

SURGICAL MANAGEMENT OF IMPACTED LOWER COMMON BILE DUCT STONES

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Abstract

Common bile duct stones have been noted in 10-15% of patients with gall stones, these stones are either primary (formed in the common bile duct) or secondary (formed in the gallbladder and migrate down to the common bile duct). Their management includes ERCP, biliary drainage procedure and choledochal exploration.

In this interventional study we reviewed transduodenal sphincteroplasty as an option for surgical treatment of impacted lower CBD stones from a point of morbidity and mortality.

A prospective study conducted over a period of 10 years from 2000 to 2010 in Basrah Teaching General Hospital and private hospitals in Basrah. Twenty three patients with impacted lower CBD stones, there were 17 females (73.9%) and 6 males (26.1%) included in this study. The impacted lower CBD stones and surgical jaundice are the main indications for surgery to which 23 patients underwent TDS. All surgeries done in elective lists.

In this prospective study, 23 patients who were diagnosed as impacted lower CBD stones managed by TDS, 17 (73.9%) were females and 6 (26.1%) were males. In patients with impacted lower CBD stones who underwent TDS as an option for surgical treatment, 3 patients (13.04%) developed duodenal leak, 2 of them treated conservatively and improved, while 1 patient re-explored. Two patients (8.69%) developed mild cholangitis which respond to conservative measures. The hospital stay for all patients ranges 5–14 days postoperatively, with mean stay of 7 days. No reported cases of postoperative pancreatitis following TDS in this study. No mortality reported (0 %) in follow-up for 2 years in our study.

It is concluded from this prospective study that TDS in the surgical management of impacted lower CBD stones with fibrosed ampulla (sphincter of oddi) is a feasible option with accepted incidence of duodenal leak and cholangitis among the biliary drainage procedures especially in an area where the facility of ERCP are not present or failed in addition of dense adhesions in supraduodenal area intra-operatively when decisions of open abdominal exploration done, make supraduodenal CBD exploration difficult and hazardous.

Introduction

Common bile duct stones have been noted in 10-15% of patients with cholelithiasis¹, the incidence of choledocholithiasis increase with each decade after the age of 60, about 6% of patients undergoing cholecystectomy has CBD stones that were completely unsuspected^{1,2}.

Common bile duct stones may be small or large, single or multiple³. The vast majority of ductal stones in western countries is formed within the gallbladder and migrates down the cystic duct to

CBD; these are classified as secondary stones, in contrast to the primary stones that are formed in the bile duct. The secondary stones are usually cholesterol stones in 25% and pigmented stones in 75% of patients^{1,3}. The primary stones are associated with biliary stasis, and infection⁴, and are more commonly seen in Asian population³.

Common bile duct stones may be silent and often discovered incidentally; they may cause complete or incomplete obstruction³. Patient with CBD stones may

present with biliary colic, bile duct obstruction, bilirubinuria (tea colored urine), pruritis, clay colored stool and jaundice, there may be nausea and vomiting with intermittent or constant epigastric or right upper quadrant pain^{1,3}, this clinical course may be complicated by pancreatitis, cholangitis, or rarely hepatic abscesses¹.

Stones impacted in the ampulla may be difficult for both endoscopic ductal clearance as well as CBD exploration (open or laparoscopic), in these cases the CBD is quite dilated (about 2 cm in diameter), choledochoduodenostomy or Roux-en-Y choledochojejunostomy may be the best option under this circumstances³. But dense adhesions in supraduodenal area from previous surgery render these procedures difficult and hazardous¹⁻⁵.

Ultrasonography is commonly the prime test useful for documenting stones in the gallbladder and CBD stones, as well as determining the size of common bile duct. As stones in the bile duct tend to move down to the distal part of CBD, bowel gas preclude their demonstration on U.S.A dilated CBD (more than 8 mm in diameter) on U.S in patient with gallstones, jaundice, biliary pain, and elevated s.alkaline phosphotase is highly suggestive of CBD stones. MRC (Magnatic Resonance Cholangiography) provide anatomic details and has sensitivity and specificity of 95% 89% respectively at detecting choledocholithiasis more than 5mm in diameter¹.

