Laparoscopic cholecystectomy (LC): predictive role of preoperative ultrasounds

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SUMMARY: Laparoscopic cholecystectomy (LC): predictive role of preoperative ultrasounds.

Aim: we studied several ultrasounds patterns concerning gallbladder, biliary tract and gallstones to identify some predictive signs of difficulties during LC.

Patients & methods: 112 patients (24 females), 25-75 years old, upper abdomen operated patients not included. From 7 ultrasounds patterns 4 degrees of potential intra-operative difficulty (0-3) were obtained. During the operation 7 conditions of true intra-operative problems were also classified.

Results: patients showing grade 0: regular gallbladder wall, stones < 20 mm, regular Main Biliary Tract (MBT)= 62 LC and 2 open surgery conversion (OSC); grade 1: wall < 4 mm, stones > 20 mm= 24 LC and 7 OSC; grade 2: hydrops, wall > 4 mm, infundibular stone = 6 LC and 6 OSC; grade 3: wall > 4 mm, stones > 20 mm, empyema of gallbladder, MBT ≥ 6 mm = 3 LC and 0 OSC. Flogosis near gallbladder and wall > 4 mm were mainly responsible for transition of LC in OSC.

Conclusion: several predictive conditions for intraoperative difficulties are often detectable by accurate preoperative ultrasounds examination, with the aim of best surgical planning and to select those patients to entrust to surgeons during their learning phase.

KEY WORDS: Laparoscopic cholecystectomy - Predictive preoperative ultrasound.

Premessa

Laparoscopic Cholecystectomy (LC) actually represents the treatment of choice for lithiasis of the gallbladder (LoGB). The success of this ‘minimally invasive’ technique is surely due to more comfort and nevertheless same results and safety in comparison with the ‘open’ surgery. Today LC is seen in the world as the golden surgical approach because of the advantages for the patient and of the favorable cost-benefits ratio. Such method offers a great advantage in respecting both the aesthetical aspect and, above all, the integrity of the abdominal wall: therefore it reduces the risk of intra-abdominal adherences and of laparocle, as well as it reduces the postoperative pain (1). The absence of wider wounds involves besides small suffering and precocious mobility for the patient and, especially for the elderly, this reduces thromboses and respiratory complications; the hospitalization has a duration of two - three days and the convalescence has lowered to a week.

Nevertheless in the last years many Authors report
an increase of the biliary complications, particularly in patients with an history of acute cholecystitis. In fact cholecystectomy can be made difficult by the presence of peri-cholecystic adherences or thickened wall or peri-cholecystic sclerosis. The operation can become dangerous when sclerosis is located in the peduncle where the various adhering elements, not easily recognizable, can easily be injured or lacerated during their isolation.

In the recent years literature reports that complications from LC have increased respect to the traditional approach, in spite of a decreased rate of biliary complications due to better learning of the laparoscopic technique. Sometimes it's necessary to convert LC in open surgery. Many recent Authors (2-11) reported their experience concerning risks factors and/or predictive conditions of the Open Surgery Conversion (OSC) from initially LC. Some Authors (12-16) dwelt upon the role of preoperative ultrasound to predict technical difficulties and/or complications during/after LC. In several clinical series the percentage of OSC during laparoscopic surgery is ranging from 2% up to 23,3% (2). Kama and coll. (2) in a series of 1000 cases report a total percentage of conversion of 4,8% (of which 16,7% are due to the wall thickness and 50% to an actual acute or past cholecystitis).

Because physical examinations and clinical history of patients don't allow to always foresee the intraoperative difficulties, we thought of giving a contribution by testing our system based upon these US (UltraSounds) signs capable to foretell the difficulties during LC, with the aim to plan the surgical approach and to select these patients to entrust to the young surgeon in formation.

### Patients and methods

We studied 112 patients (88 female and 24 male, age 25-75) treated in First Surgical Department of University of Catania (Italy) from January 2001 to December 2002. We included patients (22 of 112: 20%) undergone to lower abdominal surgery but not these patients undergone to upper one.

