bile duct stones, especially in benign biliary tract obstruction. The proportion of cases requiring this approach is diminishing because of nonoperative techniques available, but it will not be eliminated by them based on current trends.

Keywords: Biliary calculi, Cholangitis, Choledochoduodenostomy, Sump syndrome.


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Conflict of interest: None

INTRODUCTION

In this present era of endoscopy and interventional radiology, the management of benign biliary diseases is predominantly nonsurgical. Choledochoduodenostomy (CDD), which is described as an anastomosis between the lower end of the common bile duct (CBD) and the duodenum, has limited but specific indications. This procedure had been described long back but the indications have remained the same over the years. Although done infrequently, this technique has been standardized and has yielded good results. Numerous complications specific to the procedure have been described classically including ascending cholangitis, alkaline reflux gastritis, and sump syndrome, which may be the reason of this procedure being performed less frequently over the years. We reviewed our indications and outcomes of the procedure over a period of 6 years and highlight the results with a review of literature.

MATERIALS AND METHODS

This study was conducted at Dr. Ram Manohar Lohia Institute of Medical Sciences, Lucknow, India, which is a tertiary care referral hospital, over a period of 6 years from January 2011 to December 2016. The study design is a retrospective study in which 26 patients who underwent CDD within this period were evaluated by going through their hospital records and through telephonic interviews. Eight of these were male patients and 18 were female patients. The average age of the patients was above 60 years and the youngest patient was 43 years. All the patients underwent routine blood investigations like hemogram, renal function tests, liver function tests, and coagulation profile and specific investigations for other medical comorbidities like diabetes, hypertension, dyslipidemia, and thyroid function abnormalities in the preoperative period. All our patients had one or more medical comorbidities like diabetes, hypertension, coronary artery disease, chronic airway disease, etc., and were evaluated and deemed fit for surgery by specific physicians. All the patients had an abdominal ultrasonography and magnetic resonance cholangiopancreatography (MRCP) prior to surgery. In a few cases, MRCP was done after a failed endoscopic retrograde cholangiopancreatography (ERCP) (Figs 1A and B).

Surgical Technique

The technique of CDD begins with an initial assessment of the abdomen. The gallbladder is taken down from liver by
a fundus-first method. The CBD is identified and exposed by opening the overlying peritoneum, more so at the lower end (Fig. 2). Complete kocherization of the duodenum is then performed. Lower end of the CBD is confirmed by needle aspiration of bile and stay sutures are placed using Vicryl 3-0. A vertical incision of approximately 1 cm is given at the lower end of the CBD and any stones or stent are extracted from the CBD. An intraoperative video choledochoscopy was done in each case after complete clearance of CBD identifying the proximal and distal portions. A transverse incision of 2 cm length is made over the anterior wall of the first part of the duodenum. A single-layer anastomosis is established using Vicryl 3-0 interrupted sutures keeping the stoma size around 2 cm (Fig. 3). The procedure is then completed by placing a closed-suction Jackson–Pratt drain near the anastomosis as per protocol.

Follow-up

All 26 patients were followed up for a variable period ranging from 6 months to 4 years. None of the patients were lost to follow-up. During the follow-up visits, all of them underwent a liver function test, abdominal ultrasonography, and a hepatobiliary nuclear scan, in case desired, apart from a detailed history and clinical examination. The details and outcome of the follow-up visits were systematically recorded and analyzed.

RESULTS

In our study, the indications for CDD included large impacted stones after a failed endoscopic retrograde cholangiography (ERC) clearance; choledocholithiasis with stricture; recurrent stones; and CBD stone with stricture and cholecystoduodenal fistula. The indications for CDD and their distribution among male and female patients are summarized in Table 1.

The size of CBD varied from 1.5 to 2.5 cm. The mean length of hospital stay was 9.2 days. The only postoperative complications were wound infection in four cases (15.4%), postoperative fever in one case (3.8%), and pneumonia in three cases (11.6%). No cases of sump syndrome
or cholangitis were recorded. The various complications encountered in each group are summarized in Table 2. Overall morbidity was 30.8% without any mortality. None of the patients developed recurrent stones, bile leak, or hemorrhage and none showed residual stones in the follow-up period, making this procedure extremely satisfactory in these patients with multiple medical comorbidities.