Endoscopic cholangiography is gold standard for diagnosing CBD stones; it has distinct advantage of providing therapeutic option at time of diagnosis. Endoscopic U.S is good as ERCP in detecting CBD stones¹, with sensitivity of 91% and specificity of 100%. PTC is rarely needed in patients with secondary CBD stones, but frequently performed for both diagnostic, and therapeutic reasons in patients with primary CBD stones³.

The management of patients with high suspicion, or proven choledocholithiasis is depending on local resources and expertise 6. In general the lines of management of choledocholithiasis including impacted stones in the ampulla of vater are:

ERCP:- in 1968, ERCP was introduced as diagnostic tool to aid in the management of biliary and pancreatic disease⁷ with sensitivity and specificity of 90% and 98% respectively, and accuracy of 96%. Five years later with development of endoscopic sphincterotomy, ERCP Transformed to therapeutic modality, so the diagnosis and treatment can be performed at the same setting. ERCP stone extraction is successful in 80-90% of the time using the technique of spincterotomy and ballon catheter or dormia basket stone retrieval⁸.

Nowadays with the addition of mechanical, electrohydraulic, laser, or extracorporeal shock wave lithotripsy, for large stones increase the success rate to 95%¹.

Surgical drainage procedure:

These procedures must be considered in situation of multiple stones, incomplete removal of stones, impacted distal bile duct stones, markedly dilated CBD, distal bile duct obstruction from tumor, or stricture, and re occurrence after previous bile duct exploration.

The methods of biliary drainage procedures are¹:

1. Transduodenal sphincteroplasty (TDS).
2. Choledochoduodenostomy(CDD).
3. Choledochojejunostomy (CDJ).

Trans duodenal sphincteroplasty(TDS)

Is useful in the management of choledocholithiasis when these stones impacted in the ampulla of vater, papillary stenosis due to fibrosis, and multiple stones particularly in the presence of non dilated CBD¹. In majority of cases, endoscopic sphincteroplasty has replaced open TDS .if an open procedure for CBD stones is being done in which stones are

impacted, recurrent, or multiple the TDS approach may be feasible³.

The frequent passage of stones with subsequent inflammation and fibrosis lead to stenosis of sphincter of Oddi so, endoscopic or open sphincteroplasty result in good yield in management³ with preservation of anatomy and physiology of gastrointestinal tract and biliary passages.

The aim of this study

To review transduodenal sphincteroplasty as an option of surgical treatment of impacted lower CBD stones especially in areas where the facility of ERCP are not present or failed, dense adhesions in supraduodenal area intra-operatively when decisions of open abdominal exploration done and render supraduodenal CBD exploration difficult and hazardous.

Patients and methods

A prospective study conducted over period of 10 years from 2000 to 2010 in Basra teaching general hospital and private hospitals in Basra.

Patient demographics, present and past histories, drug history and accompanying systemic diseases were evaluated.

Twenty three patients with impacted lower CBD stones (17 female (73.9%) and 6 males (26.1%)) their age were range from 18-62 years approached by history, clinical examination, liver function test and coagulation profile, S.amylase, U.S, CT. Scan, MRCP, in addition to ordinary investigations are used to diagnose and, categorize those patients into different clinical presentations. Jaundiced patients admitted 72 hours before day of surgery and prepared by given an intravenous fluid therapy covering both maintenance and deficit, mannitol 200 cc 10 % twice daily, vitamin K injection monitored by prothrombin time, and cefotaxime 1 gram twice daily.

All patients took informed consent. The impacted lower CBD stones and surgical jaundice are the main indication for

surgery to which 23 patients underwent TDS.

All patients received general anesthesia with endotracheal intubation, all surgeries done in elective lists. Postoperative antibiotics (cefotaxime 1gm twice daily) continue for several days.

