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PERIOPERATIVE FLUOROCHOLANGIOGRAPHY WITH ROUTINE INDICATION VERSUS SELECTIVE INDICATION IN LAPAROSCOPIC CHOLECYSTECTOMY

Vicente **GUERRA-FILHO**[1], Tarcizo Afonso **NUNES**[2] and Ivana Duval **ARAÚJO**[2]

ABSTRACT – ***Background*** - The use of routine or selective peroperatory cholangiography in cholecystectomy is a matter of controversy in literature. ***Aim*** - To compare the efficacy of selective or routine fluorocholangiography in diagnostic of common bile duct stone in patients underwent to laparoscopic cholecystectomy based on selective indication criteria. ***Method*** - Two hundred and fifty four patients with cholelithiasis were prospectively studied. The patients were divided in two groups: to the first 127 patients perioperative fluorocholangiography was indicated as routine (group 1), and to the other 127 patients perioperative fluorocholangiography indication followed clinical criteria (jaundice, choluria, fecal acholia and history of pancreatitis), laboratory criteria (increase in seric alkaline phosphatase, bilirubins, amylase) or ultra-sonographyc criteria (less than 6 mm diameter calculi, common bile duct stone, common bile duct diameter more than 6 mm). A comparative assessment of the difference in common bile duct stone diagnosis, fluorocholangiography success index and reliability of the selective criteria of indication for perioperative fluorocholangiography was compared between the two groups. ***Results*** - Perioperative fluorocholangiography was successfully performed in 102 of the 127 patients from group 1 (a rate of 80.3%), and in 59 of the 71 patients from group 2 (a rate of 83.1%). In the 102 patients of group 1 who underwent perioperative fluorocholangiography, 11 (10.8%) presented common bile duct stone, 4 (3.9%) presented common bile duct dilatation, and 1 (1%) had a false-positive image. In the 59 patients from group 2, 7 (11.7%) presented common bile duct stone and one (1.7%) presented a common bile duct diatation. In another situation, when application of selective indication criteria to perioperative fluorocholangiography was simulated in group 1 patients, we observed that only in one patient with common bile duct stone the diagnostic would not have been made. Fluorocholangiography selective indication criteria presented sensitivity of 90.9% and specificity of 46.2%. The main causes of fluorocholangiography failure were biliary pedicle inflammation and cystic duct size and caliber variations. ***Conclusion*** - There was not a significant difference in common bile duct stone diagnostic through perioperative fluorocholangiography between the groups of patients with selective and routine indication, validating the examination selective indication criteria, with a sensitivity of 90.9%, despite the specificity of 46.2 % – 43 patients were selected to the flourocholangiography and common bile duct stone was not diagnosed.

HEADINGS – Cholangiography. Cholecystectomy, laparoscopic. Choledocholithiasis.

INTRODUCTION

Since the introduction of cholecystectomy as the treatment of choice for gallbladder lithiasis, there have been disagreements about the diagnosis and treatment of common bile duct (CBD) lithiasis, that affect 2.2% to 18% of patients with cholecystolithiasis, according different works. There are still controversy about the best time and methods to diagnostic and treatment, as well the ideal time and the way to treat it, but the warmest argument is about the diagnostic of CBD stones in perioperative period[4, 14, 24].

Perioperative cholangiography was proposed by Mirizzi in Argentina in 1932. He stated that cholangiography should be a part of the cholecystectomy procedure. That is to say, he proposed routine perioperative cholangiography and started a controversy that still exists nowadays[1, 13].

Since the introduction of laparoscopic cholecystectomy for the treatment of cholecystolithiasis there have been warmer arguments about the use of perioperative cholangiography. Many publications have shown that most surgeons, either in Brazil or abroad, did not use routine

[1]"Santa Casa" of Belo Horizonte, MG; [2]Federal University of Minas Gerais School of Medicine, Belo Horizonte, MG, Brazil
Correspondence: Dr. Tarcizo Afonso Nunes – Rua Professor Estevão Pinto, 637 – apt. 1104 – Serra – 30220-060 – Belo Horizonte, MG, Brazil. Email: tan@medicina.ufmg.br

cholangiography or even selective cholangiography due to the difficulty of cystic duct catheterization and failures of image and laboratory methods to indicate CBD stones[16, 21].

