

Original Research Article

Antegrade biliary stenting following surgical management of choledocholithiasis

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Received: 21 July 2023

Revised: 01 September 2023

Accepted: 11 September 2023

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ABSTRACT

Background: T-tube drainage of the common bile duct following bile duct exploration has been standard surgical practice for most of the past century. An important drawback of surgical duct exploration and clearance over ERCP is the need for prolonged external biliary drainage via T-tubes and consequently added morbidity. As such interest grew in reassessing the need for T-tube drainage after CBD Exploration. This was especially augmented by increased popularity of laparoscopic CBD exploration at the time of cholecystectomy which could provide a solution to both problems in a single sitting.

Methods: This is a prospective observational study. We present a series of 31 cases of open and laparoscopic bile duct exploration where we closed the choledochotomy over an endo-biliary stent which was subsequently removed endoscopically, thus obviating external biliary drainage.

Results: In this study 31 patients undergoing CBD exploration at our institution between January 2017 and August 2018 were included after informed consent. These patients underwent primary closure of the CBD over an endobiliary stent without any T-tube. The mean age of the patients was 42 years (36-57 yrs). 19 of the patients were female and 12 were male. The average operating time was 135 min (120-150 min) for open surgery and 160 min (140-170 min) for laparoscopic cases. The average number of days of hospitalization was 5 in laparoscopic cases (4-14 days) and 7 in open surgical cases (6-12 days). The median follow up of patients was up to 18 months years (8 mths-2 yrs). There were no cases of bilioma/intra-abdominal collections requiring drainage. On long term follow up we could not find any clinical/laboratory evidence of development of biliary strictures.

Conclusions: Endobiliary stenting after open or laparoscopic bile duct exploration is a safe and attractive option for biliary drainage with many advantages over T-tube and can be achieved with minimal additional skill and operative time.

Keywords: T tube, Antegrade biliary stent, CBDE, Choledocholithiasis, Primary CBD closure

INTRODUCTION

T-tube drainage of the common bile duct (CBD) following bile duct exploration has been standard surgical practice for most of the past century.¹ Although pioneers of biliary surgery such as Halstead and Thornton² did not practise T-tube drainage.² The recommendation for T-tube drainage

is based on three factors: the postoperative decompression of the CBD should outflow obstruction occur; the ease of postoperative X-ray visualization of the CBD, the potential for extraction of any residual common duct stones via T-tube tract such as with the Burhenne technique.³ The advocates of the use of a T-tube argue that it allows spasm or edema of sphincter to settle after the trauma of the

exploration and provides an alternate, controlled drainage and thus prevents bile stasis, decompresses the biliary tree, and minimizes the risk of bile leakage.⁴ The advent and widespread use of ERCP and later laparoscopic bile duct exploration changed the paradigm of management for CBD stones. The widespread availability of ERCP has made endoscopic stone extraction the primary modality for the management of choledocholithiasis.⁵ An important drawback of surgical duct exploration and clearance over ERCP is the need for prolonged external biliary drainage via T-Tubes and consequently added morbidity. As such interest grew in reassessing the need for T-tube drainage after CBD Exploration. This was especially augmented by increased popularity of laparoscopic CBD exploration at the time of cholecystectomy which could provide a solution to both problems in a single sitting.^{6,7} Studies demonstrating primary CBD closure can be found from early 1990's and after the year 2000 are abundant in literature including some meta-analysis.⁸⁻¹⁰ Our study is aimed at presenting outcome of a series of 31 cases of open and laparoscopic bile duct exploration where we closed the choledochotomy over an endo-biliary stent which was subsequently removed endoscopically, thus obviating external biliary drainage.

