

Research Article

Routine insertion of nasobiliary tube during endoscopic retrograde cholangiopancreatography (ERCP) in cases with gallstones complicated with Common Bile Duct (CBD) stones, compared to just CBD clearance.

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Abstract

Background: ERCP followed by laparoscopic cholecystectomy (LC) is the most common management of gallstones complicated by CBD stones. ERCP is a risk factor for difficult cholecystectomy and is associated with increased risk of biliary injury. Intraoperative cholangiography (IOC) can decrease the incidence or the severity of biliary injury. This study aimed to evaluate the results of routine insertion of nasobiliary (NB) catheter during ERCP, for IOC, in combined gallbladder and CBD stones. **Methods:** From total 110 patients underwent ERCP followed by LC, NB catheter was inserted in 50 patients after CBD clearance. In the other 60 patients, only CBD clearance was done. In NB group, dynamic trans-nasobiliary IOC and trans-nasobiliary methylene blue test was done. **Result:** Fifty seven patients (51.8%) were male and 53 (48.2%) were female. Median age was 50. The average operative time in NB group was 110 min. VS. 128 min. in Control group. The average postoperative hospital stay was 3 ± 0.1 days in NB group VS. 3.6 ± 0.3 days in Control group. One case of biliary leak (1.8%) occurred in NB group VS. 3 cases (5%) in Control group. No conversion to open in NB group (0%) VS. 6 cases (10%) in Control group.

Conclusion:

Routine nasobiliary insertion during ERCP, in patients with combined gallbladder and CBD stones, is simple, safe and dynamic method for IOC and can be used to diagnose, minimize the severity and treat biliary injury.

Key words: cholangiopancreatography, gallstones, and Bile Duct

Introduction

Laparoscopic cholecystectomy (LC) became the standard surgical procedure for treating symptomatic gallstones^[1,2]. In up to 19% of patients with gallstone, have common bile duct (CBD) stones and usually need endoscopic retrograde cholangiography (ERCP) before LC^[3]. The risk of complications and conversion to open after ERCP is reported to be higher^[4,5]. So, ERCP itself is considered a risk factor and a predictor for difficult LC. Other pre-operative predictors for difficult LC include old age, male sex, obesity, acute cholecystitis, previous upper abdominal surgery, and certain ultrasonographic findings.^[6,7]

Standard LC requires safe dissection of the contents of Calot's triangle, to achieve the critical view of safety (CVS) trying to

prevent accidental biliary or vascular injuries which may occur due to unclear anatomy or uncommon anatomical variations^[8,9], but in difficult cases with scarred Calot's triangle, this CVS can't be achieved^[10,11] and to continue laparoscopically in these circumstances, increase the risk of biliary and vascular injuries,^[12,13] and the usual response is the conversion to open, but, conversion does not guarantee the avoidance of complications, and may increase it, as dissection that is difficult by laparoscopy is difficult at open^[3,4]. Mirizzi in the 1930s introduced the use of intraoperative cholangiography (IOC) to facilitate the identification of obscured biliary anatomy. IOC can provide a surgical road map of the biliary tree thus, may prevent or decrease the severity of CBD injuries^[14]. But the classic way of IOC need

skill, time consuming, costly and itself can cause biliary injury^[1,2]. This study aimed to evaluate the impact of routine insertion of nasobiliary catheter during ERCP, as a tool for trans-nasobiliary IOC, in patient with combined gallbladder and CBD stones.

Patients and methods

This study is a prospective cohort study conducted in Minia university hospital, in a period from April 2010 to August 2016. From patients with combined gallstones and CBD stones, who were admitted for ERCP followed by LC, we included those who had one or more preoperative predictors for difficult LC other than ERCP including: age > 60, BMI > 30, acute cholecystitis, previous upper abdominal surgery, and presence of ultrasonographic findings as: distended or thickened wall gallbladder, pericholecystic fluid collection and impacted large stone > 1.0 cm. It is known that the conversion to open and biliary injury are higher in cases with difficult cholecystectomy^[1,2,3]. The aim of the study was to test the effect of NB insertion during ERCP for IOC in this situation, Unfit Patients, patients with no preoperative predictors for difficult LC other than ERCP, patients with failed CBD cannulation during ERCP or failed complete clearance of CBD and those who refused to share in the study were excluded. One hundred ten patients fulfilled the inclusion criteria. In 50 patients, after complete CBD clearance, NB catheter (ENBD-1.0 - Cook Medical,

Ireland) was inserted to settle, high up, in the intrahepatic biliary tree, if possible to pass through the right hepatic duct. (As the right duct form a part of Calot's triangle and is more liable for injury during dissection) (NB Group). In the other 50 patients, only CBD clearance was done (Control Group). LC was done within the 24 hours of ERCP for all patients. Biliary injury, operative time, conversion to open and hospital stay were the outcomes measured. The study received acceptance from our institution ethical committee and all included patient gave written informed consent to share in the study. All cases were done by the same senior laparoendoscopist.

