Operative cholangiography during laparoscopic cholecystectomy: considerations about routine or selective policy

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SUMMARY: Operative cholangiography during laparoscopic cholecystectomy (LC) is still a matter of debate regarding its routine or selective use.

Operative cholangiography (OC) during laparoscopic cholecystectomy (LC) is still a matter of debate regarding its routine or selective use.

The present report is based upon a series of 30 selective cholangiographies performed in 290 LC during the years 1999-2004. Indications to OC were decided according to clinical data, liver chemistries, ultrasonographic (US) and intraoperative findings. In cases of unequivocal common bile duct (CBD) stones, a preoperative ERCP was performed and OC was not applied to confirm clearing of the biliary tract. OC was successful in 26 cases (86.6%): in 18 cases a normal cholangiogram was obtained and in 3 cases stones were detected into CBD. These patients underwent a postoperative successful ERCP at a variable interval of time. In 4 cases cholangiograms showed a delayed transit and in a single case a lack of contrast into the duodenum. Such occurrence was due to morphine derivatives employed during anesthesia.

The Authors evaluate advantages and drawbacks of routine and selective OC according to personal and other Authors experience. Decision on selective or routine policy should be taken according to each surgeon experience and local facilities. Each laparoscopic surgeon must be able to perform and interpret an OC, specially if he has in mind to develop competence in laparoscopic CBD exploration.

KEY WORDS: Operative cholangiography - Laparoscopic cholecystectomy - Biliary injuries.

Colangiografia intraoperatoria - Colecistectomia laparoscopica - Lesioni della via biliare.
role of OC during open cholecystectomy, but it was really the development of LC that further reduced its acceptance in gallbladder and the biliary surgery.

Aim of this paper is to analyze the actual role of OC during LC through the personal experience in LC, evaluating advantages and drawbacks of the procedure.

Patients and methods

The study is based on the retrospective evaluation of OC performed in our Institution in a series of 290 patients who underwent LC from January 1999 to December 2004. Very important premise is that, for several reasons, in our Department LC was started just at the beginning of 1999, later then most Italian surgical institutions. OC was not performed as a routine policy, but only as selective procedure. All the cases submitted to OC were evaluated to discover if in clinical history there were signs of stones in the CBD (e.g. jaundice, fever), or symptoms of recent pancreatitis; at the same time, laboratory data were checked for cholestasis indexes, amylases and lipases. Ultrasonography was evaluated for number and size of gallbladder stones and for dilatation of CBD. If suspicion was very high or in case of unequivocal signs of CBD stones, ERCP and endoscopic sphincterotomy were performed few days before LC therefore; such cases are excluded from the present series and OC was not adopted to confirm clearing of the biliary tract. In a few cases with normal clinical, laboratory and US findings, OC was performed because of cystic or CBD dilatation discovered intraoperatively.

Cystic duct cannulation was performed after clipping and incision of the duct; followed by the introduction of the cholangiography catheter (Origin, Applied Medical). If necessary, a moderate Trendelenburg position was adopted to obtain opacification of the intrahepatic biliary tree. All the cholangiograms were performed first in a dynamic phase on the fluoroscopic monitor (Philips, BV 25) and then through a X-ray film. The following items were evaluated considering both the fluoroscopy phase and the static film:
- intra and extrahepatic caliber of the biliary tract;
- presence of filling defects in the hepatocholedocus;
- lack or delay contrast medium transit in the duodenum;
- biliary tract anomalies.

Both dynamic and static cholangiograms were examined by the operating surgeons, without interpretation of the radiologists. Normal radiological findings were defined when intra and extrahepatic biliary tracts were clearly visualized, with normal size and no filling defects, together with a good passage of contrast medium into the duodenum.

Time was recorded between cystic duct cannulation and removal of the catheter from the duct. In case of normal findings, only postoperative day hospital stay was recorded; in case of pathologic findings, the next clinical course was evaluated (endoscopic sphincterotomy, complications, etc.).