The argument to defend the routine indication was that it avoids residual calculi, made diagnostic of duodenal papilla affections, provide biliary tree anatomic studies, prevents and prematurely treats biliary tree accidental lesions and reduces the need for investigation of the CBD in the pre-operative period[6, 15, 16, 17]. On the other hand, other authors argument that selective cholangiography reduce surgical time and cost, decrease surgical field contamination, as well exposition of the medical and paramedical team to ionizing radiation. Another problem of routine fluorocholangiography is radiographic images of poor quality, leading to wrong interpretations and unnecessary biliary tree explorations[2, 3, 10]. The main criteria for perioperative cholangiography selective indication would be jaundice history, total bilirubin levels equal or higher than 3.0 mg/dL, diagnostic of biliary pancreatitis or cholangitis, and the presence - at ultrasonography – of CBD stone or CBD dilation equal or higher than 10 mm[5, 20, 22].

The different opinions about the use of perioperative cholangiography incited several authors to inquire about this matter. It was verified that routine perioperative cholangiography was used by 18.7% of surgeons, whereas 64.7% of them only used it with patients selected through clinical or laboratory evidences, and 16.6% of surgeons did not use cholangiography during cholecystectomy[8, 11, 18].

The purpose of this prospective study was to compare the use of selective or routine fluorocholangiography in laparoscopic cholecystectomy in order to stablish the sensitivity, specifity and positive predictive value in diagnostic of CBD stone.

METHOD

This research was approved by the "Hospital São Lucas – Santa Casa" of Belo Horizonte, MG, Brazil Ethics in Research Committee.

Patients with cholecystolithiasis and underwent laparoscopic cholecystectomy from "Hospital São Lucas" at Prof. Célio Edson Diniz Nogueira's Service were studied in the period of May 1992 to March 1994. There were available 254 patients (187 women - 73.6% and 67 men - 26.4%), whose age ranged from 12 and 91 years (mean 48.3 ± 7), divided into following groups: group 1 (n = 127), constituted to the first 127 patients, who underwent routine perioperative fluorocholangiography. There was in this group 93 female (73.2%) and 34 male (26.8%). Their average age was 48.8 years (13 to 83 years of age); group 2 (n = 127), formed by the other 127 patients, underwent selective fluorocholangiography on the basis of clinical, laboratory and image criteria. There were 94 (74.0%) female patients and 33 (26.0%) male patients. The average age was 47.9 years (12 to 91 years) (Figure 1).

All patients with cholecystolithiasis and indication for cholecystectomy were included, except the pregnant ones. All the patients were submitted to the propedeutics established in the service protocol (Figure 2).

FIGURE 1. Indication criteria for perioperative fluorocholangiography execution in patients with cholecystolithiasis submitted to laparoscopy cholecystectomy

Positive data at physical examination	Jaundice presence or history Choluria and/or fecal acholia presence or history Pancreatitis history
Positive data at laboratory examinations	Bilirubin serum levels increase amylase serum levels increase Alkaline phosphatase levels increase
	Main biliary via lithiasis Pancreatitis Choledoch dilation over 6 mm*

* In patients older than 60 years it was considered normal a choledoch dilation increase of 1 mm per decade

FIGURE 2. Propedeutics protocol in patients with cholecystolithiasis operated in Santa Casa de Belo Horizonte and Hospital São Lucas Surgery Service

History data	Research of pain related to biliary cramps Jaundice presence or history Choluria and/or fecal acholia presence or history Fever and chills presence or history Pancreatitis presence or history
Complementary examinations	Hemogram Fasting glycemia Prothrombin activity Routine urine analysis Serum urea and creatinine dosage Total and fractioned bilirubins dosage Alkaline phosphatase dosage Glutamic-oxaloacetic and glutami-pyruvicaminotransferase dosage Amylase dosage Profile and posteroanterior incidence chest radiography Electrocardiogram after 40 years of age Abdominal ultrasonography

Perioperative fluorocholangiography

After identification of the Calot triangle structures, the cystic duct was clipped next to the gallbladder infundibullum, cystic duct lumen oppened by means of a 1 to 2 mm incision, and digital mobilization of the cystic duct content with Marylan pliers, starting at the CBD and towards the gallbladder, until bile and incidental calculi expulsion. Afterwards Olsen pliers were introduced in the portal located at hemiclavicular line, and the cystic duct was catheterized with them, with prehension of the cystic duct and catheter by the pliers forceps coaptation, avoiding the iodized solution spilling, at the concentration of 30%, during its infusion. The contrast solution was infused in bolus, with a constant, mild pressure until fluoroscope shot. The radiographic images were studied after the radiographic film was developed.