In NB Group, during LC by standard approach, sequential, multiple, step after step (dynamic) trans-nasobiliary IOC was done (using 0.5% diluted Urografin 26% with normal saline), during the dissection of Calot's triangle and just before clipping, to make sure that the structure which will be clipped is the cystic duct (Figure 1). After the end of the procedure, methylene blue (MB) dye was injected from the NB tube to detect any leak and if present, drain was put and the NB left in its position till the leak had stopped and postoperative trans-nasobiliary cholangiography was free. If there was no leak, the NB tube was removed at the end of the operation and the patients discharged on the same or the next day of surgery.



Figure 1: trans-nasobiliary intraoperative cholangiography

Statistical analysis

The statistical software program SPSS for Windows version 20 was used for data entry and analysis. Quantitative data were presented by mean and standard deviation, while qualitative data were presented by frequency distribution. Chi Square test was used to compare between two or more proportions. Student t-test was used to compare two means. The probability of less than 0.05 was used as a cut off point for all significant tests.

Results

From total 100 patients that had gallstones and CBD stones, 119 patients had one or

more preoperative predictors for difficult LC. Two cases (1.7%) in which CBD cannulation was failed and 4 cases (3.4%) had large CBD stone (> 1cm) and couldn't be extracted by balloon or Dormia basket and underwent laparoscopic or open CBD exploration. The remaining 110 patients who underwent successful ERCP followed by LC. Fifty seven patients (51.8%) were male and 53 (48.2%) were female. The median age was 60 (range 40-70).

Preoperative predictors for difficult cholecystectomy, other than ERCP itself, are shown in **Table 1** with no significant difference between the 2 groups.

Table 1: Preoperative predictors of difficult LC

Preoperative predictors of difficulty		procedure		P value
		Control (n=50)	NB (n=69)	
The presence of Only one predictor	Old age (> 60)	4	4	1
	Male gender	19	17	0.784
	BMI>30	4	5	0.728
	Pervious surgery	4	2	0.401
	Acute cholecystitis	6	7	0.768
	US finding of difficulty	7	10	0.429
The presence More than one predictor		11	10	0.808

The averages operative time in NB Groups was 110 min (range 69 – 150 min) VS. 128 min. (range 90-180) in Control Group (P value < 0.001). The average postoperative hospital stay was 3 ± 0.1 days in NB group VS. 3.6±0.3 days in Control group (P value = 0.337). One case had a biliary leak (1.4%) in NB group, (Figure 2) with no intervention other than inserting of a drain and leaving the NB in place till post-operative cholangiography revealed no leak, VS. 2 cases (3.7%) in Control Group (P value: 0.008, NS), one case was discovered intraoperatively, which were

partial injury in the common hepatic duct and was primary repaired over T-tube. The other case was discovered postoperatively and underwent ERCP which revealed clipping of CBD in which hepatic-cojejenostomy was done. No conversion to open in NB group (0%) VS. 0 cases (0%) in Control Group (P value = 0.222), one case from bleeding, one case due to biliary injury and 2 cases due to marked adhesion. There was one case (1.4%) of operative related mortality in Control group VS. no cases (0%) in NB group. (Table 2)

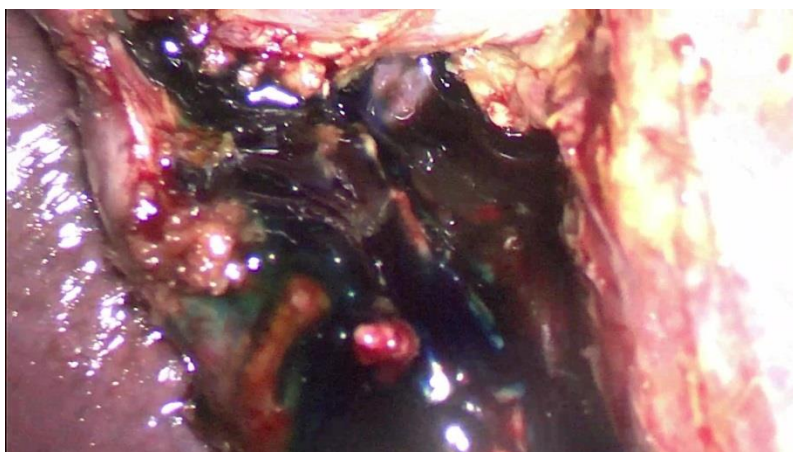


Figure 2: +ve trans-nasobiliary intraoperative methylene blue test showing leak of MB from hidden biliary injury

