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Original research

Single incision laparoscopic resection for diverticulitis

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HIGHLIGHTS

- Large Cohort of patients.
- Effectiveness of SILS sigmoidectomy for diverticular disease on a routine basis.
- Feasibility of SILS sigmoidectomy in patients with perforation at presentation.
- Technically feasibility of SILS sigmoidectomy in patients with high BMI.
- Technically feasibility of SILS sigmoidectomy in patients previously operated.

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ABSTRACT

Background: Laparoscopic sigmoidectomy is the standard procedure in elective surgery for recurrent diverticular disease. Recently, Single Incision Laparoscopic Surgery (SILS) have been developed as the next generation technique of minimally invasive surgery. SILS advantages include reduced surgical trauma due to reduction in the number of surgical incisions, faster recovery times, and reduced hospitalization. However, the use of SILS in colorectal surgery is technically demanding and requires expert surgeons, which has hampered the reproducibility and the diffusion of this technique.
Methods: Between October 2009 and August 2013, 488 consecutive patients were referred to Evangelisches Hochstift Hospital (Worms, Germany) and/or Stadt Klinikum Frankental Hospital (Frankenthal, Germany) for sigmoidectomy for diverticular disease. SILS sigmoidectomy via the umbilicus was performed in 484/488 cases. Clinical outcomes such as the rate of conversion to standard laparoscopy and/or to open surgery, operation time, post-operative complications and hospitalization time were recorded.
Results: SILS sigmoidectomy was successfully completed for 484 out of 488 patients. SILS was converted to standard laparoscopy in 3 patients (0.6%) and to an open procedure in 1 patient (0.2%). Median time for the procedures was 103.26 min (range, 52–156 min). No mortalities or major complications were noted. The average hospitalization period was of 5 days.
Conclusion: Our work demonstrates that SILS sigmoidectomy via the umbilicus is effective in the treatment of patients affected by diverticular disease on a routine basis and, moreover, is technically feasible also in patients who have been subjected to previous abdominal surgery, with high Body Mass Index and/or patients with perforation at presentation. Thus this procedure represents a valid alternative to standard laparoscopy.

1. Introduction

Laparoscopic surgery for colorectal resections has been shown to present several advantages in comparison with standard open approach, including shorter recovery time, faster return to normal bowel function, reduction of post-operative pain and of wound-related complications [1–3].

In recent years several studies have demonstrated the safety, feasibility and effectiveness of the standard minimally invasive surgery (laparoscopy) approach for diverticular disease [4], and, for these reasons, laparoscopic colectomy has replaced open resection as standard surgery for recurrent and complicated diverticulitis [5,6].

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However, in order to further reduce surgical trauma due to multiple surgical incisions, Natural Orifice (NOTES) [7] and/or transumbelical surgery called Single Incision Laparoscopic Surgery (SILS) have been offered to patients as the next generation of minimally invasive surgery [8–11]. Accordingly, several reports have appeared since 2007 showing advantages and disadvantages of SILS, though no conclusive indication on the benefits of SILS approach to diverticular disease have been reached so far. In particular, the technical difficulties in performing safe anastomosis and specimen removal as well as the lack of reproducibility on a routine basis, have hampered the development of SILS in colorectal surgery worldwide [12], Moreover most studies on SILS in colorectal surgery present relatively small cohorts of patients (<30) [13–15] and in those studies with more numerous cohorts, patients have been recruited from differents teams of surgeons [16,17]. In this study we report on our experience in the use of SILS for surgical treatment of patients (n = 488) affected by diverticular disease, recruited from 2009 to 2013 and operated by the same team of surgeons.

2. Methods

2.1. Patients

From October 2009 to August 2013, 488 patients (176 men and 312 women) underwent sigmoidectomy by SILS for recurrent diverticular disease at Evangelisches Hochstift Hospital (Worms, Germany) and at Stadt Klinikum Frankental Hospital (Frankenthal, Germany). Procedures were performed by A.R. and F.U.Z. Patients were considered eligible for surgery if they had 4 episodes of diverticulitis before admission since these patients presented fewer postoperative complications like previously described [18], or after an episode of complicated diverticulitis. The diagnose of diverticulitis was made, based on the combination of symptoms and radiology 0.357 patients had a history of one or more previous abdominal surgeries with 61 patients having been subjected to multiple operations. The characteristics of the patients are summarised in Table 1. General epidemiologic data, clinical findings, surgical treatment, histopathological examination and follow up data were collected prospectively and analysed retrospectively.

Before operation every patient underwent to mechanical bowel preparation with sodium phosphate and received two doses of perioperative parenteral antibiotics.

The median American Society of Anesthesiology (ASA) score was 3. Patients were followed up at least 3 years. In the first post-operative year the patients were checked at 3–6 and 12 months respectively and at 6 months intervals thereafter with physical examination, abdominal ultrasonography and rectoscopy. Patients were followed by A.R. and F.U.Z.

Every patient was informed about the new technique and provided written consent.

2.2. Surgical technique

SILS Sigmoidectomy (SILSTM) was performed with modified procedure based on the technique described by Westveber et al. [15]. Briefly, patients were positioned in a steep Trendelenburg tilt with divaricated legs. After disinfection, the incision was performed from the cranial to the caudal edge of the umbilicus. After the opening of the white line (approximatively 2.5 cm), a wound protector (Alexis, Applied Medical, Rancho Santa Margarita, CA, USA) was introduced in place for the whole procedure, to prevent contamination. Subsequently, the SILSTM port system with three port cannulas (for 5- to 12-mm instruments) (Single-Incision Laparoscopic Surgery Port PT 12/Autosuture, Covidien, Dublin Ireland) was inserted into the incision (Fig. 1). In all cases SILS sigmoidectomy was performed by using standard non-articulating laparoscopic instruments. And the 50-cm-long, 30°, 5-mm laparoscope (Storz, Tuttlingen, Germany)

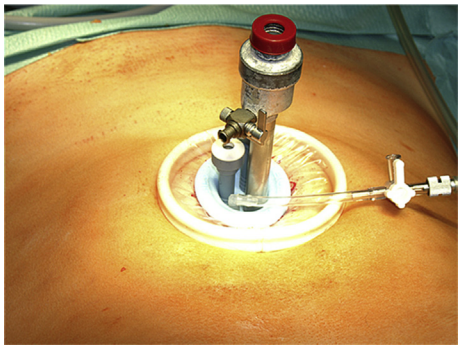

Fig. 1. The Wound Retractor (applied medical) and the SILS port system (Covidien) used in this study.

Table 1
Characteristics of patients.

Number of patients	488	
Gender	Males: 176	(36.1%)
	Females: 312	(63.9%)
Median age	60.87 years	(Range 34–90)
Median MBI	29 kg/m^2	(Range 20–42)
Previous operations	357	(73.3%)
- Appendectomies	122	25%
- Cholecistectomies	72	18.7%
- Histerectomies	37	7.63%
- Cesarean sections	106	21.8%
Presentation with cover perforation	305	62.5%
Conversion to standard laparoscopy	3	0.6%
Conversion to open surgery	1	0.2%
Median operative time	103.26 min	(range 52–156)
Median		
Post-operative complications	3	0.6%
- Major	0	
- Minor	3 Haemathoms	0.6%
Median post-operative in-hospital stay	5	(range 4–8)
Drenage	4	0.8%
Median resected Specimen length	19.5 cm	(range15, 5 cm–22 cm)