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Medicine

LAPAROSCOPIC CHOLECYSTECTOMY SILS (TRANSUMBILICAL SINGLE-INCISION SURGERY) – BETWEEN LIMITS AND POSSIBILITIES

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ABSTRACT:
THE WORK'S PURPOSE WAS TO ANALYSE THE FEASIBILITY OF THE SILS APPROACH IN PATIENTS WITH CHOLELITHIASIS, BOTH WITH CHRONIC AND ACUTE FORMS, THE SPECIFICATION OF THE INDICATIONS AS WELL AS THE LIMITATIONS OF THIS METHOD.
THE STUDY WAS RETROSPECTIVE, CONDUCTED ON A LOT OF 736 PATIENTS OPERATED IN THE CLINIC BETWEEN JANUARY 2012 – DECEMBER 2018, WITH A FIRST ATTEMPT OF SILS LAPAROSCOPIC CHOLECYSTECTOMY.
OF THE 736 CASES SELECTED FOR SILS SURGERY, 79 % (N=580) WERE COMPLETED IN THIS MANNER, THE REST OF 21% (N=156) IMPOSING EITHER THE INSERTION, SUBHEPATIC OR IN ANOTHER AREA, OF AN ADDITIONAL TROCAR, OR THE PLACEMENT OF A SUBHEPATIC DRAIN (SILS+1). OF THE 580 CASES OPERATED BY SILS, 25% (N=145) WERE ACUTE CHOLECYSTITIS. OF THE 156 CASES OPERATED BY SILS+1 - 91.2% (N=142) WERE ACUTE CHOLECYSTITIS, ADVANCED FORMS, THE REST OF 8.82% (N=14) BEING FORMS OF CHRONIC CHOLECYSTITIS, IN PATIENTS ASSOCIATING SIGNIFICANT COMORBIDITIES. NONE OF THE CASES OPERATED BY SILS OR SILS+1 RECORDED SIGNIFICANT INTRAOPERATIVE COMPLICATIONS, NO CONVERSION WAS PERFORMED, THE REMOTE POSTOPERATIVE COMPLICATIONS WERE IN A PERCENTAGE OF 15.44 % (N=38 CASES); RE-INTERVENTIONS (LATE AND EARLY POSTOPERATIVE HEMOPERITONEUM), WERE REPRESENTED BY A NUMBER OF 3 PATIENTS (0.98%).
SILS CHOLECYSTECTOMY CAN BE A FIRST OPTION BOTH FOR CHRONIC AND ACUTE CHOLECYSTITIS; THIS TECHNIQUE ALLOWS THE CONVERSION TO AN ADAPTED FORM (SILS+1) OR TO THE TRADITIONAL LAPAROSCOPIC OPTION ANY TIME.

KEYWORDS: SILS, TRANSUMBILICAL, LAPAROSCOPY.

INTRODUCTION:

After more than 25 years of conventional laparoscopic surgery, on the basis of the minimum-invasive laparoscopy and NOTES[7], another surgerical intervention method has been

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proposed: SILS - single incision laparoscopic surgery[3]. In the last 10 years, at least in the most important European and American university centers, this procedure has tended to become a routine[4]. This work's purpose is to analyse the feasibility of the SILS approach in patients with cholelithiasis, both with chronic and acute forms, the specification of the indications as well as of the limitations of this method[5].

MATERIAL AND METHOD: The study was retrospective, targeting patients operated in the Surgery Clinic of the Euroclinic Hospital Regina Maria, between January 2012 – December 2018.

The study was conducted on a lot of 736 patients operated by a single operative team, with SILS as a first attempt (Figure 1). In patients operated by SILS + 1: they needed an additional trocar placed in the right hypochondrium or a drain tube mounted[6].