Fluorocholangiography success characterization depended on cystic duct catheterization and the attainment of radiographies from biliary tree. Failure, when the examination was not carried out. Perioperative fluorocholangiography was considered positive when radiographic image suggested presence CBD stone or when the contrast was not present into duodenum. The result of fluorocholangiography was considered false-positive when, despite negative image, the stone was not identified after CBD exploration with Dormia and Fogarty catheters, 5 mm choledoscopes, choledochectomy, and when subsequent fluorocholangiography showed transposition of the iodized solution through duodenal papilla.

After end of fluorocholangiography, Olsen forceps were opened and catheter was taken out, and two clips were applied to cystic duct proximal region. This duct was sectioned when fluorocholangiography was normal.

Routine perioperative fluorocholangiography (group 1) was concluded in 102 (80.3%) patients and it was unsuccessful in 25 (19.7%) of them. The reasons for failure were biliary pedicle inflammation in 10 (40%), cystic duct anatomic variations in 10 (40%), being 5 (20%) short ducts and 5 (20%) narrow ducts; 2 (8%) with technical difficulties handling instrumental; 1 (4%) patient with hemodynamic instability; 1 (4%) patient allergic to iodine and 1 (4%) patient with cystic duct bleeding.

Among the group 2, 127 patients, 71(56%) satisfied the perioperative fluorocholangiography selective indication criteria. The examination was concluded in 59 (83.1%) and was unsuccessful in 12 (17%). Failure causes were: biliary pedicle inflammation in five (41.7%); cystic duct variations in five (41.7%), being three (25.0%) short cystic ducts and two (16.7%) narrow cystic ducts; intense fibrosis in one (8.3%) and allergy to iodine in one (8.3%).

Application of selective fluorocholangiography indication criteria in group 1 patients

In a second stage, patients of group 1 (those who underwent routine fluorocholangiography) pre-operative complementary examinations were reviewed in order to identify the patients who would satisfy perioperative fluorocholangiography criteria and the ones without indication for that examination. All patients of group 1 fluorocholangiographies were also reviewed concerning CBD stone. The two results were then correlated.

The two groups data were compared to one another by using Fisher's exact test, considering differences significant when $P<0.05$.

RESULTS

Fluorocholangiography was performed in 161 patients. CBD stones were diagnosed in 18 (11.2%) patients, being 11 (10.8%) from group 1, from the total of 102 and 7 (11.9%) from group 2, from the total of 59. The difference was not significant (Table 1).

The routine group was constituted of 102 patients, and 11 (10.8%) presented CBD stone. In four (3.9%) there was observed CBD dilatation and one (1%) presented false positive result. In remaining 86 patients (84.3%) the fluorocholangiography was considered normal.

TABLE 1. Main biliary via lithiasis distribution according to the number of perioperative fluorocholangiographies performed in each group (n = 161)

Choledocholithiasis		Fluorocholangiographies	
	Numbers	Numbers	%
Group 1	11	102	10.78
Group 2	7	59	11.86
Total	18	161	11.18

Fisher Exact test, $P = 0802$

The selective group was constituted of 127 patients, and 71 (56%) satisfied selective criteria. The fluorocholangiography was successfully conducted in 59 patients, and CBD stone observed in 7 (11.9%). CBD dilatation was observed in 1 (1.7%) and in other 51 patients (86.4%) was considered normal.

When applying the selective indication criteria to the 102 group 1 patients (routine), it was verified that perioperative fluorocholangiography was indicated in 52, among whom 10 presented CBD stone; in 42 of those patients fluorocholangiography did not reveal stones. Among the 52 patients that did not present the above-mentioned criteria, CBD stone was diagnosed in only one and the other 49 examinations did not reveal calculi. Those criteria presented high sensitivity (90.9%) to pre-operative diagnosis of CBD stone and low specificity, as 42 (46.2%) patients underwent fluorocholangiography and there were not CBD stone. The percentage of patients with indication and confirmation of CBD stone was significantly higher than the percentage of patients to whom there was indication, but in whom there were no calculli ($P = 0.008$) (Table 2).

