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Laparoendoscopic single-site surgery for the treatment of different urological pathologies: Defining the learning curve of an experienced laparoscopist

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Learning curve;
LESS;
Single port;
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ABBREVIATIONS

ASA, American Society of Anesthesiologists;
BMI, body mass index;
EBL, estimated blood

Abstract ***Objectives:*** To define the learning curve of laparoendoscopic single-site surgery (LESS) of an experienced laparoscopist.

Patients and methods: Patients who had LESS, since its implementation in December 2009 until December 2014, were retrospectively analysed. Procedures were divided into groups of 10 and scored according to the European Scoring System for Laparoscopic Operations in Urology. Different LESS indications were done by one experienced laparoscopist. Technical feasibility, surgical safety, outcome, as well as the number of patients required to achieve professional competence were assessed.

Results: In all, 179 patients were included, with mean (SD) age of 36.3 (17.5) years and 25.4% of the patients had had previous surgeries. Upper urinary tract procedures were done in 65.9% of patients and 54.7% of the procedures were extirpative. Both transperitoneal and retroperitoneal LESS were performed in 92.8% and 7.2% of the patients, respectively. The intraoperative and postoperative complication rates were 2.2% and 5.6% (Clavien–Dindo Grade II 3.9% and IIIa 1.7%),

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loss;
LESS, laparoendoscopic single-site surgery;
VAS, visual analogue scale

respectively. In all, 75% of intraoperative complications and all conversions were reported during the first 30 LESS procedures; despite the significantly higher difficulty score in the subsequent LESS procedures. One 5-mm extra port, conversion to conventional laparoscopy and open surgery was reported in 14%, 1.7%, and 1.1% of the cases, respectively. At mean (SD) follow-up of 39.7 (11.4) months, all the patients that underwent reconstructive LESS procedures but one were successful.

Conclusion: In experienced hands, at least 30 LESS procedures are required to achieve professional competence. Although difficult, both conversion and complication rates of LESS are low in experienced hands.

Introduction

Laparoendoscopic single-site surgery (LESS) was recently introduced in the field of minimally invasive urological surgery, aiming to further reduce postoperative pain, shorten hospital stay, and improve cosmesis [1–3]. Despite its technical difficulty, which limits its applications to experienced laparoscopists, LESS may be regarded as an emerging trend in minimally invasive urological surgery that has significantly evolved and became widely applicable in a relatively short time [3].

Attempting to share experiences of LESS and to outline its technical feasibility, difficulties, complications and outcomes, multi-institutional studies were recently reported including most of the centres that pioneered LESS worldwide [3–6]. These studies proved that LESS is at least comparable to well-established conventional laparoscopy. However, to date no single published report has highlighted the learning curve of LESS for an experienced laparoscopist to achieve professional competence. Therefore, we present for the first time a learning curve for LESS for an experienced laparoscopist for the treatment of different urological pathologies in different age groups.

Patients and methods

This retrospective study included 179 consecutive patients, with different urological pathologies, who were indicated for laparoscopy and were treated with LESS since its implementation at our institute in December 2009 until December 2014. All patients gave an informed consent for LESS. Exclusion criteria included absolute contraindications to laparoscopy and children aged <3 years. Procedures were scored according to the European Scoring System for Laparoscopic Operations in Urology [7]. Data were collected in a standard data sheet and all procedures were approved by our Ethical Care Committee. All LESS procedures were done by one experienced laparoscopist (A.M.A.) with an advanced laparoscopic background. To outline the learning curve for the laparoscopist, consecutive procedures were divided into groups of 10 and each group was analysed and the different groups were compared.

Outcome measures

Demographic data of patients included age, gender, body mass index (BMI), past history of (abdominal/pelvic) surgery, American Society of Anesthesiologists (ASA) score, associated comorbidities, and indication for LESS. Procedures were divided as either ablative or reconstructive, and either upper urinary tract or pelvic. The operative data analysed were: operative time, estimated blood loss (EBL), intraoperative complications, and blood transfusion. Data of the surgical procedure included: type of single-port device, type of instruments, access technique (single-port or single-incision/single-site), port-insertion site (umbilical or extra-umbilical) and approach (transperitoneal or retroperitoneal). Adding an extra ≥ 5 mm trocar was regarded as conversion to reduced-port laparoscopy [8]. Also, conversion to conventional laparoscopy or open surgery was recorded. Postoperative data included: hospital stay, visual analogue scale (VAS) pain score at discharge and postoperative complications during the hospital stay and within the first 3 months postoperatively. Postoperative complications were graded according to the Clavien–Dindo system [9]. Finally, the functional and oncological outcomes were recorded during the follow-up period.

Statistical analysis

Data were analysed using the IBM Statistical Package for the Social Sciences (SPSS®) software package version 20.0 (SPSS Inc., IBM Corp., Armonk, NY, USA) [10]. Comparisons between groups for categorical (qualitative) variables were assessed using the chi-squared test. The Mann–Whitney test was used to compare groups for abnormally distributed (non-parametric) quantitative variables. A $P \leq 0.05$ was considered to indicate statistical significance.