

Single Incision Laparoscopic Cholecystectomy

A. Cotirlet^{1,2}, M. Nedelcu³, E. Popa¹, R. Anghel¹, S. Rau¹, I. Motoc¹, E. Tincu⁴

¹Department of General Surgery, Emergency Hospital, Moinești, Romania

²“Vasile Alecsandri” University, Bacău, Romania

³Department of Surgery A, Saint Eloi Hospital – CHRU, Montpellier, France

⁴Department of Anaesthesiology, Emergency Hospital, Moinești, Romania

Rezumat

Colecistectomia laparoscopică prin trocar unic

Introducere: Odată ce chirurgii au îmbrățișat conceptul de chirurgie minim-invazivă, tehnicile cu o singură incizie mică au câștigat din ce în ce mai multă importanță. Mai multe articole despre colecistectomia laparoscopică cu o singură incizie (SILC) au fost publicate. Obiectivul acestui studiu este de a descrie rezultatele pe termen scurt ale SILC.

Metode: O analiză retrospectivă a fost făcută pentru 51 de pacienți care au avut SILC între 2009-2012. Timpul operativ, tehnica chirurgicală, rata de conversie, și complicațiile post-operatorii au fost analizate.

Rezultate: SILC a fost efectuată pentru 51 de pacienți, toate femei, cu o vârstă medie de 35,6 ani (interval=19-62). Indicele de masă corporală (IMC) a variat între 16,8-35,6 kg/m², cu o medie de 20,4. 12 pacienți (23,52%) au avut colecistită acută. Media timpului operator a fost de 58,6 minute (45-95 min). Incidente intraoperatorii au apărut la 6 pacienți (11,76%) și au fost legate de hemoragia intraoperatorie. A existat o singură conversie a procedurii la colecistectomia standard laparoscopică (1,9%). Doi pacienți (3,9%) au prezentat complicații post-operatorii (infecție de plagă) și spitalizarea medie a fost de 1,6 zile.

Concluzii: SILC este fezabilă și oferă o alternativă promițătoare la chirurgia endoscopică transluminală pentru colecistectomia laparoscopică fără cicatrice. Cu toate acestea, aplicarea de

rutină a acestei tehnici noi presupune o evaluare prin studii prospective a siguranței și eficienței costurilor.

Cuvinte cheie: colecistectomie, laparoscopie, trocar unic

Abstract

Background: As surgeons embrace the concept of increasingly less invasive surgery, techniques using only a single small incision have begun to gain traction. Multiple case series managed by a single-incision laparoscopic cholecystectomy (SILC) have been published. The objective of this study is to describe the short-term outcomes of SILC in our institution.

Methods: A retrospective review was done for 51 patients who underwent SILC between 2009-2012. The operative time, surgical technique, conversion rate, and postoperative complications were reported.

Results: SILC was performed for 51 patients, all women, with a mean age of 35.6 years (range=19-62). Their body mass index (BMI) ranged from 16.8-35.6 kg/m² with a mean of 20.4. Twelve patients (23.52 %) had acute cholecystitis. The mean operating time was 58.6 minutes (range=45-95 min). Incidents were encountered in 6 patients (11.76%) and were related to intraoperative bleeding. There was a single conversion to the standard laparoscopic procedure (1.9%) and in 5 cases an accessory needle grasp was used (9.8%). Two patients (3.9%) presented postoperative complications (wound infections) and the mean hospital stay was 1.6 days.

Conclusions: SILC is feasible and provides a promising alternative to natural orifice transluminal endoscopic surgery for scarless laparoscopic cholecystectomy. However, routine application of this novel technique requires an evaluation of its safety and cost effectiveness in larger studies.

Corresponding author:

Adrian Cotirlet, MD
Department of General Surgery
Emergency Hospital, Moinești, Romania
E-mail: spitalmoinesti@bacau.astral.ro

Key words: laparoscopic, cholecystectomy, single incision

Introduction

Due to its superior results compared to the open technique, laparoscopy represented a revolution in digestive surgery, including as well biliary tract surgery. Eric Muhe performed the first laparoscopic cholecystectomy in 1985 (1) and Perissat published in 1990 the first 157 patients (2). In the following years the method became more and more popular becoming by time “the gold standard” procedure for performing cholecystectomy. The feasibility and the safety of this technique were validated by several studies, on important numbers of patients, respectively 82,547, and 25,800 are confirming (3,4). The second revolution occurred more recently as the first natural orifice transluminal endoscopic surgery (NOTES) procedures were published (5,6). However these techniques are performed by very few centers and still on experimental basis. A competitive alternative is represented by the single incision laparoscopic cholecystectomy (SILC) realized through a single umbilical incision using both a special trocar and dedicated instruments. Earlier in 1997, Navarra et al. showed that cholecystectomy through a single umbilical incision may be technically feasible and could be proved advantageous in selected patients (7). Bresadola et al. published 2 case series in 1999 (8,9), but the real development has happened a decade after. In 2008, the technique is starting to be used again and is gaining more popularity. It is widely accepted that the SILC technique is more difficult than the standard laparoscopic cholecystectomy due to an inadequate gallbladder retraction with a difficult exposure of the operative field and a lack of instrument triangulation. Even so, some of the advantages of single-port cholecystectomy, not exactly defined yet (better cosmesis, increased satisfaction of the patients, diminished risk

