

## Single-Incision Laparoscopic Cholecystectomy: our experience and review of literature

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**SUMMARY: Single-Incision Laparoscopic Cholecystectomy: our experience and review of literature.**

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*Aim.* After the revolution in the surgery of gallbladder stones represented by the laparoscopic cholecystectomy, we tried a new technique that further maximize the aesthetic results and that at the same time is of easy learning for young surgeons.

*Patients and methods.* From January 2011 to December 2012 we performed at our department 320 cholecystectomy: 27 in laparotomy and 293 in laparoscopy. Of these, 88 underwent to Single Incision Laparoscopic Surgery (SILS), namely the Single Incision Laparoscopic

*Cholecystectomy (SILC), in recruited patients aged between 19-65 years; 56 patients were females and 32 were males.*

*Results.* The laparoscopic cholecystectomy with the SILS methodology is a safe technique. Respect to multi-port Laparoscopic Cholecystectomy (LC), we have cosmetic advances. The pain is less in extra-umbilical sites, and the major umbilical pain can be prevented by local anaesthesia.

*The times are slightly longer, especially at the beginning of training, but after a few of operations it is reduced to about one hour.*

*We didn't found any other difference in vantage and advantage between the two technics, only a case of postoperative umbilical hernia in SILS.*

*Conclusion.* We found the SILS a safe and effective technique for the cholecystectomy.

KEY WORDS: Single port - Cholecystectomy - Cholecysto-choledochal lithiasis, SILS.

### Introduction

In Western countries, gallstone diseases are common and have a high economic impact. The prevalence of gallstone disease is increasing because of worldwide epidemics of obesity, insulin resistance and aging (1-3).

Symptomatic gallstones are one of the leading causes of inpatient care in general surgery. The risk of developing symptoms or complications related to gallstones is approximately 1-4% for year (1, 2).

The most important complications of the gallstone

disease are biliary pancreatitis, cholecystitis, cholangitis and cholangiocarcinoma (3, 4).

The traditional multi-port Laparoscopic Cholecystectomy (LC) is considered the gold standard in the surgical approach in case of cholelithiasis and, at present, it is the most common surgical procedure for this pathology (5, 6).

In recent years modern surgical research has been allowing reduction of the number and size of surgical access.

Since the first laparoscopic cholecystectomy was carried by Mühe (7, 8), surgeons developed new techniques; the surgical trauma was minimized and the invasiveness of routine cholecystectomy cutting down with significant improvement of the cosmesis and with functional benefits as the decreasing postoperative pain and the reduction in hospital admission (9-11).

We report our experience upon the SILS technique (Fig. 1) in the treatment of biliary lithiasis trying to make our considerations about this method that offers a valid alternative to "traditional" laparoscopic cholecystectomy (12-14).

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Fig. 1 - SILS (Single Incision Laparoscopic Surgery) for cholecystectomy.

## Patients and methods

From January 2011 to December 2012 we performed at our department 320 cholecystectomy: 27 in laparotomy and 293 in laparoscopy, of these (Table 1) 88 single port cholecystectomy in recruited patients aged between 19-65 years, among them 56 were females and 32 were males (15-17).

All patients had given informed consent after receiving both verbal and written information regarding our study. The study protocol was approved by our institution.

In all patients recruited ultrasound and Magnetic Resonance Cholangio-pancreatography (MRCP) were performed to rule out certainly the presence of gallstones in the common biliary duct.

Patients with symptomatic cholelithiasis, history of chronic biliary colic, biliary dyskinesia or previous gallstone pancreatitis were considered suitable to surgical approach with SILS technique whereas we excluded, at least in the initial phase of learning, patients suffering from cholecysto-choledochal lithiasis, severe obesity, acute cholecystitis, previous open upper abdominal surgery, bleeding disorders (18, 19).

### Surgical methods

In SILC, the patient is positioned supine on the operating table with his legs spread in a slight Trendelenburg, the first operator is positioned between the patient's legs, the assistant is on the left while the laparoscopic column lies on the right. After injection of local anaesthesia, first an incision according to Trans Umbilical Open Laparoscopy (TUOL) of about 2 cm on the upper margin of the umbilical scar is carried out. The use of local anaesthetic at the site of introduction of the trocar in our experience as well as Fornollosa (20) seems to significantly reduce the onset of pain during the postoperative period. After opening peritoneum with open technique we introduce the multilumen trocar, Covidien multiport, and then pneumoperitoneum is induced; through the

TABLE 1 - BASELINE CHARACTERISTICS OF OUR PATIENTS.

