

# Comparison between single-incision and conventional laparoscopic cholecystectomy: a prospective trial of the Club Coelio

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## Abstract

**Background** The aim of this study was to compare the outcomes of single-incision laparoscopic cholecystectomy (SILC) and conventional laparoscopic cholecystectomy (CLC).

**Method** Patients' inclusion criteria were uncomplicated gallstones, BMI  $\leq 30$ , ASA score  $\leq 2$ , and no past surgery in the upper abdomen. Five surgeons performed only SILC and seven only CLC. Data analyzed included operative time, morbidity, quality of life (QOL), cosmetic result, and global patient satisfaction. The last three parameters were evaluated 3 months after surgery. QOL was assessed with the Gastrointestinal Quality of Life Index (GIQLI)

questionnaire. Cosmetic result and patient satisfaction were rated using a 5-grade Likert scale.

**Results** This study included 104 patients operated on between April and June 2010. A SILC was performed in 35 patients and a CLC in 69. The preoperative characteristics of the two groups were similar. Median operative time for SILC was higher than that for CLC: 55 versus 40 min ( $p < 0.001$ ). Postoperative complications (0 vs. 2) and postoperative GIQLI scores ( $123 \pm 13$  vs.  $121 \pm 18$ ) were not significantly different between groups. Cosmetic result and patient satisfaction were better for SILC than for CLC. The percentages of results rated as excellent were 68 versus 37 % ( $p < 0.006$ ) and 80 versus 57 % ( $p < 0.039$ ),

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respectively. For the whole group, multivariate statistical analysis revealed that postoperative GIQLI score and cosmetic result were independent predictive factors of patient satisfaction. The percentages of satisfaction rated as excellent were greater in patients who had a postoperative GIQLI score  $\geq 130$  (92 vs. 49 %, odds ratio [OR] = 4,  $p < 0.001$ ) and in patients who had an excellent cosmetic result (82 vs. 47 %, OR = 7,  $p < 0.001$ ).

**Conclusions** Compared to CLC, SILC is associated with a longer operative time, an equivalent morbidity and QOL, and a better cosmetic result. The improved aesthetic result also leads to a better global patient satisfaction.

**Keywords** Single incision · Laparoscopic cholecystectomy · Quality of life · Satisfaction · SILS · LESS

In the search for less aggressive surgical techniques, single-incision laparoscopic cholecystectomy (SILC) is an alternative to natural orifice transluminal endoscopic surgery, judged by many as too complicated [1]. SILC was first reported in 1997 when Navarra [2] used it on 30 patients and reported favorable outcomes. Since then, several observational studies that included more than 60 patients have confirmed the feasibility and safety of the procedure [3–8]. If the concept of minimally invasive surgery with one practically invisible scar is attractive, the expected advantages of this new technique, such as reduced postoperative pain, shorter hospitalization, improved cosmetic result, and better quality of life, have still to be proven [1]. The goal of this study was to compare prospectively the surgical outcomes of the patients who underwent single-incision laparoscopic cholecystectomy (SILC) or conventional laparoscopic cholecystectomy (CLC).

## Material and methods

### Study design

Twelve surgeons, members of the Club Coelio, a group of French and Belgian surgeons focused on laparoscopic surgery, participated in the prospective multicenter trial. The inclusion criteria were (1) elective cholecystectomy for biliary colic with (2) documented uncomplicated gallstones by imaging, (3) a body mass index (BMI)  $\leq 30$ , (4) an American Society of Anesthesiologists score (ASA)  $\leq 2$ , and (5) no past abdominal surgery except at the McBurney or Pfannenstiel incision. Exclusion criteria included (1) pregnancy, (2) acute or chronic cholecystitis, (3) common bile duct stones, (4) ASA score  $> 2$ , (5) presence of a midline or subcostal incision, (6) presence of an

umbilical hernia, or (7) prior umbilical hernia repair. All consecutive patients operated on between April and June 2010 who met the inclusion criteria were included in the study. The choice between SILC and CLC was left to each surgeon. During the study period, five surgeons performed only SILC and seven performed only CLC. All the surgeons had extensive experience with classic laparoscopic cholecystectomy and advanced laparoscopic techniques. In addition, the surgeons who performed single-incision surgery had performed at least five cases of SILC before beginning the current study enrolment.

### Surgical technique

For SILC, the umbilicus was grasped at its base and everted. A skin incision was made within the umbilical fold, and an approximately 20-mm fascial incision was created. The SILS<sup>TM</sup> port (Covidien, Mansfield, MA, USA) was then placed into the peritoneal cavity with the assistance of a curved clamp. After inflation, intra-abdominal vision was obtained by one rigid 30° 5-mm laparoscope. One articulating instrument was used for lateral retraction of the infundibulum and dissection of the triangle of Calot was performed with a hook coagulator such that a critical view was established. Once clearly identified, the cystic artery and cystic duct were clipped and divided. Perioperative cholangiography was performed at the discretion of the surgeon. The gallbladder was removed from the gallbladder fossa using electrocautery and extracted through the umbilical incision.

For CLC, the abdomen was accessed using either a Hasson or a Veress technique at the surgeon's discretion. Intra-abdominal vision was obtained by introduction of a rigid 0° laparoscope through a 10-mm port at the umbilicus. Two or three additional ports were added and positioned at the discretion of the surgeon. The infundibulum was retracted laterally and the triangle of Calot was dissected with a hook coagulator such that a critical view was established. Once clearly identified, the cystic artery and cystic duct were clipped and divided. Perioperative cholangiography was performed at the discretion of the surgeon. The gallbladder was removed from the gallbladder fossa using electrocautery and extracted through one 10-mm port.

### Outcomes and statistics

The primary end point was global patient satisfaction. Secondary end points included operative time, conversion rate, postoperative morbidity, quality of life (QOL), and cosmetic result. Duration of operation was defined as the interval between initial skin incision and skin closure. Surgical complications were classified as described by