LESS (laparo-endoscopic single-site surgery) right hemicolectomy

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Abstract

Laparo-endoscopic single-site surgery (LESS) is a step toward an even less invasive surgical procedure. LESS is being performed for a wide variety of procedures. Use of a natural scar, the umbilicus, for introduction of the trocar improves the cosmetic effect. We describe LESS right hemicolectomy. Hospital stay was 3 days and no postoperative complications were observed. LESS colectomy can provide satisfactory oncological resection.

Key words: *LESS, right hemicolectomy, laparo-endoscopic single site surgery, minimally invasive surgery.*

Introduction

The last two decades were marked by continuous efforts of surgeons to minimize perioperative trauma. Minimally invasive techniques and the technology attributed to them are quickly gaining a strong position in contemporary surgery. Laparoscopic surgery during these years has become a classical method of surgical treatment. Two brand new surgical techniques appeared in the 21st century: NOTES (natural orifice transluminal endoscopic surgery) and LESS (laparo-endoscopic single-site)/ SILS (single incision laparoscopic surgery). Other names are also used in the literature for this procedure: SAS (single access site), SPL (single port laparoscopy), SPA (single port access), SSA (single site access) and OPUS (one port umbilical surgery) [1]. LESS/SILS technique utilizes the umbilicus – a natural scar resulting from fetal life – as an entry site to the peritoneal cavity [2-4]. Such access does not necessitate another scar of the abdominal tegument and only uses an existing one. The cosmetic effect of this incision is perfect. The scar inside the umbilicus is practically invisible. Yet, use of the umbilicus as a natural scar and the cosmetic result are not the only benefits of LESS/SILS. The possibility to access any organ within the peritoneal cavity is another important feature and makes a qualitative change in comparison to classic/open surgery and laparoscopy, where the operative wound must be tailored to the organ operated on and operative ports/trocars should be positioned accordingly.

Case report

On 5 June, 2009 we performed right hemicolectomy for adenocarcinoma of the caecum. The patient was a 51-year-old male with BMI of 27.5 kg/m² and ASA I, without history of previous surgery. He was diagnosed with anaemia on routine lab test. Colonoscopy revealed tumour of the caecum. Computed tomography showed neither distant metastases nor adjacent tissue infiltration. The patient's bowel was prepared with three Macrogolum sachets. 'One shot' antibiotic (2 g of cefotaxime) prophylaxis was used.

The procedure was performed under general combined anaesthesia in the supine position, with rotation of the operating table to the patient's left to make sure that the bowels would fall to the left side. The operator and first assistant stood at the patient's left side. Another assistant remained on the right,

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Figure 1. Position of TriPort (photo P. Lech)

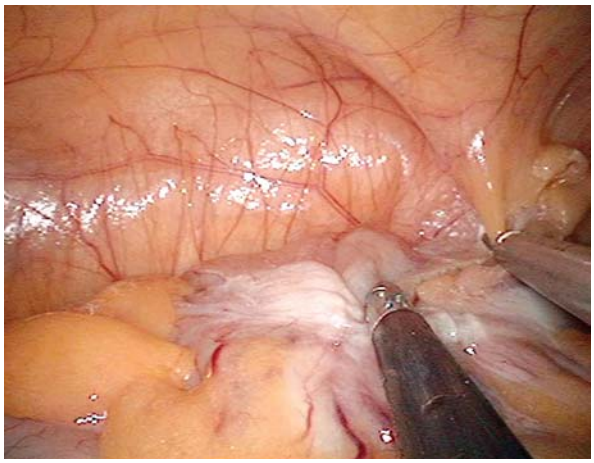

Figure 2. Preparation of ascending colon (photo P. Lech)