METHODS

This is a prospective observational study. In this study 31 patients undergoing CBD exploration at SMHS Hospital Kashmir between Jan 2017 and Aug 2018 were included after informed consent. This small cohort were divided into two sets: 17 patients with failed attempts at pre operative ERCP due to impacted/large stones, failure to cannulate or inability to tolerate the procedure proceeded directly to open Cholecystectomy with CBD exploration, 14 Patients undergoing laproscopic cholecystectomy who had with pre or intra operative suspicion of choledocholithiasis, subsequently confirmed on IOC. These patients underwent Laparoscopic CBDE which was successful in 12 patients and needed conversion due to unfavourable anatomy or other technical factors in 2 patients. IOC was selectively done based on pre-operative or intra Operative Suspicion of Choledocholithiasis such as history of jaundice or pancreatitis, raised ALP or Bilirubin, Dilated ducts found on US Scans or Intraoperatively. The median follow-up of patients was up to 18 mths years (8 mths-2 yrs). We did not include a control arm because of low Accrual reflecting the impact of ERCP on management of choledocholithiasis. The data was entered into Microsoft excel and was analysed.

Surgical technique

Open cholecystectomy was done through a Right Subcostal Incision. After dissection of calots triangle and take down of the cystic artery the insertion of cystic duct was used to identify the CBD. Bile duct exploration was done via a sub centimetre choledochotomy incision at 12 o'clock position in all but 2 patients with grossly dilated cystic duct where trans-cystic exploration was done.

Thorough irrigation of proximal and distal ducts was done followed by palpation for calculi. Impacted calculi were removed by direct massage or with help of Desjardins forceps. Large calculi were fragmented in situ and flushed out with irrigation. Completion choledochoscopy was done in most cases. A 7 Fr DJ stent was placed with one end in duodenal lumen and other near the confluence. The choledochotomy was closed with 4-0 interrupted vicryl or PDS suture. A sub-hepatic drain was placed in all patients. Laparoscopic cholecystectomy was done through standard four port configurations. An intra operative cholangiogram was done based on pre-operative or intra operative suspicion of choledocholithiasis. In patients with bile duct stones on IOC a CBDE was done through a choledochotomy. Stones were dislodged by thorough irrigation through a 7 Fr feeding tube or direct milking with the suction/irrigation canula. In some cases a balloon sweep with Fogarty's catheter was done. Completion choledochoscopy was done in all cases with a flexible ureteroscope. A 7 Fr DJ stent was placed through the choledochotomy as in Open cases and the choledochotomy was closed by interrupted 4-0 Vicryl sutures. A drain was placed in all cases.

RESULTS

The mean age of the patients was 42 years (36-57 yrs). 19 of the patients were female and 12 were male. The average operating time was 135 min (120-150 min) for open surgery and 160 min (140-170 min) for laparoscopic cases (Table 1).

Table 1: Patient and outcome variables.

Parameters	Observations	
Age	42 (36-57)	
Gender	Male	12
	Female	19
Surgery	Laparoscopic surgery	Open surgery
Operative time (mins)	160 (140-170)	135 (120-150)
Length of hospital stay (days)	5 (4-14)	7 (6-12)

Complete CBD clearance was achieved in all the Open cases where as remnant stones/fragments were found post-operatively in two patients who underwent laparoscopic CBDE. These were removed by ERCP at the time of stent removal. Drain was removed on the third day in 24 patients, by 5th day in 28 of the 31 patients. Three patients developed biliary drainage which was low volume (<100 ml) and stopped by 10 days in 2 patients, it was prolonged (38 days) and up to 350ml/day in one patient (Figure 1). This patient was discharged with drain in situ and the output dried up spontaneously. The average number of days of hospitalization was 5 in laparoscopic cases (4-14 days) and 7 in open surgical cases (6-12 days). Stent removal was done endoscopically between 2nd and 3rd

week in all but one case which developed prolonged biliary drainage. In this case the stent was removed after removal of abdominal drain (6 weeks). On endoscopy stent was found to have been spontaneously dislodged in 4 cases however there were no instances of intra-abdominal migration. There were no cases of bilioma/intra-abdominal collections requiring drainage. On long term follow up we could not find any clinical/laboratory evidence of development of biliary strictures.