In the studied patients underwent TDS, we did exploration of the abdomen via upper midline incision, mobilization of the duodenum next, to obtain exposure of the lateral portion of the second part of the duodenum. Oblique incision of 3cm length is made on the lateral surface of the duodenum, then after locating the ampulla, 2 sutures line of vicryl 3/0 inserted on both sides of ampulla, then we do incise the ampulla at 11'oclock position starting at papillary orifice and extend above the ampullary sphincter using a scissor (pancreatic duct usually identified at 4'oclock position) (in good number of patients in our study we find fibrosed tight ampulla.

Next we do extraction of the stones, and wash the CBD with saline, Then we approximate the mucosa of the CBD to the duodenal mucosa. Closure of the duodenum with direction of the incision by interrupted 3/0 vicryl, and subhepatic drain insertion follows, and closure of the abdomen in layers.

Postoperatively the nasogastric tube removed on 2 or 3 day, and new set of liver function test, S.amylase, and complete blood count done on alternate day postoperatively.

Follow up of patients in this study continue for two years postoperatively, three patients developed duodenal leak, only one patient required re exploration. Two patients developed mild attacks of cholabgitis.

No mortality was reported in this study.

Results

In this prospective study, 23 patients with impacted lower CBD stones were managed by TDS, 17 were females and 6 (26.1%) were males as in table I. The age

of patients in this study range from 18-62 years old with mean age of 38.9 and SD of 11.2 as in table II.

In this target population with impacted lower CBD stones, 11 patients (47.82%) present with jaundice and biliary colic, 7 patients (30.43%) present with on and off jaundice, 3 patients (13.04%) present with jaundice and acute pancreatitis, 2 patients (8.69%) present with jaundice and cholangitis, as in table III.

All patients with impacted lower CBD stones who underwent TDS as an option for surgical treatment, 3 patients (13.04%) developed duodenal leak, 2 of them treated conservatively and improved, and

1 patient re explored again.

Two patients (8.69%) developed mild attacks of cholangitis which respond to conservative measures in the form of supportive I.V fluids, analgesia, antipyretics, and antibiotics and need no further intervention as shown in table V.

The hospital stay for all patients ranges from 5 – 14 days postoperatively, with mean stay of 7 days.

No reported cases of postoperative pancreatitis following TDS for our patients in our study.

No mortality reported (0 %) in 2 years follow up.

Table I: Gender frequency distribution

Gender	Transduodenal Sphincteroplasty
female	17 (73.9%)
male	6 (26.1%)
total	23 (100%)

Table II: Age distribution

	Transduodenal Sphincteroplasty
Age	18-62 years
Mean	38.9
Standard deviation	11.2

Table III: Clinical presentation

Mode of presentation	
Jaundice and biliary colic	11 (47.82%)
Intermittent jaundice	7 (30.43%)
Jaundice and acute pancreatitis	3 (13.04%)
Jaundice and cholangitis	2 (8.69%)
Total	23(100%)

Table IV: Causes of regional adhesions

Previous surgery for liver hydatid	5 (21.7%)
Previous surgery for shell injury	5 (21.7%)
Previous cholecystectomy	4 (17.4%)
Previous surgery for peptic ulcer	2 (8.6%)
Total	16 (69.5%)

Table V: Morbidity and mortality

Complication	%
Duodenal and anastamotic leak	3 (13.04%)
Postoperative cholangitis	2 (8.69%)
Post operative Pancreatitis	0 (0%)
2 years mortality	0%

Discussion

The management of CBD stones (including impacted lower CBD stones) is something challenging and depend highly on the local resources, facilities and on endoscopic bilairy intervention. The best path is the one the surgeon is most adept at or the one that local expertise can accomplish most safely¹. From 1968 to 1973 ERCP introduced and transformed into therapeutic modality so the diagnosis and the treatment of CBD stones achieved in the same setting. In united state of America more than 150,000 endoscopic biliary sphincterotomies was done annually⁹.

In Iraq especially the southern part lack of ERCP and the expertise to do endoscopic CBD exploration made the use of biliary drainage procedure vital option to deal and manage patients with impacted CBD stones keep in mind that transduodenal approach is feasible when stone is impacted in a fibrosed ampulla (sphincter of oddi) or dense adhesions in supraduedenal area intra operatively seen in 16 pateints (70%) due to previous surgeries as in table 4 which render supraduedenal CBD exploration difficult and hazardous.