**DISCUSSION**

Open surgical procedures on the biliary tract have been widely investigated since the advent of therapeutic ERCP and more recently that of laparoscopic CBD exploration. The routine use of endoscopic sphincterotomy (ES) and CBD stone extraction, with gallbladder in situ, has 10 to 20% risk of developing chronic cholecystitis and empyema of the gallbladder. Choledochoduodenostomy was originally performed by Sprengel in 1891 and was subsequently used with considerable success by German surgeons. The risk of causing recurrent cholangitis led to a decline in the popularity without detailed evidence for the same. Several studies on the long-term follow-up of CDD had good outcomes, with an incidence of sump syndrome and/or cholangitis of <5%. Most of these complications can be readily dealt with by endoscopic treatment.

There has been a renewed interest in CDD in the last three decades, with several publications carefully evaluating the results, indications, advantages, complications, and shortcomings of CDD. The consensus is that CDD is a very satisfactory surgical procedure to treat a variety of obstructing lesions of the distal CBD. Most of these authors stipulate that the diameter of the CBD should be at least 16 mm for good outcomes of CDD.

There are specific indications for performing CDD, most of which have remained unchanged over time. It has been recommended in the treatment of multiple CBD stones, retained or residual stones following a prior biliary intervention, primary CBD stones, lower-end CBD strictures, dilated CBD with a diameter of more than 2 cm, or failure of ERCP. Benign peripancreatic tumors and nonavailability of ERCP may also be considered as indications for CDD. This procedure has been favored particularly in elderly patients.

In our study, the indications for CDD included large impacted stones, choledocholithiasis with stricture, recurrent stones, and CBD stone with stricture and cholecystoduodenal fistula. None of these patients developed recurrent stones and none showed residual stones in the follow-up period, making this procedure extremely satisfactory in these patients with multiple medical comorbidities.

There have been alternative treatments for primary or retained CBD stones, such as dissolution with deoxycholic acid and endoscopic papillotomy, but CDD has been used with increasing frequency over the past decade with good results. Although ready reflux from the duodenum into the biliary tree may lead to some derangement of hepatic function tests, this is not clinically important. The long-term results of CDD are comparable with ES.

Earlier studies, such as the one conducted by Degenshein, published 18-year experience with 175 consecutive CDDs, and concluded that it was a safe and effective operation for varied indications. It was emphasized that ascending infection from reflux of duodenal contents into the biliary tree, causing recurrent cholangitis, was not a problem if the diameter of the CBD used to construct the CDD measured at least 16 mm.

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**Table 1: Indications for CDD**

<table>
<thead>
<tr>
<th>Indications</th>
<th>Male, n (%)</th>
<th>Female, n (%)</th>
<th>Total, n (%)</th>
</tr>
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<tbody>
<tr>
<td>Large impacted stones</td>
<td>4 (15.4)</td>
<td>8 (30.8)</td>
<td>12 (46.2)</td>
</tr>
<tr>
<td>Choledocholithiasis with stricture</td>
<td>3 (11.6)</td>
<td>5 (19.2)</td>
<td>8 (30.8)</td>
</tr>
<tr>
<td>Recurrent stones</td>
<td>1 (3.8)</td>
<td>4 (15.4)</td>
<td>5 (19.2)</td>
</tr>
<tr>
<td>CBD stone with stricture and cholecystoduodenal fistula</td>
<td>0 (0)</td>
<td>1 (03.8)</td>
<td>1 (3.8)</td>
</tr>
<tr>
<td>Total</td>
<td>8 (30.8)</td>
<td>18 (69.2)</td>
<td>26 (100)</td>
</tr>
</tbody>
</table>

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**Table 2: Complications following CDD**