Figure 1) Trocars in SILS

[3] Chamberlain RS, Sakpal SV. A comprehensive review of single-incision laparoscopic surgery (SILS) and natural orifice transluminal endoscopic surgery (NOTES) techniques for cholecystectomy. *Journal of Gastrointestinal Surgery* 2009; 13(9): 1733-1740; Ersin S, Firat O, Sozbilen M. Single-incision laparoscopic cholecystectomy: is it more than a challenge? *Surgical Endoscopy* 2010; 24(1): 68-71; Vidal O, Valentini M, Ginesta C, Espert JJ, Martinez A, Benarroch G, Anglada MT, Garcia-Valdecasas JC. Single-Incision Versus Standard Laparoscopic Cholecystectomy: Comparison of Surgical Outcomes from a Single Institution. *Journal of Laparoendoscopic and Advanced Surgical Techniques* 2011; 21(8); Cao ZG, Cai W, Qin MF, Zhao HZ, Yue P, Li Y. Randomized Clinical Trial of Single-incision Versus Conventional Laparoscopic Cholecystectomy: Short-term Operative Outcomes. *Surgical Laparoscopy, Endoscopy and Percutaneous Techniques* 2011; 21(5): 311-313

[4] Chamberlain RS, Sakpal SV. A comprehensive review of single-incision laparoscopic surgery (SILS) and natural orifice transluminal endoscopic surgery (NOTES) techniques for cholecystectomy. *Journal of Gastrointestinal Surgery* 2009; 13(9): 1733-1740

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[6] Cao ZG, Cai W, Qin MF, Zhao HZ, Yue P, Li Y. Randomized Clinical Trial of Single-incision Versus Conventional Laparoscopic Cholecystectomy: Short-term Operative Outcomes. *Surgical Laparoscopy, Endoscopy and Percutaneous Techniques* 2011; 21(5): 311-313

The study did not include a number of 79 cholecystectomies, performed in the same period, by traditional laparoscopy.

The SILS DAPRI – modified cholecystectomy supposes: particular curved reusable instruments (Figure 2), it does not modify the type or the time of the surgery, the surgery does not leave apparent scars – strictly transumbilical incision (Figure 3), compliant with the NOTES principles, it does not induce any additional risk for the patient, it can be converted into standard laparoscopy any time and it is a clinically proven technique[7].

Figure 2) DAPRI Instruments

Figure 3) Ombilical scars after SILS technique

The study was comparative, analysing various statistical indicators, such as: age, gender, associated surgeries, hospitalization duration, postoperative diagnostic, conversion

[7] Hodgett SE, Hernandez JM, Morton CA, Ross SB, Albrink M, Rosemurgy AS. Laparoendoscopic single site (LESS) cholecystectomy. *Journal of Gastrointestinal Surgery* 2009; 13(2): 188-192; Navarra G, Pozza E, Occhionorelli S, Carcoforo P, Donini I. One-wound laparoscopic cholecystectomy. *British Journal of Surgery* 1997; 84(5): 695;
Cao ZG, Cai W, Qin MF, Zhao HZ, Yue P, Li Y. Randomized Clinical Trial of Single-incision Versus Conventional Laparoscopic Cholecystectomy: Short-term Operative Outcomes. *Surgical Laparoscopy, Endoscopy and Percutaneous Techniques* 2011; 21(5): 311-313

rate, mortality, immediate and remote postoperative complications, re-interventions, associated comorbidities, limits and possibilities of SILS laparoscopic cholecystectomy.

Age

The SILS lot included a number of 580 patients operated by this method, with ages between 17 and 84. The average age was 42.91. The median value of age was 41.

The SILS +1 lot included a number of 156 patients, with ages between 26 and 88, the average age being 52.5, without any notable differences recorded between genders.

Gender

Of the 580 patients operated by SILS, 66.1% were females (N=383), and 33.9% males (N=167), stressing the increased incidence of gallbladder lithiasis in women. The average age of the women included in the study was 42.24. The average age of men was 44.20.

The SILS +1 lot of patients studied included 156 patients with the following componence: women 47.1% (N=73) and men 52.9% (N=83), confirming the complexity of cholecystitis cases in men.

