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Mesh herniorrhaphy with simultaneous colorectal surgery: a case-matched study from the American College of Surgeons National Surgical Quality Improvement Program

Cigdem Benlice, M.D., Emre Gorgun, M.D.*, Erman Aytac, M.D., Gokhan Ozuner, M.D., Feza H. Remzi, M.D.

Department of Colorectal Surgery, Digestive Disease Institute, Cleveland Clinic, 9500 Euclid Ave. A-30, Cleveland, OH 44195, USA

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Abstract

BACKGROUND: The aim of this study is to evaluate the impact of concurrent mesh herniorrhaphy on short-term outcomes of colorectal surgery by using a large, nationwide database.

METHODS: Patients who underwent simultaneous ventral hernia repair (VHR) and colorectal surgery between 2005 and 2010 were identified from the American College of Surgeons National Surgical Quality Improvement Program. Patients who underwent VHR with mesh repair were case matched with patients who underwent VHR without mesh based on the type of colorectal procedure, diagnosis, and American Society of Anesthesiologists score.

RESULTS: Two hundred sixty-two patients who underwent VHR with mesh were case matched with 524 patients who underwent VHR without mesh. Mean operating time was significantly longer in patients who underwent VHR with mesh (195.8 ± 98.7 vs 164.3 ± 84.4 minutes, $P < .001$). Postoperative morbidity ($P = .58$), mortality ($P = .27$), superficial surgical site infection (SSI) ($P = .14$), deep SSI ($P = .38$), organ space SSI ($P = .17$), wound disruption ($P > .99$), reoperation ($P = .48$), and length of hospital stay ($P = .71$) were comparable between the groups.

CONCLUSION: The American College of Surgeons National Surgical Quality Improvement Program data suggest that VHR with mesh does not increase 30-day mortality, medical or surgical morbidity in colorectal surgery setting.

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The authors declare no conflicts of interest.

American College of Surgeons National Surgical Quality Improvement Program and the hospitals participating in the American College of Surgeons National Surgical Quality Improvement Program are the source of the data used herein; they have not verified and are not responsible for the statistical validity of the data analysis or the conclusions derived by the authors.

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* Corresponding author. Tel.: +1-216-444-1244; fax: +1-216-445-8627.

E-mail address: gorgune@ccf.org

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Concurrent ventral hernia repair (VHR) and colorectal surgery (CS) are still an area of investigation with limited data. Although mesh hernia repair is recommended in accordance with the complexity of the hernia, the patient's condition, and contamination status of the procedure,[1] surgeons tend to avoid using it in the setting of CS because of increased risk complications. These complications include intra-abdominal adhesions, chronic draining sinus, chronic enteric fistula, chronic wound infection, and mesh migration all of which may require further surgical operations for treatment.[2–4] Indeed, mesh use in bowel surgery has been accepted as a risk factor causing failure of VHR and is associated with increased postoperative morbidity.[5] The incidence of wound infections after CS ranges from 12% to 30%, with a likely increase in infection rate following simultaneous VHR and CS.[6] Some studies, though, report acceptable outcomes after simultaneous mesh herniorrhaphy with CS[7–10] without increasing postoperative wound complications.[8–11]

To help better clarify the issue, we reviewed the data in the American College of Surgeons National Surgical Quality Improvement Program (ACS-NSQIP)—this is a national, validated, risk-adjusted, outcomes-based systems designed to measure the quality of surgical care, including more than 100 prospectively collected variables. Preoperative risk factors, operative characteristics, and 30-day postoperative morbidity and mortality data are collected by specially trained surgical clinical reviewers.[12,13] The ACS-NSQIP database provides an opportunity to assess simultaneous VHR during CS on operative and postoperative outcomes within a 30-day time-frame from Participant User Files.[14,15] In this study, we evaluated the impact of mesh use on short-term outcomes after concurrent VHR and CS, and risk factors associated with wound complications in these concurrent operations using this large, nationwide database.

Patients and Methods

After institutional review board approval was obtained, we queried the ACS-NSQIP database for all patients who underwent CS according to their primary procedure Current Procedural Terminology (CPT) codes between 2005 and 2010. Subsequently, we reviewed the procedures from this cohort for simultaneous VHR using the following CPT codes: mesh (49568, 49652, 49653, 49654, 49655, 49656, and 49657) and mesh free (49560, 49561, 49565, 49566, 49570, 49572, 49585, 49587, and 49590). Regarding secondary procedures, NSQIP has 2 categories: "other" CPT codes, which are designed for additional procedures performed by the same surgical team, and "concurrent" CPT codes, which are designed for additional procedures performed by the different surgical team. Patients with a secondary CPT code, with the exception of CPTs reported in Table 1, were excluded. Patients were compared according to mesh use during simultaneous VHR and CS. Patients with a body mass index of 18 to 50 kg/m^2 and an American Society of Anesthesiologists (ASA) score of I to IV were included in the analysis. Patients who underwent VHR with mesh were case matched with patients who underwent VHR with no mesh (1:2). Case-matching criteria were as follows: type of colorectal procedure, diagnosis, and ASA score. Finally, patient demographics, characteristics, and preoperative comorbidities were analyzed. Intraoperative and 30-day postoperative outcomes were analyzed by comparing the 2 groups.

Table 1 Secondary procedure codes included in our study

CPT code	Secondary procedure
44005	Enterolysis
44139	Mobilization of splenic flexure
44180	Laparoscopic enterolysis
44187	Laparoscopic ileostomy
44188	Laparoscopic colostomy
44213	Laparoscopic mobilization of splenic flexure
44310	Ileostomy
44320	Colostomy
45330	Diagnostic flexible sigmoidoscopy
45378	Diagnostic flexible colonoscopy
45300	Diagnostic rigid proctosigmoidoscopy
46600	Diagnostic anoscopy
49255	Omentecomy
49905	Omental flap intra-abdominal
76998	Intraoperative ultrasonic guidance

The primary outcomes of this study were rates of surgical site infections (SSI) among the groups (categorized separately as a superficial SSI, deep SSI, organ space SSI, and wound disruption in ACS-NSQIP).[14] Postoperative complications included superficial SSI, deep SSI, organ space SSI, wound disruption, bleeding requiring transfusion, the need for reoperation, pulmonary embolism, unplanned intubation, progressive renal insufficiency, pneumonia, acute renal failure, urinary tract infection, coma longer than 24 hours, ventilator support for more than 48 hours (ventilator dependency), cerebrovascular accident, cardiac arrest, deep venous thrombosis, sepsis, septic shock, and myocardial infarction. Wound infection, which was defined as any surgical infection including superficial SSI, deep SSI, organ space SSI, and wound disruption, was created separately.

Each patient undergoing simultaneous VHR and CS with mesh was matched with 2 counterparts without mesh based on the following matching criteria: primary colorectal procedure, diagnosis, and ASA score. Categorical variables were analyzed with chi-square or Fisher's exact test, and quantitative variables were analyzed with Wilcoxon rank-sum test. P value less than .05 was considered statistically significant. After comparing the baseline characteristics and postoperative study outcomes between the mesh and mesh-free groups, we also conducted multivariate analysis among the patients for independent risk factors associated with wound infection by using a logistic