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Intraoperative Cholangiography during Laparoscopic Cholecystectomy, Is it beneficial?

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Abstract

Background: Laparoscopic cholecystectomy is the standard treatment for patients requiring gallbladder removal. Although the advantages of the laparoscopic technique are widely accepted, the introduction of this technique has doubled the rate of operative complications of extrahepatic bile ducts. Research methods for biliary tree also evolved, but intraoperative cholangiography, the traditional exploring method used for the biliary tree in classic cholecystectomy remains a debatable intra-operative investigation.

Methods: A randomized controlled clinical trial of 120 patients was undertaken to assess the benefit of routine cholangiography during laparoscopic cholecystectomy for biliary complications. Cases are randomized into 2 groups, intropeative cholangiography (IOC) group and control group.

Result: 2 cases (3.3%) have a filling defect in CBD (stone) and it was flushed with dye and followed under fluoroscope down to duodenum.

Conclusion: The role of IOC in detection of silent CBD stone(s) and biliary injuries has been shown to be a useful tool in detection in selected cases.

Keywords: Laparoscopic; Cholecystectomy; Intraoperative cholangiography

Introduction

Routine intraoperative cholangiography (RIOC) during laparoscopic cholecystectomy (LC) offers several advantages. It allows intraoperative detection of common bile duct (CBD) stone(s) with subsequent management in up to 75% of patients in some studies [1].

The incidence of common bile duct stones among patients undergoing cholecystectomy is 10% and the incidence of common bile duct stones unsuspected on preoperative investigations but discovered at the time of routine intraoperative cholangiography is ranged from 3% to 5% [2].

Another advantage is that RIOC can help to clarify anatomy and therefore reduce bile duct injuries during LC as laparoscopic instrumentation allows only a two dimensional view and limits tactile feedback [3].

The classic description of the extrahepatic biliary tree and its arteries applies only in about one third of patients [4].

Common bile duct injuries, although uncommon, can be devastating to patients. Proper exposure of Calot's triangle and careful identification of the anatomic structures are keys to avoid such injuries [5].

Patient and Methods

The study included 120 cases of patients with chronic calcular cholecystitis subjected to laparoscopic cholecystectomy. They are randomized into two groups by coin and flip method:

1. Study (IOC) group: include cases of laparoscopic cholecystectomy with intraoperative cholangiogarphy.

2. Control group: include cases of laparoscopic cholecystectomy without intraopertaive cholangiography.

Inclusion criteria

Patients with symptomatic chronic calcular cholecystitis indicated for laparoscopic cholecystectomy.

Exclusion criteria

All patients with elevated liver enzymes, history of jaundice or pancreatitis, dilated intrahepatic biliary radicals or dilated common bile duct.

Investigations

Preoperative: Pelviabdominal ultrasonography(US).

Laboratory investigations: CBC, RBS, renal functions (Urea, Creatinin), liver functions (ALT, AST, Bilirubin total & direct, ALK, GGT), coagulation profile.

24h Postoperative: Liver enzymes (ALT, AST, Bilirubin total & direct, ALK, GGT).

Operative steps: After obtaining an informed consent, positioning of the patient and general anesthesia, routine 4 port laparoscopic cholecystectomy was performed. After dissection of Calot's triangle, identification of the cystic duct and artery, clipping and division of the artery is performed. A distal clip (welfare medical of medium size) is applied to the duct near the gall bladder neck securing the infundibulocystic junction.

A small incision in the cystic duct is performed near to the clip using laparoscopic microscissors and the duct milked using the blades of Maryland forceps to ensure clearance of cystic duct

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from stones. The cystic duct is cannulated using an ERCP cannula (ULTRATOME^{tm}XL). The latter is introduced through the epigastric 10mm port.

1. Prior to injection, the patient is turned back to the neutral position and slightly tilted (15-20°) to the right side to get the vertebral column out of the x-ray field. 10 ml of Sodium Amidotrizoate 30% (Urografin) diluted with 10 ml normal saline in a 20 ml syringe. The patient is screened with a C-arm (OEC series 7700) during the injection and cholangiography is considered complete and negative if there is: Filling of the non-dilated extra and intrahebatic biliary radicles up to the second order divisions.

2. No filling defects in the biliary tree.

3. Free flow of the dye to the duodenum.

Local anesthetic 2.5% Bupivacaine (Sunny-pivacaine) is infiltrated in wounds at the end of surgery. Postoperative pain relief is achieved by Meperidine (Pethidine) 50-100 mg given once during recovery and Diclofenac sodium (Voltaren) 100 mg injections 12 hourly for 24 hours then oral Diclofenac sodium 50mg 12 hourly for five days.

All data were statistically analyzed.