SILS technique and associated surgeries:

- Laparoscopic adhesiolysis for pericholecystic or viscero-parietal adherences, in 51.2% of the patients (N=297)
- Appendectomy, in 0.9% of the patients (N=5)
- Ovarian cysts fenestration, 0.6% (N=4)
- Umbilical hernia surgery-monoplan or alloplastic procedure, in 0.6% of the patients (N=4)
- Laparoscopic hepatic biopsy, white line hernia surgery, supra-aponeurosis alloplastic procedure, para-duodenal cyst ablation, varicocele surgery, mesenteric inclusion cyst ablation, total laparoscopic vaginal hysterectomy, surgical sterilization respectively, each of them in 0.34% of the patients (N= 2).

SILS+1 technique and associated surgeries

The surgeries performed in association within the SILS +1 lot were represented by: laparoscopic appendectomy, peritoneal node biopsy-ADK, adnexectomy, each in a female patient representing (0.64 %). In 5.76 % of the cases (N=9), the laparoscopic cholecystectomy also included umbilical hernia surgery, monoplan or alloplastic procedure.

Hospitalization duration

The hospitalization duration for the SILS lot, following surgery, was between 1 and 5 days, with an average duration of 1.18 days.

The hospitalization duration for the SILS +1 lot was between 1 and 6 days, with an average of 2.03 days, without any significant gender differences, being influenced by the complexity of the

(acute) cholecystitis and associated comorbidities. Major pancreatic reaction is the only one associated with an average hospitalization duration of over 3.67 days.

Postoperative diagnostic

Of the 580 patients operated by **SILS**, 75% (N=435) were diagnosed with chronic cholecystitis, the rest of them being diagnosed with acute cholecystitis 25% (N=145), as

follows: out of the 145 cases of acute cholecystitis diagnosed, 30% were catarrhal (N=43), 53% phlegmonous (N= 77), 17% gangrenous (N= 25) (Figure 4)

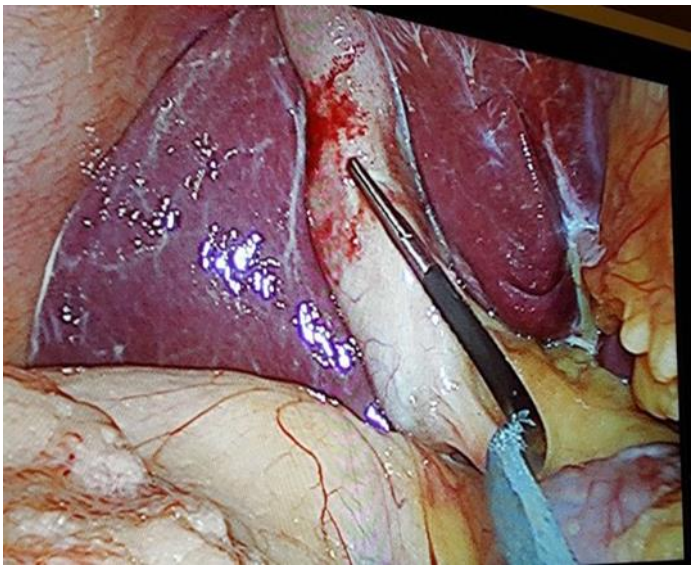

Figure 4) Acute phlegmonous cholecystitis - SILS technique

Gallbladder hydrops associated to a form of acute gangrenous cholecystitis was diagnosed in 16 patients out of the 580 included in the lot (SILS), i.e. in 2.7% of them. Per gender, a slightly increased incidence can be noticed in men, as the gallbladder hydrops was found in 3.6% of them (N=10), as compared to 2.3% of women (N=6).

Chronic sclero-atrophic lithiasic cholecystitis was found in 5.6% (N=24 cases) of the patients.

Of the 156 patients, operated by **SILS+1**, 91.2% were diagnosed with acute cholecystitis (N=142), and the rest of 8.82% (N=14) were diagnosed with chronic cholecystitis. Of the 142 patients, who were diagnosed with acute cholecystitis: 3.22% of the patients presented the edematous and catarrhal forms (N=5), 77.5% the phlegmonous form (N=110) and 19.3% the gangrenous form (N=27);

Approx. 26.5% (N=41) of the SILS +1 lot were diagnosed with gallbladder hydrops in association with a form of acute cholecystitis, 61.11% (N=25) of the patients diagnosed with gallbladder hydrops being men and 38.8% women (N=16).