In this prospective study, we review TDS as an option of biliary drainage procedures; we review the postoperative morbidity like; anastomotic leak, cholangitis, pancreatitis, and the mortality related to this option. The ages of the studied group ranges from 16 to 62 years old, with no exclusion criteria used to exclude specific age from the studied

group. The sex distribution of the studied group follows the classical 1:3 male to female ratio of gall stones disease.

The incidence of duodenal leak following TDS in our study was 13.04% (3 patients out of 23), 75 % (2 patients) treated conservatively and improved and 1 patient re explored, with no significant morbidity postoperatively. The incidence of cholangitis in our study was 8.69%, which was probably due to preexisting biliary contamination resulted from combination of stasis, CBD obstruction by stone, and bacterial overgrowth in bile. However it's still less than what's reported with other biliary drainage procedures. NO patient in the study developed postoperative pancreatitis, No mortality related to surgery had been detected in 2 years follow up of patients in our study. In

French study by Suter and colleagues, of 78 patients who underwent TDS, for CBD stones 3 patients died, one from pulmonary embolism, 1 from pulmonary sepsis, and 1 from multiple organ failure syndromes complicating preoperative necrotizing pancreatitis. Of the 30 patients (38%) with complications, 20 were directly related to surgery and included 4 cases of hemorrhage not requiring transfusion, 1 case of clinical pancreatitis, and 1 case duodenal fistula that healed after conservative therapy. No deaths were noted that were directly attributable to TDS¹⁰. On the other hand in older review by Meyhoff, a 10% postoperative mortality was noted after TDS, with 4 patients developed fatal pancreatitis¹¹.

In review of 126 patients underwent CDD after CBD exploration over 19 years, by Deutsch and colleagues reveal 4% mortality rate, with all deaths occurring in patients over 70 years old and morbidity included wound infection in 18 patients (14%) bile leak through the drain to over 2 weeks in 4 patients (3%).

Rameriz and colleagues, report their experience with CDD and TDS for the treatment of CBD stones over period of 10 years, of 126 patients with TDS and 216 patients with CDD, complications include 6 intra abdominal abscesses (2.7%) and 3 (1.4%) external biliary fistula in the CDD group, and 4 (3.8%) intra abdominal abscesses and, 2 episodes (1.6%) of pancreatitis in TDS group. There was no difference in the mortality between both groups, and after mean follow up of 5.6 years 75.2% of TDS group and 71.5% of CDD group were asymptomatic. In the symptomatic group 6 patients (2.7%) in the CDD group and 3 patients (1.4%) in

the TDS group developed cholangitis that required reexploration^{12,13}.

In long term follow up of patients side to side CDD and TDS done by A. R. Baker and colleagues, 190 patients with CDD and 56 patients with TDS, there were 10 (5.3%) and 3 (5.3%) hospital deaths respectively. (3.8%) cholangitis in the TDS group compared to (8.1 %) in the CDD group other complication like anastomotic leak and intra abdominal abscesses are not significant¹⁴.

In study of surgical treatment of choledocholithiasis done by Klimenko G.A and colleagues 241 patients with choledocholithiasis treated by TDS, and 118 treated with CDD. The incidence of specific post operative complication after TDS was 10.3% and 10.2% for CDD, postoperative mortality was 6.2% for TDS and 6.8% for CDD, the hospital stay duration from the time of operation till discharge from hospital was 16.8 days for TDS and 21 days for CDD, so the author speculate that TDS is method of choice for operative choledocholithiasis treatment¹⁵.

Conclusion

Transduodenal sphincteroplasty (TDS) is feasible option in management of impacted lower CBD stone with fibrosed ampulla (sphincter of oddi) in an area where the facility of ERCP are not present or failed, in addition dense adhesions in supraduodenal area intra operatively when decisions of open abdominal exploration done, make supraduodenal CBD exploration difficult and hazardous. Also TDS preserve the anatomy of the gastrointestinal tract and biliary passages.

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