Impact of Teaching on Surgical Site Infection after Colonic Surgery

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OBJECTIVE: The present study aimed to evaluate whether teaching had an influence on surgical site infections (SSI) after colonic surgery.

DESIGN: Colonic surgeries between January 2014 and December 2016 were retrospectively reviewed. Demographics, surgical details, and SSI rates were compared between teaching procedures vs. experts. Risk factors for SSI were identified by multinominal logistic regression.

SETTING: SSI were prospectively assessed by an independent National Surveillance Program (www.swissnoso.ch) at Lausanne University Hospital CHUV, a tertiary academic institution.

PARTICIPANTS: Included in the present analysis were patients documented in a prospective institutional enhanced recovery after surgery (ERAS) database and who were prospectively monitored by the independent National Infection Surveillance Committee between January 1, 2014 and December 31, 2016.

RESULTS: In all, 315 patients constituted the study cohort. Demographic and surgical items were comparable between teaching ($n = 161$) vs. expert operations ($n = 135$) except for higher occurrence of wound contamination class III-IV (13 vs. 19%, $p = 0.046$) in patients operated by experts. Overall, 61 patients (19%) developed SSI, namely 25 patients (16%) in the teaching group and 32 patients (24%) in the expert group ($p = 0.077$). Contamination class III-IV (OR = 3.2; 95% CI: 1.4–7.5, $p = 0.005$) and open surgery (OR = 3.4; 95% CI: 1.8–6.7, $p < 0.001$) were independent risk factors for SSI, while teaching had no significant impact (OR = 0.6; 95% CI: 0.3–1.2, $p = 0.153$).

CONCLUSIONS: Surgical teaching was feasible and safe after colonic surgery in the present cohort and had no impact on SSI rate. (J Surg Ed ▮:▮▮▮-▮▮▮. © 2018 Association of Program Directors in Surgery. Published by Elsevier Inc. All rights reserved.)

KEY WORDS: colorectal surgery, teaching, surgical site infection, risk factors

COMPETENCIES: Practice-Based Learning and Improvement, Systems-Based Practice

INTRODUCTION

Teaching of young surgeons represents an important task of every academic hospital to ensure long-term quality of care.[1,2] Skills of the operating surgeon are directly related to short-term outcome after surgery.[3] Surgical site infections (SSI) represent the most frequent complication after colorectal surgery, even within enhanced recovery pathways.[4]

The aim of the present study was to evaluate the impact of teaching on SSI after colonic surgery in a tertiary academic institution.

METHODS

Patients

Included in the present analysis were patients documented in a prospective institutional database as outlined below *and* who were prospectively monitored by the independent National Infection Surveillance Committee (www.swissnoso.ch) between January 1, 2014 and December 31, 2016 at Lausanne University Hospital (CHUV). All patients were treated within a standardized ERAS pathway.[5] Open and laparoscopic colectomies and colonic stoma procedures in an elective and emergency setting were retained. Excluded were patients who were not assessed by the national surveillance team.

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This study was considered a quality improvement project and approved by the Institutional Review Board (Commission cantonale d'éthique de la recherche sur l'être humain CER-VD # 2016-00991). The study was conducted according to the STROBE criteria and registered under www.researchregistry.com (UIN researchregistry 2867).

Demographics and surgical information were prospectively assessed by the operating surgeon in a dedicated database; accuracy of data entry was cross-checked by the consultant surgeons (D.H and M.H.) and a dedicated ERAS nurse. Demographics included age, gender, Body Mass Index (BMI), American Society of Anesthesiologists (ASA) score, while comorbidities were assessed by the Charlson score.[6] Further recorded were the presence of malignancy, immunosuppressive treatments (i.e., steroids) by the time of the procedure and previous abdominal surgery. Surgical information included type of procedure (colectomy: left, right (including segmental) or total (excluding proctocolectomy); stoma procedures: colostomy, colostomy closure and Hartmann reversal), approach (open vs. laparoscopy), conversion rate, setting (elective vs. emergency within 72 hours after unplanned admission), procedure duration (time from skin incision to skin closure), estimated blood loss based on surgeons and anesthesiologists' assessment, intraoperative transfusion and intraoperative complication (defined as adverse event during the procedure, which significantly extended procedure duration). According to ERAS protocol, mechanical oral bowel preparation was never performed.[7] Patients undergoing left-sided colectomy were treated by rectal enemas the day before surgery and the morning of the day of surgery, while patients undergoing right-sided colectomy did not get any preparation.

According to institutional guidelines, intravenous cefuroxime 1.5 g and metronidazole 500 mg were systematically administered 60-30 minutes before incision. As an alternative in case of non-tolerance, clindamycin 600 mg and ciprofloxacin 400 mg were used. Besides antibiotic prophylaxis, infection-preventing measures were adhered to according to NICE recommendations.[8]

Teaching

Senior surgeons (experts) were 3 board certified consultant surgeons (M.H., D.H., and ND) by the Society for Visceral Surgery (www.sgvc.ch). Teaching procedures were defined as procedures carried out to an extent of at least 75% by junior surgeons (fellows in colorectal surgery who had completed their general surgical training and performed at least 20 colonic resections *and/or* stoma procedures) under direct, continuous and close (face-to-face) supervision by one of the experts. All procedures were entirely standardized by the consultants.[9,10]

Assessment and classification of surgical site infection

SSI were prospectively assessed, in-hospital and post-discharge [systematic phone call at postoperative day (POD) 30], by a national surveillance program by the independent committee (www.swissnoso.ch). Methodological details of this assessment have been published before.[11] SSI were classified according to the Center for Disease Control (CDC) National Nosocomial Infection Surveillance (NNIS) criteria into superficial incisional, deep incisional, and organ space infections.[12] Contamination class was assessed by the surgeon and classified at the end of the procedure as clean contaminated (grade II), contaminated (grade III), or infectious (grade IV).[12]

Outcomes/study endpoints

The primary binary endpoint was the comparison teaching vs. expert. In a second step, uni- and multivariate risk factors for SSI were identified.

Statistical analysis

Descriptive statistics for categorical variables were reported as frequency (%), while continuous variables were reported as mean (standard deviation). Chi-square was used for comparison of categorical variables. All statistical tests were two-sided and a level of 0.05 was used to indicate statistical significance. Variables with p-values ≤ 0.1 were then entered into a multivariate logistic regression (based on a probit regression model) to provide adjusted estimations of the odds ratio (OR). Data analysis was performed with the Statistical Software for the Social Sciences SPSS Advanced Statistics 22 (IBM Software Group, 200W. Madison St., Chicago, IL 60606, USA).

RESULTS

Three hundred and fifteen patients with complete datasets were retained for the present analysis. Nineteen patients (6%) were excluded due to inability to clearly assign them to 1 of the 2 groups (teaching vs. expert) according to the definition, leaving 296 patients for final analysis. One hundred and sixty-one procedures (55%) were performed by fellows (teaching procedures), while 135 surgeries (45%) were carried out by colorectal consultants (experts). Demographic and surgical details are displayed in Table 1.

Sixty-one patients (19%) developed SSI during the 30-day observation period. Of these, 16 (26%) presented with superficial incisional, 7 (12%) with deep incisional and 38 (62%) with organ space infection. SSI occurred at POD 10 $\pm$ 6. No significant difference with regarding incidence of SSI was noted between the two comparative groups ($p = 0.077$) (Table 2).