The average age of patients with gallbladder hydrops was 58.28. Per gender, we noticed an earlier diagnosis of gallbladder hydrops among women, their average age being 52.29, as compared to men, with an average age of 62.09.

Pericholecystitis and postoperative adherence syndrome

In the SILS study lot, 45.8% of the patients (N=266) were diagnosed with pericholecystitis (pericholecystic adhereneces) and postoperative adherence syndrome; 72.8% of them were women (N=194), and 27.2% men (N=72). D

The patients diagnosed with pericholecystitis were between 20 and 76 of age, with an average age of 42.56, without significant gender differences.

A percentage of 63.2% of the 156 patients operated by SILS +1 were diagnosed with pericholecystitis and postoperative adherence syndrome, with various degrees of complexity (N=99), being between 26 and 88 of age, with an average age of 55.19.

All these patients needed lax or tight adhesiolysis.

Per gender, the incidence of pericholecystitis and postoperative adherence syndrome is slightly increased in men, being diagnosed in 66.66% of men (N=66), as compared to women, 33.3% of women, (N=33). The average age of men diagnosed with pericholecystitis was 56.58, and of women, 53.42.

Subhepatic drainage - SILS +1

A subhepatic drainage (N=142) was performed in 91.2% of the 156 patients included in the lot, with ages between 26 and 88 and an average age of 52.65. Of these patients, 54.8% were men (N=85), and 45.2% women (N=15). The average age of men with subhepatic drainage was 52.06, with an age range between 26 and 88. The average age of women with subhepatic drainage was 53.36, their age ranging between 28 and 81.

Choledocian passage:

In regards to the number of patients diagnosed with preoperative choledocian passage for the SILS lot – they were 29, representing 5 % of the patients.

The age of the patients with choledocian passage was between 26 and 82, with an average age of 44.33.

12 % (N=19) of patients included in the SILS +1 study lot were diagnosed with choledocian passage. Of these patients, 73.6% are men (N=14), indicating a higher incidence of choledocian passage among men than women, with an approximate percentage of 26.3% (N=5).

Plastron

16.17% (N=16) of the 156 patients included in the SILS +1 lot were diagnosed with intraoperative pericholecystic plastron. The average age of diagnosed patients is 57.45, with an age range between 42 and 79.

Choledocian lithiasis and posoperative complications in the SILS lot

Choledocian lithiasis association in the SILS lot was identified in 1.89 % of the cases (N=11):

- 0.86 % cases preoperative ERCP (N= 5).
- 1.03 % cases postoperative ERCP (N=6).

Conversions: 0. Mortality:0.

Postoperative complications: 19 cases (3.27%).

A. Immediate complications:

Re-interventions: 2 cases operated by SILS, patients without associated comorbidities, who developped average early postoperative hemoperitoneum a few hours after the surgery (0,34%); emergency exploratory laparoscopy, lavage, hemoperitoneum evacuation, hemostasis control and subhepatic draianage were performed in these patients.

B. Local and remote complications: 17 cases (2.93%): 11 cases of periumbilical hematomas and seromas, postoperative extended algic syndrome), with conservatory

treatment applied and 6 cases of postoperative CBP residual lithiasis, with postoperative ERCP performed.

Choledocian lithiasis and postoperative complications in the SILS +1 lot.

Choledocian lithiasis association in the SILS +1 lot was identified in 16.6 % of the cases (N=26):

- 61.5 % cases preoperative ERCP (N= 16).
- 38.5 % cases postoperative ERCP (N=10).

Associated localized or generalized peritonitis was identified only in the SILS +1 lot: in 5.7% of the cases (N=9).

In all these cases, SILS +1 laparoscopic cholecystectomy was performed in the same hospitalization episode.

Conversions: 0. Mortality: 0.

Postoperative complications: 19 cases (12.17 %)

A. Immediate complications: Re-intervention: one patient (0.64 %), under treatment with oral anticoagulants (Warfarin tb), mitral valve metallic valvuloplasty – Late average postoperative hemoperitoneum (10 days postoperative).