of incisional hernia), have suggested SILC as a valuable option for the treatment of biliary lithiasis.

Materials and Methods

Between 2009-2012, 51 patients underwent SILC in the Emergency Hospital of Moinesti, the first procedure being performed on the 4th edition of the “Moinesti Emergency Hospital Medical Days” with the participation of Ramon Villalonga, MD, PhD, from “Vall d’Hebron” Hospital, Barcelona and Nicolae Iordache, MD, PhD, from “Sf. Ioan” Hospital, Bucharest.

The following factors are reported: age, gender, operative time, intraoperative incidents and accidents, conversion rate, specimen pathology, postoperative complications and hospital stay.

Operative technique

The surgical intervention is made under general anesthesia and the patient is placed in the supine position with the left upper limb situated in 90 degrees abduction and the right upper limb along the body. The surgeon and the camera assistant are placed on the patient’s left side with a second assistant on the opposite side. The monitor is situated on the right side of the patient, under direct vision of the surgeon. Local anesthesia is infiltrated into the umbilicus, which was everted (Fig. 1).

A 3-cm incision is made through the umbilicus down to the midline fascia, and a 3-cm incision is made through the fascia and the peritoneum, followed by the introduction of the multichannel port (Covidien) (Fig. 2).

With the trocar in place, carbon dioxide is insufflated at a high flow rate to 12 mm/Hg of pressure and a 30 degree 5-mm laparoscope is placed into the abdominal cavity. The operating table is put in the reverse Trendelenburg position (20 degrees), left side down. An articulated grasper and the monopolar electrocautery are introduced through the other