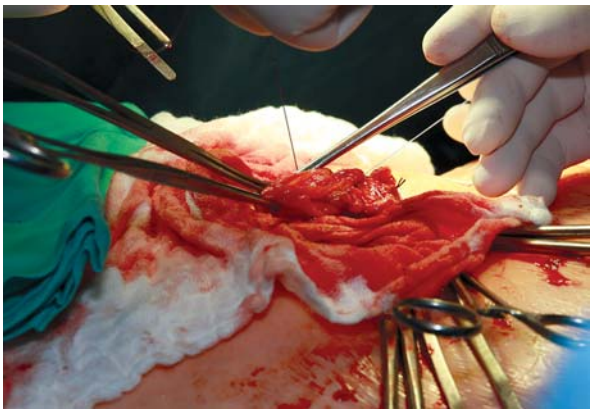

Figure 3. Hand-sewn anastomosis of the bowel (photo P. Lech)

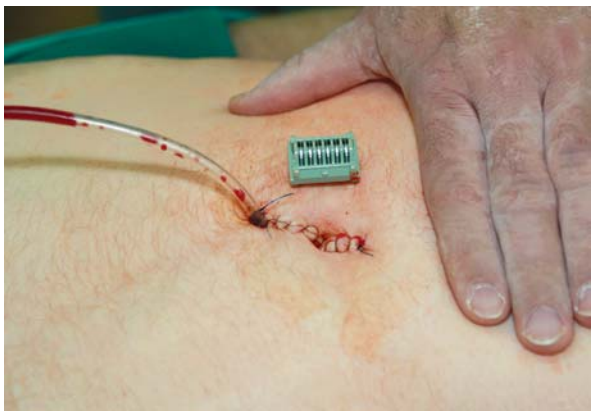

Figure 4. The umbilicus after reconstruction (photo P. Lech)

where also the laparoscopic tool set was placed, vis-à-vis the surgeon and first assistant.

The procedure was begun by turning out the umbilicus over the abdominal wall. Then, the umbilicus was cut longitudinally for the length of 2 cm. A trocar with a TriPort (gel port, Olympus) was placed within the peritoneal cavity (Figure 1). Following port implantation and sealing within the wall, inspection of the peritoneum was performed. Ten-millimetre telescope and classical laparoscopic 5 mm tools were used. Haemostasis and dissection were accomplished with a disposable 5 mm harmonic scalpel (Johnson & Johnson). The caecum and distal ileum were exposed (Figure 2). The procedure was commenced with the vascular stage, i.e. preparation of the ileocolic and right colic arteries. Vessels were transected with the harmonic scalpel and preparation of the distal ileum, caecum and ascending colon was continued. The hepatic flexure and proximal transverse colon were freed. As soon as the right hemicolon had been mobilized, the pneumoperitoneum was released and the distal ileum, caecum, ascending colon and proximal transverse colon were pulled outside the abdomen. The right hemicolon was excised and end-to-end anastomosis of the ileum and transverse colon was performed with single-layer full thickness running suture (Figure 3, 4). Free passage through the anastomosis was confirmed. The excised fragment was sent for pathology. Redon drainage was placed within the peritoneal cavity in proximity to the bowel anastomosis, layers of the abdominal wall were sutured and the umbilicus was invaginated. The procedure lasted 75 min. The patient was mobilized

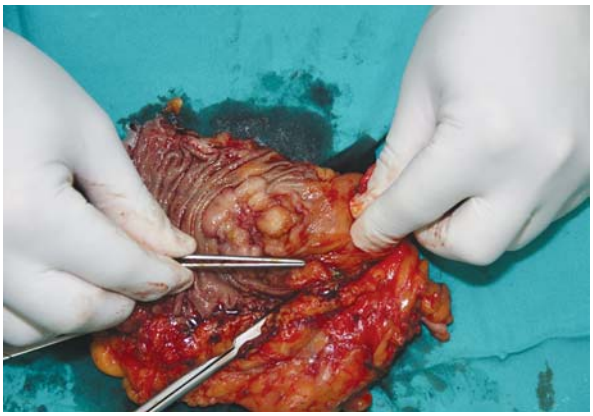

Figure 5. Transsection of the tumour (photo P. Lech)

Figure 6. TriPort (Olympus) (photo P. Lech)

in the evening of the day of surgery. Fluids were administered orally on the first post-operative day. The patient required intravenous analgesia on the day of surgery and the following day. On the third post-operative day he was discharged home and taken care of by an oncologist. Histopathology of the excised specimen revealed poorly differentiated, partly mucinous tubular adenocarcinoma.

