

## Single-incision laparoscopic appendectomy is comparable to conventional laparoscopic and laparotomic appendectomy: our single center single surgeon experience

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**SUMMARY:** Single-incision laparoscopic appendectomy is comparable to conventional laparoscopic and laparotomic appendectomy: our single center single surgeon experience.

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Several studies have demonstrated the clinical and technical benefits of the laparoscopic surgery for complicated and uncomplicated appendicitis.

Our retrospective study included 12 patient who underwent SILS appendectomy (SILS-A), 14 who received conventional laparoscopic surgery (VL-A), and 12 who received laparotomic appendectomy (O-A); performed in all cases by the same surgeon (C.F). The aim of this study was the comparison between this three different surgical techniques on same features: post operative leukocytosis, post operative pain, need abdominal drainage, esthetic viewpoint, incidence of complication, hospital stay.

The results showed no significant differences between SILS-A and VLS-A, while an evident improvement shows versus O-A, even though not statistically significative. SILS was more effective in decreasing the risk of postoperative wound infection.

KEY WORDS: SILS appendectomy - Conventional laparoscopic appendectomy - Open appendectomy - Post-operative complications.

### Introduction

Laparoscopic appendectomy is now considered the gold standard for appendectomy, even in complicated appendicitis (1). In numerous studies, when the conventional laparoscopic appendectomy (VL-A) is compared with laparotomy (O-A), it has advantages of reduced pain, reduced hospital stay and enhanced aesthetic effect (2). Multiple comparative analyses have recently described single-port or single-incision surgery for treatment of acute appendicitis (3,4).

In studies comparing single-incision laparoscopic surgery for appendectomy (SILS-A) with conventional laparoscopic appendectomy, although early pain was observed, the former was superior from the aesthetic viewpoint, and the incidence of complications was not different.

In this study we examine the application and the safety of SILS-A by comparing single-incision laparoscopic an appendectomy whit a conventional laparoscopic appendectomy and laparotomy.

### Methods

The retrospective study involves 12 patients who received laparoscopic single-port appendectomy (SILS-A), compared with 14 patients who received conventional laparoscopic appendectomy (VL-A) and 12 patients who received laparotomic appendectomy performed by the same surgeon (C.F) at a single institution. Written informed consent was provided by all the patients. Medical records were used to conduct a retrospective comparative analysis of sex, age, body mass index (BMI), duration of hospital stay, bowel movements, presence of complications.

Subjects were diagnosed based on medical history, physical examination, abdominal ultrasonography.

#### Surgical technique

Surgery was performed in all patients after the insertion of a Foley catheter under general anaesthesia.

All patients received a 2<sup>nd</sup> generation cephalosporine intravenously at induction of anaesthesia. After surgery, patients were administered with two or more further doses of antibiotics. The umbilicus was cleaned thoroughly before the incision in cases of la-

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paroscopy. In VL-A a small midline incision inside the umbilicus and the fascia was made and an Hasson's trocar was inserted to obtain pneumoperitoneum at intra-abdominal pressure of 10 to 12 mmHg. A 30°, 5 mm laparoscope was used to visualize the abdominal cavity. A 5 mm trocar was inserted, relying on the laparoscopic light source and avoiding contact with the abdominal wall vessels, in the immediately suprapubic area on both sides of the lower abdomen. Patient position was 20° Trendelenburg and tilted in left lateral position to 15° to 20° to secure easy access to the appendix. The operation was performed using the standard procedures of laparoscopic appendectomy. The mesoappendix was dissected by ultrasonic shears (Ultracision, Ethicon Endo-Surgery Inc., Cincinnati, OH, USA), and the base of appendix was ligated using two endoloops (Ethicon Inc., Sommerville, NJ, USA) and cut with Ultracision. The resected appendix was removed through the Hasson's trocar with the aid of a bag (Endocatch, Ethicon Endo-Surgery Inc., Cincinnati, OH, USA). The umbilical fascia was closed with 2-0 Vicryl sutures, and the umbilical and suprapubic skin sutures was made with 3-0 silk stitches. When request a drain tube was inserted through the right 5mm suprapubic trocar.

In SILS-A a 2-2,5 cm longitudinal incision was made through the umbilicus and the fascia and peritoneum were opened under direct vision. The SILS port (Covidien, Norwalk, CT, USA) was then inserted with three 5 mm cannulas at different heights to reduced clashes between their own, and CO<sub>2</sub> insufflated through a three way catheter to achieve pneumoperitoneum. Patient position and surgical technique performed with basic laparoscopic instruments, was the same that in VLS-A. Drain tube was inserted through an adjunctive 5mm trocar positioned in the right iliac fossa.

The surgical technique in O-A was that described by McBurney with transverse incision in the right suprapubic area (Kustner incision). Drainage was inserted through another incision below.

All patients were allowed a clear fluid diet after subjective full recovery from general anaesthesia; and diet was advanced as tolerated.

## Results

All of 12 SILS-A patients were female, 11 (91,6%) aged <30 and 1 (8,4%) from 61 to 70 years old, mean age 23,3 years. 6 (42,8%) of the VLS-A patients were male, 8 (57,1%) female; 10 (71,4%) aged from < 20 to 30 and 4 (28,5%) from 41 to 80 years old, with mean of 34,16 for male and 32,12 for female. Of O-A group 7 (58,3%) were male and 5 (41,6%) female with age from <20 to 30 in 9 patients (75%), 2 (16,6%) from 41 to 60 and 1(8,4%) from 71 to 80 years old; mean age was 38,6 for male and 17,2 years for female. 2 of O-A, 6 of VLS-A and 11 of SILS-A group had normal BMI, 7, 4 and 0 respectively was overweight, 1 for each one obese (Table 1).