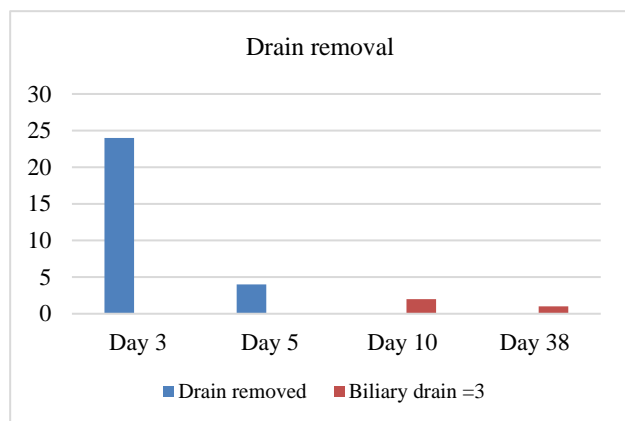


Figure 1: Days of drain removal 3 patients had biliary drain out of which 2 had drain upto 10 days and 1 had prolonged drainage upto 38 days.

DISCUSSION

Although ERCP is currently the most commonly used and preferred modality for management of choledocholithiasis, surgical exploration of bile ducts still has an important role. Surgery for bile duct stones may be done in three settings: Failed ERCP, Inaccessible papilla due to previous surgery, unavailability of requisite endoscopic expertise, inability of patient to tolerate ERCP, intraoperatively detected bile duct stones when adequate surgical expertise is available, preoperatively detected stones in units with adequate expertise to provide complete treatment in a single procedure. The main drawback of surgical duct clearance is need for external biliary drainage via a T-Tube which in itself adds to increased hospital stay and operative time and morbidity can cause complications of its own. The complications of T-Tube include fluid electrolyte disturbances, dislodgement, bile leak/biliary peritonitis, obstruction, infection. A study has highlighted the fact that the T-tube-related complication rate is approximately 15%, without any significant difference between open and laparoscopic CBD explorations.¹⁰ Endobiliary stents provide effective decompression of the CBD while avoiding the need for external biliary drainage. Furthermore, any retained stones can be removed by ERCP at the time of stent removal because these are usually fragments or small calculi which escaped removal during surgery. Thus, the role of percutaneous removal (Burhene) seems to be fading. As such antegrade stenting may become a favoured form of biliary drainage after surgical duct exploration and will make Laparoscopic

CBDE at the same time as cholecystectomy an even more attractive option because of decreased morbidity and hospital stay and cost effectiveness. A retrospective cohort study published in 2016 studied the trends in management of choledocholithiasis in the United States From 1998 to 2013. The authors observed that there is a marked decline in the use of CBDE in the treatment of choledocholithiasis and corresponding rise in utilization of ERCP followed by Laparoscopic Cholecystectomy although the unadjusted median hospital length of stay as well as risk adjusted length of hospital stay was shorter in the Lap CBDE+Cholecystectomy Group.⁵ In our small series we demonstrated the safety and feasibility of Antegrade biliary stenting in a teaching hospital. Other studies in the domain have compared it with other forms of drainage including T-Tubes or primary closure without drainage. A common consensus of these studies is the decreasing role of T-Tube after biliary surgery and the need to formulate formal guidelines on the subject.

Limitations

Our study has a definite limitation of being a case series and the choice of the procedure were based on surgeons' decision but not randomisation

CONCLUSION

Endobiliary stenting after open or laparoscopic bile duct exploration is a safe and attractive option for biliary drainage with many advantages over T-tube and can be achieved with minimal additional skill and operative time.

Funding: No funding sources

Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

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Cite this article as: Masudi FA, Arish H. Antegrade biliary stenting following surgical management of choledocholithiasis. *Int Surg J* 2023;10:1595-8.