Before operation we performed an accurate US examination, to obtain an uniformity of data; during US we particularly annotated the following patterns and conditions:
- the thickness of the walls of the gallbladder;
- the dimensions and the mobility or position of the gallstones (particularly if stuck in the infundibulum);
- the presence of hydrops or empyema;
- the diameter of the common bile duct (CBD);

Based upon these signs we established four ordinal degrees of difficulty from 0 up to 3 (Table 1).

During operation, we verified the correspondence between regional anatomical pattern and preoperative US signs and noted the followings aspects and conditions too:
- adherences between omentus and gallbladder;
- difficulty for the isolation of Calot's triangle;
- difficulty in the dissection of the gallbladder from the liver bed;
- bleeding during surgery;
- perforation of the gallbladder with outgoing of bile;
- duration of the operation;
- conversion in open cholecystectomy.

### Results

Table 1 (see legend) shows our results concerning relationship between US grade and rate of OSC. Grade 0 present a significant lower rate of OSC respect to all grade and OSC rate in grade 0 is less respect to grade 1 and 2. Grade 2 has a the higher rate of OSC respect to OSC distributed in all cases. Grade 3 has non statistically evaluated because small size of sample. These grade 3 patients with CBD more than 6 mm presented at colon-
Discussion and conclusion

LC has been performed for the first time in Lyon (France, 1987) by Mouret, then in Paris by Dubois and in Bordeaux by Perissat, it was introduced in the United States by Barry McKernan and it has quickly spread in the whole world.

When LC was introduced many patient suffering from LoGB couldn’t take advantage of this new

methode; now almost all these patient can benefit by this technique, thanks to continuous improvement of the surgical instrumentality (e.g. systems for the transmission of the image; specific or better tools for this surgery), as well as thanks to the evolution of the surgical ability of the operators. Actually LC represents the golden standard treatment of LoGB. The indications for the laparoscopic cholecystectomy don’t differ from open surgery; in fact acute cholecystitis is laparoscopically operable also, with the condition of an immediate surgical aggression but, in alternative, we can wait for the cooling of the inflammatory process.

Nevertheless, it’s necessary to perform an open conversion of LC or open surgery from the beginning when laparoscopic surgery doesn’t ensure guarantees of safety for some particularly complexe patients, whose number is inversely proportional to the ability and the experience of the operator. Our preliminary results and literature suggest that preoperative US can be useful for information about an intraoperative difficulty that can lead to the OSC. These data are very important to correctly inform a patient that pretends to know both the percentages of failure of a technique and the probable complications. In our experience thickness of gallbladder caused more duration of the operation and a great percentage of conversions (22,6%): for patient with thickness more than 4 mm the percentage of conversion has risen up to 42,9%.

We have not observed a correlation between dimensions of the stones and intraoperative problems; so we did not note an influence of the previous surgical intervention on lower abdomen or of the presence of an enlarged CBD. We think that the inflammation (cause of an increase of parietal thickness), the adhering parts as well as the peri-cholecystic sclerosis are the principal risk factors increasing both intraoperative difficulties and complications and, therefore, the rate of OSC.

Particularly, the peri-cholecystic inflammation and a wall > 4 mm appear to be most important factors responsible of OSC from LC in our experience.

From our data we infer the following statements:
1) the principal conditions responsible of OSC and/or of difficulties during LC can be foreseen by means of the awareness to these clinical and US patterns (US grading);
2) it’s possible a selection of the fitter surgical procedure and with less risk for the patients.

If difficulties are not foreseen we can entrust the patient to the surgeon during his learning curve, under the supervision of a more expert surgeon. The forecast of possible difficulties during LC allows a more complete information to the patient and the knowledge both of the possibility of an OSC and of the possible complications, so that the operator himself could take the decision of a conversion more preciously during
LC or of an laparotomic intervention of principle.

We expect in mind to study more patients and more parameters, including others clinical and laboratory data, for a better evaluation of the several factors before and after LC, to compare patients with/without OSC during LC and with/without complications.

The open conversion of a laparoscopic procedure, whereas it results necessary, constitutes an eventuality that we doesn't considered as a technical error; on the contrary, it is a sign of clinical maturity and adroitness of judgment to avoid useless risks for the patient and ethical/legal problems for the surgeon.

References