TABLE 2 – Analysis of association between the results evaluated in group 1, by the execution of routine perioperative fluorocholangiography, and group 2 selective indication protocol criteria. (n = 102)

	Choledocholithiasis diagnosis by routine perioperative fluorocholangiography (group 1)		
Fluorocholangiography selective indication criteria applied to group 1	yes	no	total
yes	10 (90.9%)	42 (46.2%)	52
no	1 (9.1%)	49 (53.8%)	50
total	11	91	102

Note: The values in parentheses refer to the percentage in relation to the column
Fisher exact test, $P = 0.008$.

DISCUSSION

Laparoscopy cholecystectomy is the gold standard method to cholecystolithiasis treatment, but biliary tree study during this operation is still controversial. The reason for surgeons attitude change towards perioperative cholangiography is still unclear. A fact to be considered is that laparoscopy cholecystectomy is a procedure which is in improvement phase to many surgeons, and the examination cannot be performed in some circumstances due to the lack of ability and preparation of the surgeon[7, 15, 19].

The results in literature do not show unanimity about the best criteria used to indicate selectively perioperative cholangiography. The main purpose of this study was to evaluate whether information obtained through clinical history, laboratory examinations and ultrasonography (criteria for selective indication) are safe to select the patients that must be submitted to cholangiography during cholecystectomy, thus avoiding the examination execution in every patient. BRESCIANI and GAMA-RODRIGUES[3] and KOO and TRAVERSO[9] stated that the information obtained through clinical, laboratory and ultrasonography examinations present low sensitivity, low positive predictive value and high negative predictive value in diagnostic of asymptomatic CBD stone, not recommending the use of selective perioperative

cholangiography. On the other hand, MATIAS et al.[12] showed that jaundice, serum bilirubin and phosphatase alkalin are associated to high sensitivity and specificity in diagnostic of CBD stone.

It was noticed that jaundice, bilirubin and alkaline phosphatase presented fairly high levels regarding sensitivity, specificity and positive and negative predictive values that allow their use as perioperative fluorocholangiography selective indicators[12]. In this study perioperative fluorocholangiography diagnosed choledocholithiasis in 38.88% of the cases in which signs and symptoms of choledocholithiasis were present, and when there was main biliary via lithiasis in the selective indication group there was at least one alteration in the examinations that were a part of the selective criteria. Jaundice history was the most common one, followed by bilirubin increase, alkaline phosphatase increase, dilated choledochus at ultrasonography and amylase increase in one patient.

Perioperative fluorocholangiography was indicated in all group 1 patients but it was not concluded in 19.69% of them. In group 2 that examination was not concluded in 18.06% of the patients who satisfied the perioperative fluorocholangiography indication criteria. Most of the published works show a failure rate between 6% and 23%[3, 23, 24]. Cystic duct inflammatory alterations were the main causes for not performing perioperative fluorocholangiography in both groups of patients. In another study[3], there was no case of failure due to inflammatory changes but narrow cystic duct was the main cause of failure to catheterize cystic duct. Several studies about perioperative cholangiography during laparoscopy cholecystectomy showed that false-positive and false-negative incidence was low, sensitivity and specificity rates, positive and negative predictive values ranged from 90% and 100%. Nevertheless, those results may be questioned due to deficiency in diagnosis confirmation; it would be necessary the exploration of all patients' biliary vias by means of choledochoscopy so that those values could be confirmed. However, that procedure presents not negligible, ethically questionable morbimortality. If patients with normal perioperative cholangiography are studied longer than 2 years there is a chance that residual main biliary via lithiasis is observed, which was not noticed at perioperative cholangiography. In that case there will be false-negative rate increase and sensitivity reduction, increasing the negative predictive value. For those results to be reliable it is necessary to follow patients that undergo cholecystectomy for a long period of time[3].

In this work fluorocholangiographies were performed by using C arch x-ray device, fluoroscopy and image intensifier, following the orientation proposed by SABHAWAL et al.[17]. Those authors emphasized that the use of this device allows for a higher rate of success in the obtainment of images. It is a dynamic, real-time examination that makes easier the study of intra and extra-hepatic ducts and of the contrast solution flux from main biliary via to duodenum.