The procedure was performed with classical, straight laparoscopic tools. Hence, a lean patient with no history of previous surgery and a small tumour in a convenient location had been chosen (Figure 5). Abdominal access through the umbilicus with an Olympus trocar and TriPort/gel port is very easy (Figure 6). The TriPort does not need additional sealing trocars. Air tightness at the beginning of the procedure is very good. Unfortunately, during the procedure tightness of the ports decreases and they are no longer air-tight. Navigation within the peritoneum is also satisfactory. Triangulation with straight tools is somewhat complicated. Such tools as harmonic scalpel (Johnson & Johnson), SonoSurg (Olympus) or LigaSure (Covidien) are mandatory for preparation and haemostasis. They limit the need for tool changes and problems with air tightness. Perfect cooperation of the surgeon and assistant operating the video camera is a must. The camera's telescope ought to be introduced into the peritoneum only minimally, so as not to affect mobility and tools' operating range. Tool mobility is high due to the possibility to change the TriPort direction freely, but triangulation is limited and hence scarce tissue extension. We have not found it difficult to follow oncological excision rules of the right hemicolon. This is true for any stage of the procedure, from closure of the vessels to extent of excision.

During the surgery, only 5 mm tools are used due to construction of the TriPort, yet this is not another difficulty as long as one remembers it when deciding to perform the LESS/SILS procedure. For instance, a 5 mm clip applier must be among the OR instruments. A single incision and single port placed within the umbilicus grant access to the whole abdominal cavity. This is why LESS/SILS operative techniques have gained so much popularity in many surgical specialties. Gynaecologists were the first to use single umbilical incision in 1969 for ligation of the salpinx [5]. Urologists have shown the applicability of this technique for total and partial kidney resection, renal pelvis plasty, lithotripsy and radical prostatectomy [6]. In general surgery LESS/SILS is popular in cholecystectomy [7, 8] and appendectomy [9]. Some cases of sleeve gastrectomy [10], adjustable gastric banding [11], and right hemicolectomy (two cases by Bucher *et al*. [12] and Remzi *et al*. [13]) or sigmoidectomy (a single case by Bucher *et al.* [14]) have also been described. Contrary to the aforementioned case, all three reported cases of large bowel excision through single access in the umbilicus concerned non-malignant changes. Right hemicolectomy performed by Bucher was performed for a 5-cm wide ascending colon polyp with high grade dysplasia [12]. The procedure was executed with a 12 mm port (Endopath Xcel Trocar, Ethicon Endo-surgery, Spreitenbach, Switzerland) with 10 mm laparoscope and 6 mm working port and transtegumental sutures for large intestine stabilization throughout the procedure. Anastomosis was

performed outside the abdominal cavity. The procedure described by Remzi concerned an endoscopically non-resectable polyp of the caecum and was done with a Uni-X™ (Single-Port Access Laparoscopic System, Pnavel Systems, Morganville, New Jersey, USA) port and special set of angled laparoscopic tools [12]. Likewise, anastomosis of the bowel was performed outside the abdominal cavity.

The case we have described here was adenocarcinoma of the caecum. To our knowledge it is the first described clinical case of surgical treatment of a malignant tumour with LESS. Application of the TriPort (Laparo-Endoscopic Single-Site Surgery, Olympus) allows for easier manoeuvring with standard laparoscopic tools in such a complicated procedure as right hemicolectomy. No doubt tools with flexible tips would facilitate the whole operation, but they are not necessary for an experienced laparoscopic surgeon. As it is still an early stage of LESS/SILS development, scant support from the literature is another obstacle. Available data are sparse, making theoretical preparation for the procedure challenging [15, 16]. In our centre we based preparations on our expertise in advanced laparoscopic surgery including 300 laparoscopic large bowel and rectum resections, 8 cases of NOTES procedures and hybrid technique surgeries. We have also participated in LESS/SILS workshops in Brussels, Elancourt (4 times), Strasbourg and Athens.

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