All the patients were submitted to clinical and US control at one month; further evaluations were scheduled according to emerging data.

Results

From January 1999 to December 2004 at our Institution a total of 30 OC on a series of 290 LC were attempted (10.3%). Tables 1 and 2 report respectively the epidemiologic data and the incidence of OC on LC by years. Indications to OC are depicted in Table 3; they are distinguished according to clinical data, liver chemistries (i.e., elevated indexes of cholestasis), ultrasonographic findings (dilatation of main biliary tract); in a few cases OC was performed for the presence of a large cystic duct or a seemingly dilated common bile duct. In some patients there was more than one indication.

The procedure was successful in 26 cases (86.6%). Failure to cannulate was due to a narrow cystic duct.

![Fig. 1 - A small yellow stone is escaping from the incision on the cystic duct.](image-url)
Three patients (11.5%) were found to harbour CBD stones with a preserved flow in the duodenum; also in these cases no operative measure was taken. The patients underwent postoperative endoscopic sphincterotomy with removal of stones at a distance respectively of 7, 19 and 40 days; the post-endoscopic course was uneventful and the patients were discharged within 3 days.

In two patients with normal OC, small stones were milked from the cystic duct after its incision; so that we found three cases with stones removed from the cystic duct, including the case where OC was unsuccessful.

The postoperative clinical and US controls at one month from discharge showed normal size of the main biliary tract with no suspicion of retained or missed stones. At the moment the follow up is negative with a minimum of 1 month and a maximum of 60 months (average 28 months).

**Discussion**

Since its introduction by Mirizzi in 1932, OC found wide acceptance or strong opposition, but it has been the advent of LC that made its role questionable. Actually there are as many Authors who support the mandatory application of routine OC (4-10) as those who believe it unnecessary if not dangerous (11-18).

In the present series OC was adopted in selected cases, that is in those patients where suspicion of CBD stones was consistent but not so strong enough to decide for a preoperative endoscopy. We already said that patients with unequivocal signs of cholecystic lithiasis underwent endoscopic removal of stones before LC and in such cases OC was not performed. OC was rather performed for patients who had previous history of cholestatic jaundice, which faded during the hospital stay, mild signs of cholestatic indexes and moderate dilatation of the main biliary tract. In a few cases OC was performed for intraoperative finding of a dilated cystic duct.

Our attitude had minor but consistent changes during the previous years. At the beginning of the present experience, OC was not adopted as safely as it is at the moment. In fact, when LC was started in our Institution at the beginning of 1999, it did not seem wise adding a further procedure to a new operation which was not mastered completely as open cholecystectomy (19). Most likely this very reason explains why for many other Authors OC was not the routine procedure at the beginning of the laparoscopic experience, even when biliary iatrogenic injuries appeared to occur with greater frequency if compared to traditional surgery (6, 20). On the other
ducts and vasculobiliary anomalies (4-8, 21, 22).

The present study cannot add much on this matter: in our series of 26 OC no anomalies were detected nor lesions of the biliary tract. We did have cases of biliary lesions in the whole series of 290 LC where OC was not performed. It is difficult to say if in such cases a routine OC could have avoided such complications; truly the safest way to recognize a biliary anomaly and prevent a lesion is a careful preparation and recognition of all the structures in the hepatic pedicle, (2, 23, 24).

Moreover, if it is true that OC is helpful in case of confusion between cystic and CBD, it can not recognize lesions during the phase of gallbladder detachment, just because the investigation has already been performed (24).

Objections to OC include the possibility that the procedure itself can be responsible of a lesion of the main biliary tract in the attempts to cannulate the cystic duct (11, 17). Such occurrence has never been observed in the present series even if in a few cases avulsion of the cystic duct has been described without too severe consequences (11, 23-26).