Postoperative period was characterized by fever only in 4 (30%) of 12 cases of SILS-A, 6 (43%) of the 14 VLS-A and 5 (42%) in O-A. 58,3 % of SILS-A had neutrophil leukocytosis in the 1<sup>st</sup> post-operative day (from 11.05 to 14.48 x10<sup>3</sup> u/l), as 42% in VLS-A (from 11.47 to 26.36 x10<sup>3</sup>u/l), and 41,6% in O-A group (from 9.25 to 21.83 x10<sup>3</sup>). The leukocytosis

decreased in 2<sup>nd</sup> post-op day in all groups. Abdominal drainage was placed in 3 (25%) of SILS-A cases and in 3 (21,4%) of VLS-A; in each of that cases it was removed in 2<sup>nd</sup> postoperative day. The drainage placed in 4 (33,3%) of O-A cases was removed in 2<sup>nd</sup> p.o.d. in 1(25%) of it, in 7<sup>th</sup> in another 1(25%) and in 2 (50%) in 3<sup>rd</sup> p.o.d. Stool passage occurred in 58,3% (7/12) of SILS-A and in 57,1% of VLS-A (8/14) during p.o.d. two; in 4/12 (33,3%) of O-A in p.o.d. three.

In 2 cases of SILS-A group also ovarian benign cysts were removed. In the VLS-A an haemorrhagic ovarian cyst in one case, and a 6 mm nodule of the cecum (negative for neoplasia) in another case were removed. In O-A group derotation of a volvulus of sigma (detected by a CT scan), and excision of an ovarian cyst were made.

Sutures of surgical wounds were removed in 8<sup>th</sup> postoperative day in all groups. None of the SILS-A patients show a wound complications. In VLS-A one case of FID abdominal wall abscess; a wound seroma in O-A.

Mean hospital stay was 3,5 days in VLS-A, 4 days in SILS-A and in O-A.

In immediate postoperative days we had a good pain control, as after the discharge. We observed postoperative complications in 1 (7,1%) of VLS-A, a pelvic peritonitis treated with laparotomy and abdominal drainage and discharged in 10<sup>th</sup> p.o.d.; 1 (8,3%) of O-A group, a IMA arose during the 4<sup>th</sup> p.o.d. and the patient was transferred to UTIC.

## Discussion

Laparoscopic appendectomy is widely performed for the treatment of acute appendicitis. Single port laparoscopic appendectomy is rapidly gaining momentum due to improved cosmesis and reduced parietal trauma. In our study the clinical data of SILS-A was comparable to that of conventional laparoscopic appendectomy, with no significant differences in hospital stay, bowel movements, return to diet and complication rate.

Clinical evidence and consensus development conferences have stated, so far, some evidence regarding the advantages of VLS-A when compared to open appendectomy (O-A). In comparison with a laparotomy, laparoscopic appendectomy reduces postoperative pain. It reduces not only the tissue injury of patients but also irritation of the intestine and, thus, reduces adhesion that may occur after surgery.

The same was found in our data comparing SILS-A, VLS-A and O-A.

This type of surgery can be a very attractive al-

TABLE 1 - FEATURES AND RESULTS.

GENERAL CHARACTERISTICS		SILS-A	VLS-A	O-A
Gender	Female	12	8	5
	Male	0	6	7
Mean age (years)	Female	23,3	32,1	17,2
	Male	--	34,1	38,5
BMI	Normal	11	6	2
	Overweight	0	4	7
	Obese	1	1	1
	No	0	3	2
POST-OPERATIVE CHARACTERISTICS		SILS-A	VLS-A	O-A
Fever		4	6	5
Abdominal drainage		3	3	4
Drainage removal	II post-op day (p.o.d)	3	3	1
	III post-op day (p.o.d)	0	0	1
	VII post-op day (p.o.d)	0	0	2
Mean hospital stay (days)		4	3,5	4
Surgical wound complications	FID abdominal wall abscess	0	1	0
	Wound seroma	0	0	1
Post-operative complications	IMA (IV p.o.d)	0	0	1
	Pelvi-peritonitis	0	1	0

ternative to patients, especially in the younger population. As laparoscopic minimal invasive surgery draws attention, interest in non-scar surgical methods is on the rise, and together with the development of equipment single incision surgical methods have been applied to diverse disease in the abdominal cavity. Single Incision Laparoscopic Surgery for an appendectomy makes an incision window through the umbilicus in most cases. It is applied because the umbilicus is located in the middle of the abdomen, so diverse intrabdominal approaches can be performed, blood vessels and nerves are absent, so incision windows can be readily created; even after surgery, wounds became depressed within the umbilicus and, thus, may be considered as a congenital existing scar.

Reviewing the reports that compared SILS-A with VLS-A, the former was found to reduce scars, thus it is advantageous from cosmetic improvement. The aesthetic satisfaction level was not statically significant in single incision laparoscopic surgery for an appen-

dectomy. However, in patients who underwent SILS-A statistically significant satisfaction levels were shown in literature, in comparison with patients who underwent VLS-A or O-A.

Some cases may require drainage, making the term "single port" meaningless. Although there have been reports of drainage catheters put through the umbilicus, we chose to add a sovrapubic incision.

In conclusion, no significant differences were found when parameters compare between SILS-A and VLS-A, while an evident improvement shows versus O-A, even though not statistically significant. SILS-A and VLS-A showed not much difference in relation to surgical outcomes and performance, but SILS was more effective in decreasing the risk of postoperative wound infection.

Because of the small number of patients compared between the three techniques, supplementary studies need to be performed in the future to acquire more objective results.

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