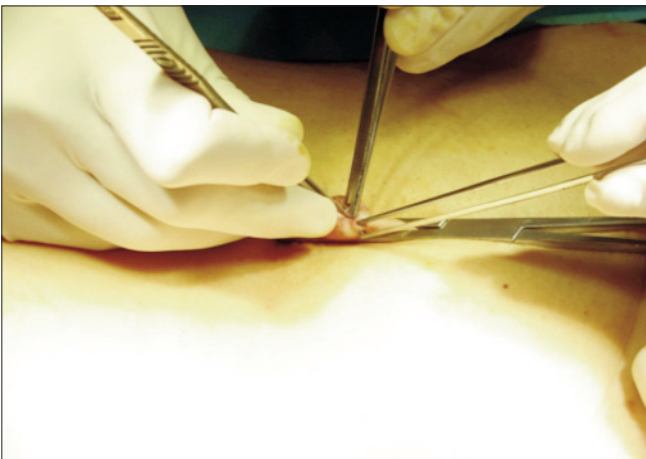


Figure 1. Eversion and incision of the umbilicus

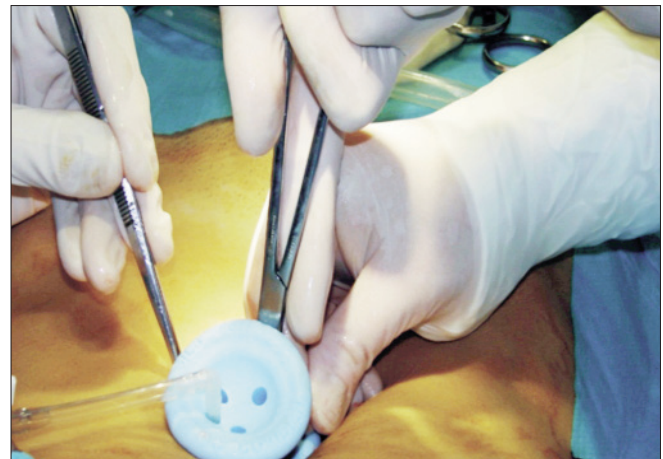


Figure 2. The insertion of the trocar into the abdominal cavity

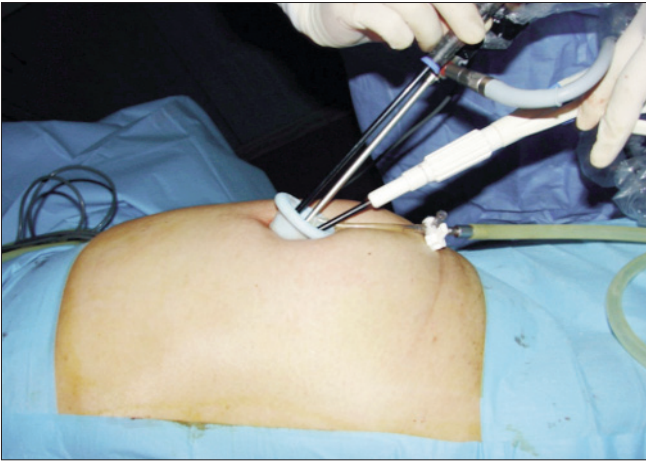


Figure 3. Position of the instruments in the triport system



Figure 4. Suspension of the gallbladder's fundus with needle grasper

2 ports of the trocar into the abdominal cavity (Fig. 3) and the dissection of the gallbladder starts in a retrograde manner. The triangle of Calot is exposed, the cystic duct and artery are separately dissected and ligated with 5 mm clips.

In difficult cases the retraction of the gallbladder fundus is realized with a special grasper (needle grasper) inserted in the midclavicular line on the right side, 3 cm below the costal edge (Fig. 4).

The dissection continues in a retrograde manner and the monopolar electrocautery is used to remove the gallbladder from the liver bed. Further, the gallbladder is removed along with the port system from the abdominal cavity. The fascia at the port site is closed and the umbilicus is inverted.

One month postoperatively, after complete healing of the wound, the umbilicus appeared practically scarless (Fig. 5).

Results

SILC was performed for 51 patients, all women, with a mean age of 35.6 years (range 19-62). Their body mass index (BMI) ranged from 16.8 to 35.6 kg/m with a mean of 20.4. Twelve patients (23.52 %) had acute cholecystitis and the rest of them (39 patients) presented signs of chronic cholecystitis. The mean operating time was 58.6 minutes (range = 45-95 min), longer for initial and acute cases that implied a difficult dissection. Incidents were encountered in 8 patients (15.6%) and were related to intraoperative bleeding at dissection due to local inflammatory processes. There was a single conversion to the standard laparoscopic procedure (1.9%). The needle grasper, which is illustrated in Fig. 5, has been used in 5 cases. It was described by Professor Marescaux team as Berci needle or by other teams as fascial closure. For 4 patients this accessory 2 mm grasp was used due to local inflammatory process of acute cholecystitis. In another case the use of the grasp was needed because of major hepatomegaly with impossible retraction of gallbladder by the curved grasp introduced through the

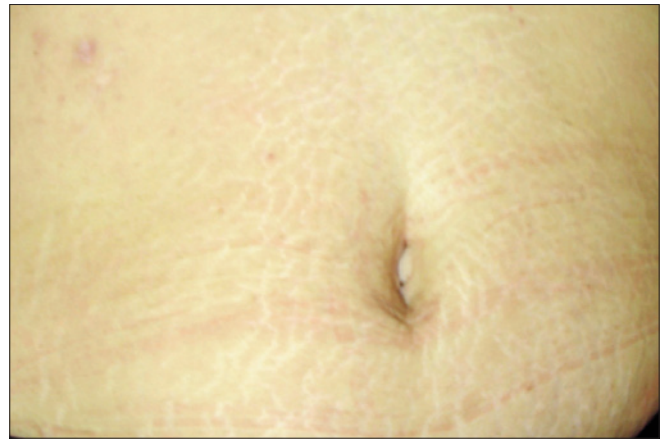


Figure 5. Umbilicus after complete healing of the wound

umbilical incision. Two patients (3.9%) presented postoperative complications (wound infections) and the mean hospital stay was 1.6 days.

Discussions

The unquestionable advantage of SILC is cosmesis, when the incision is appropriately covered in the umbilicus, being essentially invisible (10,11,12). Other potential benefits would be less postoperative pain with faster recovery, although definitive studies are still pending. Some authors predict fewer complications related to wound infections and incisional hernias because there are fewer incisions and less potential for infection and incisional hernia (13). An important factor is the number of incisions made through the fascia of the umbilicus necessary for the introduction of the multiport system, depending on the type of multichannel ports used. Thus, in our opinion making a single fascial incision, but larger, is better than multiple small incisions through the fascia by reducing the incidence of postoperative port-site hernias, the so called "Swiss cheese hernias".

The use of the needle grasp to retract the gallbladder offers few advantages over the transabdominal anchoring stay sutures:

- The possibility to reposition the grasp during the procedure as needed;
- Greater mobility;
- Increased exposure of the gallbladder;
- Eliminates the risk of intraabdominal bile leakage or even rupture of the gallbladder (14,15,16,17).