The success rate of OC in the present report has been of 86.6 %, which seems a little lower with the rates reported during routine procedures (5-7, 25, 27), but in order of the results of selective series (11-13).

In the same time it is true that several minutes are to be wasted when OC is performed, specially when the radiological equipment is not at the top standard: Cuschieri and coworkers, for instance: report very different results when performing OC with traditional mobile X-ray machine and modern fluorocholangiography intensifier (6). Few minutes are really necessary to perform OC when experience of the operators and radiologic facilities are at their best (22). But this does not apply to all the places where LC are done. In our experience, for instance, the average time required to accomplish an OC was 11 minutes which is good enough if compared to other studies with up to 24 minutes of increased operating time (25, 26).

The other important point to analyse refers to the role of OC in detecting CBD stones. In our series OC revealed 3 cases of stones within the main biliary tract, which corresponds to 11.5% of successful cholangiographies. Such rate, which can not be considered negligible, comes from a selected and not from the whole series. On this behalf, some Authors believe that the small percentage of stones detectable by OC does not justify in terms of cost its routine application which appear reasonable only in very selected cases (13). Again, if stones are found, this does not mean they will surely cause symptoms, because many of them can pass spontaneously into the duodenum. Other objection to OC is that, in spite the finding of stones, in many cases no procedure will be taken because not all the surgeons are capable to remove them during a laparoscopic procedure: so it is wiser to leave these patients to a following operative endoscopy (11, 19). This is true also in our personal experience: balance between technical skills and total equipment necessary in these cases, does not warrant at the moment to perform a safe laparoscopic CBD exploration, which is however foreseen in the coming years. In this view OC seems a necessary prerequisite, because a frequent application of such technique enables to acquire the confidence for a safer approach to the hepatic pedicle. In this regard, simple cystic duct incision may be helpful to remove small stones eventually located into its lumen. Such is our personal experience in three cases: through the preliminary incision for the catheter introduction, few small stones were seen escaping from the duct and some were milked withatraumatic forceps. In two cases a normal OC was then performed, while in the other OC was not successful. The emerging issue is that only through an OC all this manoeuvre could be realized, may be preventing a possible outcome of a later pancreatitis. Preliminary cystic duct incision with this purpose, even without OC, has already been advocated by Soper and Dunnegan (26).

The last issue to discuss is related to radiograms interpretation. No doubt that OC is useless without visualization of the biliary tree including transit of the contrast into the duodenum. Cholangiogram interpretation in the present paper depended on the operating surgeon and such position is commonly shared by most of the Authors (6, 8, 9, 20, 23). The surgeon should pay particular attention to two points: 1) correct recognition of the main intrahepatic branches, and 2) passage of the contrast into the duodenum. It is not always easy to obtain a complete opacification of segmental and subsegmental branches of main biliary ducts, but what is important is to realize if “something is missing on the hepatic map”: this is an alarm signal which helps the operator to avoid a major biliary injury (8, 23). We already observed in our results a few cases of delayed or even lacking transit of contrast in the duodenum: in such circumstances surgeon should be aware on the use of morphine derivatives by the anestetist and at the same time should evaluate preoperative liver chemistry and US together with cholangiography data. Such appraisal entrust him to plan a postoperative ERCP or instead an immediate CBD exploration or a conversion.
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Conclusions

OC is feasible in the majority of cases submitted to LC. The procedure is not associated with lesions of the biliary tract nor with complications. In the majority of LC routine application of OC is not indispensable to prevent biliary lesions; the best way to prevent such damage is thorough preparation of the cystic duct and recognition of all the structures before clipping and incision. In several occasions (most frequently not the easier ones) an OC is really necessary. Every laparoscopic surgeon should be capable to perform and interpret a cholangiogram: such competence is strictly connected with the common use of procedure. If a surgeon feels to engage himself in biliary laparoscopic surgery, OC becomes an important preliminary step before attempting CBD exploration.

References