Results

The number of cases done was 120 patients with symptomatizing gall bladder stones, after exclusion of patients not fulfilling the inclusion criteria. All procedures were completed laparoscopically with no conversion to open surgery. In this study there is no statistically significance difference with p-value >0.05 between cases and controls as regards to sex and age, which indicates proper matching between the study and control groups.

The operative time in study group (mean±SD) is 81.2±11.3 minutes and in control group is 63.5±12.7 minutes, so there is statistically significance difference with p-value <0.05 between both groups, with high mean of duration among the study group.

In the study group, there is only 3.3% of patients (2 of 60 patients) show positive intraoperative clinical finding. In the positive cases we found a filling defect in the CBD which is flushed with the dye till it reached duodenum. Post-operative labs of these cases were normal with no complications.

There is statistically significant difference with p-value <0.05 between cases and controls as regards to post operational liver function tests as (ALT, and GGT) with low mean of ALT (36 ±18.2), and low mean of GGT (37.9± 14) among cases versus (39.6 ±15.6), and (43.3± 13.7) among controls respectively.

Discussion

Intraoperative cholangiography (IOC) was historically utilized in open procedures to aid CBD stone detection and its routine use was debated long before the birth of LC. However, IOC during LC provides the additional benefit by providing a road map for operative dissection. Some institutions use IOC routinely to identify CBD stones, provide extra evidence for anatomical decisions during dissection, training purposes, and to highlight biliary injury [6,7]. Berci et al (2013) feel that the time taken is not well spent. The technique can be difficult, and reimbursement of the 10–20 min it takes to perform it and the value for an IOC is paltry when considering the technical expertise and cognitive decision-making associated with the procedure which is compatible with our results regarding time consumed [8].

Araújo et al (2005) stated that the combination of clinical, laboratory and ultrasonographic para-meters for the preoperative suspicion of choledocolithiasis is a low-cost strategy and is available at medical centers with few resources. In this study, 2 cases from study group had CBD stone not discovered by US and it may be able to be discovered by MRCP which is not available here in all centers [9], these two cases (3.3%) have a filling defect in CBD (stone) and it was flushed with dye and followed under fluoroscope down to duodenum. These cases were discharged next day and followed up in outpatient for 10 days till stitches were removed. In control group of our study there is one patient (1.7%) developed postoperative jaundice on the 24$^{th.}$ Postoperative day where ERCP was done and revealed CBD stone that managed subsequently. No postoperative jaundice was encountered in the study group.

Mohandas et al (2010) believe that routine IOC, in order to detect coincidental CBD stones, is not required in patients without clinical, biochemical or radiological evidence of ductal stones and believed that the routine IOC results in increased costs, prolonged operative times, unnecessary exposure to ionizing radiation especially in females of child bearing age, image misinterpretation leading to false positive studies, contrast related complications and risk of IOC related biliary injury without clear benefits [10].

On the other side Nickkholgh et al (2006) stated that routine intraoperative cholangiography (RIOC) is a safe, accurate, quick, and cost-effective method for the detection of bile duct anatomy and stones. A highly disciplined performance of RIOC, especially in the hands of an experienced laparoscopic surgeon, can well minimize the potentially debilitating and hazardous complications of bile duct injury. A normal cholangiogram, routinely performed, almost always means a clear bile duct and can prevent unnecessary postoperative ERCP and its potential complications for the symptoms that can be attributed to retained ductal stones[3] which had occurred to the patient of the control group in our study.

One stage (laparoscopic cholecystectomy+ERCP) versus two stage management of CBD stone were extensively reviewed by many centers in the literature. Lu (2012) reviewed this in many researches and concluded that Single-stage management is equivalent to Two-stage management but requires fewer procedures. However, the patient's condition, operator's expertise and local resources should be taken into consideration in making treatment decisions [11].

Bansal et al. (2013) agreed with this result and showed that Single stage was less cost than two stages [12]. Moreover Ding et al. (2014) saw that the single stage gives less recurrence than two stages [13]. Regarding our resources, one stage management is not available constantly, as it needs previous reservation and co-management. Also, choice like laparoscopic CBD exploration is not feasible to all.

We can conclude that In spite of the controversy about the role of IOC as a routine procedure in patients subjected to laparoscopic cholecystectomy, we believe that the role of IOC in detection of silent CBD stone(s) and biliary injuries has been shown to be a useful tool in detection in selected cases according to the following criteria:

1. History of abnormal liver function tests, pancreatitis, jaundice.

2. A large cystic duct and small stones.

3. A dilated common bile duct on preoperative ultrasonography.

4. If preoperative endoscopic cholangiography for the above reasons was unsuccessful.

Such patients can be managed according to the expertise and resources available and we still believe that more researches and extension work are necessary to know which patients can benefit from IOC.

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