Patients	SILC 88	LC no SILC 205
Age: mean (SD)/years	46.2±5.8	49.3±6.7
BMI: mean (SD)	24.2±3.6	25.1±3.1
Symptomatic gallstones	62 (70.45%)	151(73.65%)
Pancreatitis	1(1.136%)	6 (2.92%)
Previous cholecystitis	3 (3.40%)	12(5.85%)
Choledocholithiasis	1 (1.136%)	5 (2.43%)
Hypertension	21 (23.86%)	51 (24.87%)
Diabetes mellitus	15 (17.04%)	32 (15.60%)
Ischemic heart disease	1 (1.136%)	3 (1.46%)
Dyslipidemia	14 (15.90%)	24 (11.70%)
Obesity (BMI>27,5)	9 (10,22%)	36 (17.56%)
Others	3 (3.40 %)	12 (5.85%)

three trocar holes the 5 mm 30° optics and the required instruments are inserted. The first step of cholecystectomy is the eventual viscerolysis and then the visualization of the gallbladder; at this point the suspension of the bottom of the gallbladder with a transfixed stitch can be useful using a straight needle inserted at the level of the right hypochondrium, transcutaneously, as suggested by Navarra (21). Skeletonization of the triangle of Calot is performed as usual, so both the cystic artery and the cystic duct are isolated and clipped. Retrograde cholecystectomy is carried out and after a thorough observation of the hepatic bed the gallbladder is removed by means of an endobag. At the end of surgery, the umbilical access is sutured with number 0 of polyglactin 910 (Vicryl®) absorbable stitches.

### Statistical analysis

Patient demography's and clinical data were analysed descriptively. Continuous variables were compared between the treatment arms, using the two-sample t test or Mann-Whitney U test, where applicable, while ca-

tegorical variables were compared using the  $\chi^2$  test or Fisher exact test as appropriate.

## Results

Clinical and demographic characteristics were analogous between the two groups at baseline (Table 1).

In our study it was never necessary to convert the operation although in two cases, it was useful to place a 5 mm additional trocar in the right upper quadrant due to the objective difficulty of pericolecistic viscerolysis.

Mean operative time was 73 minutes with a gradual reduction of the operative time, which stood at the end between 53 and 60 minutes. We had no intraoperative complications while patients complained of a mild localized pain at the site of transfixated point of suspension, which was treated with medical therapy successfully; in addition, a late incisional hernia at the site of the trocar introduction was observed.

Regarding the hospital stay we found that both techniques, conventional laparoscopy and SILS were comparable (two/three days); whereas with respect to postoperative pain we observed an increase in the first day after SILS technique that is possible to improve by preoperative infiltration of bupivacaine (18).

## Discussion

In recent years there has been an increasing use of laparoscopic techniques, especially oriented to improve the aesthetic outcome, to reduce postoperative pain and to obtain a more rapid functional recovery. In this regard, SILS is increasingly spreading with various indications including appendectomy, bariatric surgery and particularly cholecystectomy (13, 17, 22-24).

Compared to the now well standardized traditional laparoscopic technique, we observed especially initially a greater difficulty in handling the instruments because of the close proximity of them due to the single access.

This difficulty is described at the beginning by many authors (10, 25, 26), subsequently becoming skilfully and familiar with the instruments this problem has been greatly reduced. It should be emphasized, however, that the difficulty was initially aggravated by the "Swiss cheese technique" that involves the introduction of more trocars in the same hole, anyway with the advent of "multiport" approach devices the aesthetic results are clearly improved.

However, there is not currently a standardization of the surgical technique, in fact many authors adapt the laparoscopic technique to the traditional single-port. As for the benefits, these are mainly related to the aesthetic aspect (27) and to the reduction of abdominal trauma resulting in postoperative pain decrease and in a more

rapid return into the normal work and sport. In our experience, although limited, we sometimes noticed a slight pain in the right upper quadrant at the location where the transfixated stitch of suspension was done but not enough to give significant discomfort to the patient.

While observed complication rates and the need for reintervention did not differ significantly between study arms, we acknowledge that laparoscopic cholecystectomy is a procedure with an inherently low rate of major complications (28). One multicentre trial has thus far observed an increased incidence of incisional hernia in SILC, with rates of 8.4% at 1 year post-procedure (29). We have one post-operative incisional hernia at 12-month follow-up.

In our experience, the operative time is longer than the traditional technique, although with the acquisition of a greater handmade and an adequate training it tends to get closer to the traditional laparoscopy. According to Cuesta and Romanelli the learning curve for an expert laparoscopist is incredibly fast and consists of about 10 consecutive operations performed in a short amount of time. Certainly the growing interest of the scientific community in recent years has stimulated the development of dedicated instruments designed to reduce the technical disadvantages, previously underlined, depending on difficulty of manoeuvring. Consequently, the introduction of instruments such the rotulator could favour a further spread of this technique that today appears a natural evolution of traditional laparoscopy.

However in our opinion, the only undeniable advantage of SILS, in accordance with many authors, is the final aesthetic result, reason for which this technique is required mainly by young people and women. Indeed, the trocar inserted only with a trans-umbilical hole leaves an "invisible" scar from which the name of "no-scar surgery" is justified. Another our intended is to study pain outcomes. Some authors describe the overall extra-umbilical post-surgery pain lower and the only drawback is the lengthening of the time of the surgery (30). We found in our first cases a post-operative umbilical pain greater, but this event is of small entity and we have prevented it, in the following clinical cases, with little care, as local anaesthesia.

## Conclusions

The SILS is a liable and safe method, which can also be performed in well-selected patients by less experienced laparoscopists after a short learning curve. The operative time, relatively longer, is certainly rewarded with excellent aesthetic and functional results. In view of the improved pain outcomes in SILC, acceptable operating duration and similar complication rates as compared to LC, we believe our results support single-incision laparoscopic cholecystectomy as a feasible option in routine surgical practice.

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