Table 2: Operative and postoperative data

	Group 1 (NB) (N=55)	Group 2 (Control) (N=55)	P-value
Operative time	115 ± 11 min	128 ± 17 min	0.000
Conversion to open	0%	0 (9.1%)	0.022
Biliary leak	1 (1.8%)	2 (3.6%)	0.508
Mean of hospital stay	2.1 ± 0.1 days	3.6 ± 0.3 days	0.037
Mortality	0%	1 (1.8%)	0.310

Discussion

Patients with combined gallstones and CBD stones usually undergo ERCP with sphincterotomy then LC^[15,16]. In these patients the incidence of intraoperative and postoperative complications and conversion to open surgery has been reported to be high. However, the definite mechanisms of this have not been identified; one possibility is that the CBD stones induce more extensive inflammation and adhesion which increase the difficulty of subsequent LC. Another explanation is that the ERCP itself, induces trauma to the tissues with bacterial colonization of the biliary tree due to sphincteromy leading to inflammation and scarring of the hepatoduodenal ligament making dissection of Calot's triangle difficult^[17,18,19]

There are other preoperative predictors for difficult cholecystectomy, that may add more difficulty for LC after ERCP,

including: male gender, age > 60 years, previous upper abdominal surgery, sonographic finding as: thick gallbladder wall, pericholecystic fluid collection, impacted stone and preoperative diagnosis of acute cholecystitis.^[1]

The risk of bile duct injury (BDI) in LC for difficult cases is high; this risk may reach up to 3.0 times as for easy cholecystectomy.^[11,22] This BDI is a major surgical complication that leads to destructive outcomes, including the higher risk of early death and 3.7 risk ratio of death within one year in comparison to non-injured patients. BDI also markedly increase the cost of healthcare, due to repeated and prolonged hospital stay, long sick leave and frequent reinterventions^[23,24]

One of surgical technique that used by many surgeons and have considered to decrease the rate and the severity of CBD

injuries is the intraoperative cholangiography (IOC), but the conventional IOC is time-consuming, need skills and experiences, increase the total cost and may give false positive results. Also in Mirizzi syndrome and other circumstances in which the gall bladder is scarred to the CBD, the IOC may be difficult to perform and there is a higher risk for injury.^[15, 16]

In this study we tried to get the benefits of the IOC in difficult cases after ERCP by insertion of NB catheter during ERCP with the advantage of easy and dynamic IOC in every step during LC especially with suspicious anatomy, not only, but also to inject methylene blue dye (MB) at the end of the procedure to detect any missed injury.

The results revealed that operative time of LC in cases underwent dynamic transnasobiliary IOC is significantly less than in Control group who were underwent LC without nasobiliary (110 ± 11 min. VS. 128 ± 17 min.) (P value < 0.001). This reduction in operative time can be explained by easy and rapid identification of biliary anatomy with no hesitation about structure supposed to be the cystic duct and also due to spared time for management of complications. In a study of Lengyel et al., and LO et al., reported a median operative time for difficult LC 123 min and 130 minutes respectively.^[17, 18]

The risk of biliary injury is higher in cholecystectomy for difficult than for easy cases.^[19, 20, 21] The highest incidence of biliary injury for difficult cholecystectomy is reported by to be 3.3% ,^[22, 23] in this study the incidence of biliary injury in NB group in this study was 1.7% (one case), which was partial with no intervention other than leaving the NB catheter in place till postoperative transnasobiliary cholangiography revealed no leak, VS. 3.7% in Control group, which in spite it appears not statistically significant, but clinically and practically, in absence of NB, biliary injury was severe, may not discovered intraoperatively and needs further intervention with increased cost, morbidity and mortality.

In difficult LC, there is a higher rate of conversion to open and a higher incidence of biliary and vascular injuries^[4]. In this study there is a significant reduction in the conversion rate in NB group (0%) compared to Control group (9.1%) and for the known average rate of conversion in difficult cholecystectomy in literatures, which range from $0-10\%$.^[17]

There was a significant reduction in the mean hospital stay in NB group (7 ± 0.1 days) compared with Control group (3.7 ± 0.7 day), this may be due to less number of complicated cases also there was no conversion to open, which known to increase the hospital stay. In a study of Neri et al., the mean hospital stays for difficult cholecystectomy was 3 days^[17]. In meta-analysis done by Henneman et al, the mean hospital stay for difficult cholecystectomies operated by partial cholecystectomy was 3.0 days^[4].

Conclusion

Routine nasobiliary insertion during ERCP in patients with combined gallbladder and CBD stones is simple, safe and dynamic method for IOC and can be used to diagnose, minimize the severity and treat biliary injury and to decrease the conversion rate in difficult LC after ERCP.

Conflicts of interests

All authors have no conflicts of interests to disclose.

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