<table>
<thead>
<tr>
<th>Complications</th>
<th>Large impacted stones, n (%)</th>
<th>Choledocholithiasis with stricture, n (%)</th>
<th>Recurrent stones, n (%)</th>
<th>CBD stone with stricture and cholecystoduodenal fistula, n (%)</th>
<th>Total, n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wound infection</td>
<td>3 (11.6)</td>
<td></td>
<td>1 (03.8)</td>
<td></td>
<td>4 (15.4)</td>
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<tr>
<td>Postoperative fever</td>
<td>1 (03.8)</td>
<td></td>
<td></td>
<td></td>
<td>1 (03.8)</td>
</tr>
<tr>
<td>Pneumonia</td>
<td>2 (07.8)</td>
<td>1 (03.8)</td>
<td></td>
<td></td>
<td>3 (11.6)</td>
</tr>
<tr>
<td>Alkaline reflux gastritis</td>
<td></td>
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<tr>
<td>Cholangitis</td>
<td></td>
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<tr>
<td>Anastomotic stenosis</td>
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<tr>
<td>Bile leak</td>
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<tr>
<td>Sump syndrome</td>
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</table>

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The results of CDD when done for the proper indications, when the diameter of the CBD used measures 16 mm or more, and the technical precautions (mobilization of the duodenum, vertical incision in the CBD, and meticulous and precise suture techniques) have been better or comparable to other alternative operative methods. There is a thought that CDD should be avoided in younger patients who have a life expectancy of 10 or more years due to long-term complication of cholangitis and the “sump syndrome.” This is a rare and late, albeit overemphasized, complication of CDD. Its prevalence has been reported widely varying from as low as 0% to as high as 10%.1,5 This complication was not seen in our series. An extensive literature review showed that the absence of this complication could be explained based on at least two important factors. Firstly, a wide tension-free anastomosis provides effective drainage of enteric contents that may enter the CBD through the CDD site. Secondly, the narrow part of CBD distal to the anastomosis prevents the entry and stasis of duodenal contents. Also in patients who have undergone a preoperative ERCP with papillotomy, the contents easily pass through the ampulla, preventing this complication altogether. Therefore, with the proper indications and meticulous technique, it can be performed even in younger patients.4

Choledochoduodenostomy has its own technical advantages; for instance, it maintains the normal anatomy. As compared with a routine Roux-en-Y hepaticojejunostomy, CDD is technically easier, faster, requires less manipulation of the CBD, and is more physiological. Subsequent endoscopic intervention is possible following CDD. Choledochoduodenostomy bypasses the narrowed/stricthed area and is amenable to subsequent surgical intervention (hepaticojejunostomy) in case required. It is suitable for elderly patients or patients with multiple surgeries and interventions. Roux-en-Y hepaticojejunostomy in comparison requires construction of two anastomoses, is more time consuming, is technically more demanding, and alters the normal anatomy. Scarring of the duodenum and impending obstruction of the duodenum are contraindications for CDD; under these circumstances, hepaticojejunostomy is performed.11

Hence, from the observations made in this study and the review of literature, CDD produces good long-term results in the treatment of non-neoplastic obstructing pathology of the distal CBD. The size of the CBD with tension-free meticulous suturing techniques is essential for good outcomes. Intrabiliary stents are not necessary under these circumstances and we have not used stents or T-tubes in any of our cases. Technical experience in performing CDD is also an important consideration in assuring good results. Cholangitis and symptoms related to the “sump syndrome” do not occur, or occur very infrequently. These can be managed readily by endoscopic techniques. In the absence of local sepsis, CDD can be performed with very low rates of morbidity and near-zero mortality. The notion that CDD should be reserved only for elderly patients with limited (less than 10 years) life expectancy should be revised, and the spectrum of its indications should be broadened under appropriate circumstances to include much younger patients.

CONCLUSION

Choledochoduodenostomy has a definite role in the management of bile duct stones, especially in benign biliary tract obstruction when a permanent biliary drainage procedure is required. The size of the CBD is of critical importance and meticulous and precise suturing techniques are also essential. The proportion of cases requiring this approach is diminishing because of nonoperative techniques available, but it will not be eliminated by them based on current trends.

REFERENCES