Journal of Pediatric Surgery (2011) **46**, 704–707

ELSEVIER

Journal of Pediatric Surgery

www.elsevier.com/locate/jpedsurg

Single center experience in single-incision laparoscopic surgery in children in Turkey

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Received 28 July 2010; revised 13 September 2010; accepted 4 October 2010

Key words:
SILS;
Minimal invasive surgery;
Children;
Single incision;
Laparoscopy

Abstract

Purpose: Minimally invasive surgery has evolved into single-incision laparoscopic surgery (SILS) in the recent years. Few reports have addressed the practicality of SILS in children. Our current experience with regard to feasibility and effectiveness of SILS in children is presented.

Methods: A retrospective review of the operative database for patients operated on using SILS in our department from March 2009 to July 2010 was performed. Data regarding the type of the procedure, age, sex, operative performance, hospital stay, and complications were collected.

Main Results: Among 43 patients, cholecystectomy was performed in 11; appendectomy, in 10; unroofing for ovarian cysts, in 5; unroofing for splenic cysts, in 4; oophorectomy, in 6 (ovarian torsion, 2; teratoma, 4); ovary-preserving teratoma excision, in 1; splenectomy, in 1; gonadectomy, in 3; and varicocelectomy, in 2. There were no conversions to standard laparoscopic or open techniques. The only postoperative complication was a wound infection that occurred after an appendectomy.

Conclusion: Although currently more expensive, SILS can be performed in children in almost every pediatric surgical procedure that can be accomplished with conventional laparoscopic techniques. The most significant contribution of SILS procedure is cosmesis. Postoperative pain and length of hospital stay were not improved.

Minimally invasive surgery (MIS) has progressed rapidly in the last 2 decades. Minimally invasive surgery has become the gold standard approach in many surgical conditions. Because of the development of smaller instruments, a wide spectrum of surgical problems in children has been performed by laparoscopic surgery. However, the desire to seek perfection for smaller scars, less pain (preferably in a single site), shorter recovery, and earlier resumption of routine activity has led to the performance of laparoscopic procedures through a single small incision. Several reports concerning the feasibility of single-incision laparoscopic surgery (SILS) in various procedures (ie, cholecystectomy, appendectomy, gastric banding, splenectomy, and gynecologic procedures, etc) in adults have appeared in the literature [1,2]. However, there are only a few scarce reports regarding the use of this novel technique in children [3-5]. This study reviews our initial results with SILS procedure in 43 children.

1. Patients and methods

A retrospective review of the operative database of all patients operated by SILS technique at Ege University Department of Pediatric Surgery from March 2009 to July

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0022-3468/$ – see front matter © 2011 Elsevier Inc. All rights reserved.
doi:10.1016/j.jpedsurg.2010.10.004

2010 was performed. Data regarding the type of the procedure, age, sex, operative performance, hospital stay, and complications were collected.

Single-incision laparoscopic surgery was performed by experienced laparoscopic surgeons. The procedure required some box training to adjust to the principles and the use of articulating instruments during SILS.

After induction of general anesthesia and preparing and draping the patient, a semicircular intraumbilical skin incision (3- to 9-o'clock position) was performed. The surgical site (ie, pelvic, upper, or lower quadrant, etc), volume of the peritoneal cavity of the child, and length of the devices need to be considered before beginning the operation. After the skin incision, the peritoneal cavity is entered through a 2-cm midline vertical (*linea alba*) fasciotomy. The SILS port (Covidien, Mansfield, Massachusetts, USA) is inserted using a curved Rochester-Carmalt clamp to grasp the inferior aspect of the port. Insertion is facilitated by using sterile lubricating gel. The SILS port is a pulley-shaped, single, elastic, and flexible port and can fit through a 2-cm fascial incision. The port has 3 trocar sites in addition to an insufflation tubing, which can accommodate trocars 5 to 12 mm in size. A 15-mm EndoCATCH port (Covidien, Mansfield, MA) may also be placed if one of the trocars is removed. The compressibility and elasticity of the elastic polymer of the port allow access by expansion and permit easy use of trocars without any air leak. Both conventional and articulating instruments may be used during surgery.

Cholecystectomy, a basic procedure of conventional laparoscopy, may become a challenge with SILS because of both loss of triangulation and difficulty in maintaining exposure of the operative site. Upward and posterior retraction of the liver is provided by placing a 2/0 polypropylene transverse stay suture through the corpus of gall bladder [6,7]. Similarly, during splenectomy, the stomach may need to be held away from the operative site by a stay suture to better expose the vascular pedicle.

The umbilical incision is large enough to remove the surgical specimen without any need to extend the incision. The Endocatch may be used for removal of the infected material (ie, appendix) and spleen by crushing the material within the bag without spillage or an ovarian mass.

The midline fascia and the skin are closed in an orderly fashion with absorbable sutures after infiltration of local anesthesia with prilocaine and bupivacaine for analgesia [8].

Postoperative pain at the umbilical incision site was assessed by a visual analog pain scale for children [9] to determine the need for additional administration of analgesics. Shoulder pain for those who were old enough to express themselves was assessed independently.

Cost analysis of the SILS procedure was calculated as total operative charges for the procedure(s) and compared with similar procedures performed by other surgeons in our department using conventional laparoscopic surgery during the study period.

All patients/parents were similarly asked about their opinion about the incision and cosmesis after surgery, and their answers were recorded.

2. Results

There were 43 patients operated by SILS for a wide variety of procedures. These included cholecystectomy (11), appendectomy (10), unroofing for ovarian cysts (5), unroofing for splenic cysts (4), oophorectomy (ovarian torsion, 2; teratoma, 4), teratoma excision with ovarian conservation (1), splenectomy (1), gonadectomy (3; for sexual differentiation disorder), and varicocelectomy (2).

Operative time ranged from 10 to 200 minutes depending on the type of the procedure (Table 1). There were no conversions to conventional laparoscopic or open techniques. The only postoperative complication was a wound infection that occurred after an appendectomy. This patient

Table 1 Demographic data of the SILS procedures

Procedure	No. of patients	Mean age	Mean operative time (min)	Mean postoperative stay (d)
Cholecystectomy	11	9.6 (4 mo-17 y)	56 (25-120)	1
Appendectomy	10	8.3 (1-15 y)	41 (18-68)	1.6 (1-2)
Unroofing				
Ovarian cyst	5	13 (7-17 y)	19 (10-22)	1
Splenic cyst	4	12 (10-14 y)	48 (28-64)	1.5 (1-2)
Gonadectomy	3	11 (1-16 y)	25 (23-29)	1.5 (1-2)
Splenectomy	1	14 y	200	3
Varicocelectomy	2	11 y	22 (20-24)	1
Oophorectomy				
Ovarian torsion	2	12.6 (7-16 y)	36 (32-40)	2
Teratoma	4	16 (15-17 y)	29 (18-37)	2 (1-3)
Ovary-preserving teratoma excision	1	16 y	19	1