B. Local and remote complications: 18 cases – 11.53 %

- 2 cases- subhepatic residual abscesses, with conservatory treatment applied
- One case of eventration at the level of the umbilical trocar port site (eventration surgery – alloplastic procedure).
- 5 cases: other local minimum complications (periumbilical hematomas and seromas, extended abdominal pain), with conservatory treatment applied.
- 10 cases of CBP residual lithiasis (remote complications), i.e. 6.41% of the patients, with postoperative ERCP performed.

The SILS cholecystectomy is an intervention with extremely fast recovery and a very good cosmetic result.

DISCUSSIONS:

The limits of the technique:

- Elderly patients with comorbidities such as atrial fibrilation, hepatic cirrhosis, chronic consumers of oral anticoagulants, patients with a pro-coagulant status, severe sepsis, with postoperative bleeding risk, such as: hemophilia, thalassemia, when most of the time they need the "postoperative support"- the drainage tube[8].

[8] Lai ECH, Yang GPC, Tang CN, Yih PCL, Chan OCY, Li MKW. Prospective randomized comparative study of single incision laparoscopic cholecystectomy versus conventional four-port laparoscopic cholecystectomy. *The American Journal of Surgery* 2011; 202(3): 254-258

- Patients with advanced forms of acute cholecystitis, of the following type: phlegmonous, gangrenous, in association with gallbladder hydrops, cholecystic plastron, acute lithiasic piocholecystitis, scleroatrophic cholecystitis (an additional trocar and subhepatic drainage were needed)[9].
- Patients who presented unfavorable local pericholecystic and intra-abdominal conditions such as left hemiabdominal viscero-parietal adherence syndrome, hepatomegaly (they needed an additional trocar to support the left hepatic lobe or the placement of a drainage tube as a postadhesiolysis support)[10].
- Patients with significant pedicular local modifications (intense process of wooden pediculitis– the need of an additional trocar for safe identification and dissection of pedicular elements)[11].
- Patients with associated lesions, randomly detected intraoperative, such as: postbulbar perforated ulcer, plate subhepatic plastron, ovarian tumor, incarcerated umbilical hernia, with the need of an additional trocar and postoperative drainage.
- Patients with localized peritonitis, such as: cholecystic, hepatic parietal abscesses, falciform ligament abscess or with generalized peritonitis (severe pancreatic reactions of biliary cause)- a drainage tube was necessary as a support in the peritoneal cavity, to monitor the aspect of the intraperitoneal secretions[12].
- Patients with difficult postcholecystectomy hemostasis at the level of the hepatic bed, who needed an additional trocar and a drainage tube as a postoperative support.
- Relatively high purchase price of instruments.
- After a training period (accumulated time and experience), this technique can become a routine for any surgeon with competences in advanced laparoscopic surgery (as observed and supported in our case by the decrease in the number of SILS +1 surgeries in the last 3 years and the increase of the number of SILS completed surgeries).
- Even though it was not requested within the study, the conversion to traditional cholecystectomy is possible any time[13].

[9] Vidal O, Valentini M, Ginesta C, Espert JJ, Martinez A, Benarroch G, Anglada MT, Garcia-Valdecasas JC. Single-Incision Versus Standard Laparoscopic Cholecystectomy: Comparison of Surgical Outcomes from a Single Institution. *Journal of Laparoendoscopic and Advanced Surgical Techniques* 2011; 21(8)

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CONCLUSIONS:

- SILS cholecystectomy can be a first option both for chronic and acute cholecystitis[14]
- The absence of major complications confirms the feasibility of the method even in correctly selected forms of acute cholecystitis[15]
- This technique allows the conversion to an adapted form (SILS+1) or to the traditional laparoscopic option any time[16].

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[15] Ersin S, Firat O, Sozbilen M. Single-incision laparoscopic cholecystectomy: is it more than a challenge? *Surgical Endoscopy* 2010; 24(1): 68-71; Hodgett SE, Hernandez JM, Morton CA, Ross SB, Albrink M, Rosemurgy AS. Laparoendoscopic single site (LESS) cholecystectomy. *Journal of Gastrointestinal Surgery* 2009; 13(2): 188-192.

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