The mean operative time is correlated both with the particularities of the case and the learning curve, as has been advocated by several studies (18,19,20,21). The intraoperative incidents and accidents represented by the 8 cases of acute cholecystitis were intraoperative bleeding (in one case the conversion to laparoscopic standard technique being necessary) and are correlated with other experiences reported in the literature (22).

Regarding postoperative complications the literature offers a widespread area of results. There are systematic reviews and meta-analyses of prospective randomized clinical trials that found no statistical difference between postoperative complications (23). Katkhouda et al. included in the analysis nine true randomized controlled trials and reported a total of 695 patients, divided into the single access laparoscopic cholecystectomy group of 362 patients and the conventional laparoscopic cholecystectomy group of 333 patients. Other studies, Rubay R et al. (24) found a significant rate of complications of 5.7 % on 105 consecutive single access laparoscopic cholecystectomies including 2 cases of incisional hernia and 4 cases of superficial wound infection. In our experience the postoperative complications rate was 3.9 % and it was represented by 2 cases of wound infection. They were associated with inflammatory pathology of the gallbladder. No cases of incisional hernia were identified up to now. The mean hospital stay was 1.6 days, longer for acute cases where intraoperative incidents and accidents and postoperative complications were involved.

In our experience we recorded no bile duct injury, but this is a potential risk of any laparoscopic cholecystectomy and we have to be aware of this disastrous and very difficult to treat complication in SILC as well. It was mentioned in several papers in the literature for this approach. Joseph M. et al (25) reported 19 bile duct injuries identified for a SILC-associated bile duct injury rate of 0.72% in a review of 2626 cases. Most SILCs were performed in optimal conditions, such as lack of acute cholecystitis (90.6%). According to this study, we urge caution with this technique in inflamed gallbladder pathology.

Others modalities than conventional laparoscopy to perform the cholecystectomy are represented by the transvaginal or transgastric approach. The first natural orifice transluminal cholecystectomy in humans was performed in Strasbourg, France (26). A 30-year-old woman with symptomatic cholelithiasis was submitted to cholecystectomy using a standard double-channel flexible gastroscope and standard endoscopic instruments. A 2 mm transabdominal needle port was used to insufflate carbon dioxide, to monitor the pneumoperitoneum, and to retract the gallbladder. Colpotomy

was closed using conventional instruments. The patient had no postoperative pain and no scars, and was discharged on the second postoperative day. Shortly after that, the same technique was used by another team in Italy (27). The same team of Antonello Forgione performed the first case of transvaginal cholecystectomy in our department. The transgastric approach was realized for the first time by Professeur Swanstrom (28). None of these approaches gained the worldwide acceptance of the single approach due to a very long learning curve and limited development of endoscopic instruments.

Regarding the ergonomics of the procedure, many surgeons have found the operation difficult, the main motives incriminated being: limited viewing angles, clashing of instruments and difficult triangulation (29). A lot of surgeons are using 0° or 30° laparoscope, but several teams find advantageous the use of a 5 mm diameter laparoscope with a deflectable-tip and incorporated light source which allows surgeons to clearly view the operative field and create a sense of triangulation, all the while keeping the bulk of the laparoscope out of the surgeon's way (30). The use of reticulating, curved or flexible instruments can create a greater comfort avoiding clashing of instruments and improving triangulation. Also the difficulty with the retraction of the gallbladder can be surpassed by use of adjunctive sutures, extra-long bariatric instruments, Berci grasper or internal retractors (31). Different types of instruments for laparoscopic surgery have to be developed like retractors, dissection and laparoscopic cameras to make the surgeon more efficient. As we lead into the next phase of minimal access surgery, we need to develop procedures, instruments and ports easily available and affordable so that they can be used for large volumes of patients.

Conclusions

The demand and interest for "scarless" surgery are undeniable at the moment and seem to be a normal evolution of minimally invasive surgical techniques. Up to date, several other pathologies benefitted from the single incision laparoscopic approach: single incision appendectomy (32), colectomy (33), adrenalectomy (34), splenectomy (35), sleeve gastrectomy (36), and gastric bypass (37). The advantages emphasized are less postoperative pain, fewer postoperative complications and the excellent cosmetic result compared with the standard laparoscopic technique. However, single-incision laparoscopic cholecystectomy does not replace, for the moment, the "gold standard" status that belongs to the standard laparoscopic procedure because of insufficient data regarding the safety of the procedure, complication rate and costs. Besides these factors we can add the feasibility of this approach only for elective selected cases. This explains the actual experimental status of this technique, but with a great developing potential in the future.

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