Group 1 patients' clinical and complementary examinations and perioperative fluorocholangiographies results were researched. Bearing the results in mind, fluorocholangiography selective indication criteria were applied, as if it were group 2. Main biliary via lithiasis was diagnosed in 11 patients and perioperative fluorocholangiography selective indication criteria were present in 10 of them. So, among the 127 patients (102 submitted to fluorocholangiography), only in 1 main biliary via lithiasis would not have been diagnosed if perioperative fluorocholangiography selective indication criteria had been applied to group 1. That finding shows that these criteria present high sensitivity (90.9%), providing, therefore, satisfactory safety as a screening method for main biliary via lithiasis diagnosis. On the other hand it presents low specificity, for 42 (46.2%) patients underwent the examination and calculi presence was not diagnosed in them.

CONCLUSION

Perioperative fluorocholangiography is a good propedeutic method to study biliary via during cholecystectomy, with a high sensitivity despite a low specificity, not existing a significant difference in main biliary via lithiasis diagnosis through perioperative fluorocholangiography between the groups of patients with routine and selective indications.

Guerra-Filho V, Nunes TA, Araújo ID. Fluorocolangiografia peroperatória com indicação de rotina ou seletiva na colecistectomia laparoscópica. Arq Gastroenterol. 2007;44(3):271-5.

RESUMO – ***Racional*** - Existem controvérsias sobre a realização da colangiografia peroperatória seletiva ou de rotina na colecistectomia. ***Objetivos*** - Validar critérios para indicação seletiva da fluorocolangiografia durante a colecistectomia para o diagnóstico da coledocolitíase. ***Métodos*** - Foram estudados, prospectivamente, 254 pacientes com colecistolitíase e submetidos a colecistectomia laparoscópica. Os pacientes foram divididos em dois grupos: nos primeiros 127 pacientes, a fluorocolangiografia peroperatória foi indicada como rotina (grupo 1) e nos 127 pacientes subseqüentes a fluorocolangiografia foi indicada seguindo critérios clínicos (história de icterícia, colúria, acolia fecal e pancreatite), laboratoriais (elevação na dosagem de fosfatase alcalina, bilirrubinas, amilase) ou ultra-sonográficos (cálculos menores que 6 mm de diâmetro, coledocolitíase, colédoco maior que 6 mm de diâmetro). Foi feita avaliação comparativa quanto a diferença no diagnóstico de coledocolitíase na indicação seletiva ou de rotina; índice de sucesso na realização do exame nos dois tipos de indicações e confiabilidade dos critérios de indicação seletiva da fluorocolangiografia peroperatórias. ***Resultados*** - Dentre os 127 pacientes do grupo 1, a fluorocolangiografia peroperatória foi realizada com sucesso em 102 (80,3%) deles e, no grupo II, em 59 (83,1%) dos 71 que apresentavam sua indicação. Dentre os 102 pacientes do grupo 1 submetidos a fluorocolangiografia peroperatória, 11 (10,8%) apresentaram coledocolitíase, 4 (3,9%) colédocos dilatados e 1 (1%) falso-positivo enquanto nos 59 do grupo II, 7 (11,8%) apresentaram coledocolitíase e 1 (1,7%) colédoco dilatado. A aplicação simulada dos critérios de indicação seletiva da fluorocolangiografia peroperatória nos pacientes do grupo 1 mostrou que em apenas um o diagnóstico de coledocolitíase não teria sido feito. Os critérios de indicação seletiva da fluorocolangiografia apresentaram sensibilidade de 90,9% e especificidade de 46,2%. As principais causas de insucesso da fluorocolangiografia foram inflamações do pedículo biliar e variações de tamanho e calibre do ducto cístico. ***Conclusão*** - Não houve diferença significativa no diagnóstico de coledocolitíase por meio da fluorocolangiografia peroperatória entre os grupos de pacientes com indicação de rotina e seletiva, validando a realização do exame baseado nos critérios seletivos, com uma sensibilidade de 90,0%, apesar da especificidade de 46,2%, uma vez que 43 pacientes foram encaminhados para o exame e não foi diagnosticada coledocolitíase.

DESCRITORES – Colangiografia. Colecistectomia laparoscópica. Coledocolitíase.

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