

Risk Factors for the Development of Parastomal Hernia after Radical Cystectomy

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Abbreviations and Acronyms

BMI = body mass index
COPD = chronic obstructive pulmonary disease
PH = parastomal hernia
RC = radical cystectomy

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Nothing to disclose.

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Editor's Note: This article is the second of 5 published in this issue for which category 1 CME credits can be earned. Instructions for obtaining credits are given with the questions on pages 1940 and 1941.

Purpose: Parastomal hernia is a frequent complication of stoma formation after radical cystectomy. We determined the prevalence and risk factors for the development of parastomal hernia after radical cystectomy.

Materials and Methods: We conducted a retrospective study of 433 consecutive patients who underwent open radical cystectomy and ileal conduit between 2006 and 2010. Postoperative cross-sectional imaging studies performed for routine oncologic followup (1,736) were evaluated for parastomal hernia, defined as radiographic evidence of protrusion of abdominal contents through the abdominal wall defect created by forming the stoma. Univariable and multivariable Cox regression analyses were used to determine clinical and surgical factors associated with parastomal hernia.

Results: Complete data were available for 386 patients with radiographic parastomal hernia occurring in 136. The risk of a parastomal hernia developing was 27% (95% CI 22, 33) and 48% (95% CI 42, 55) at 1 and 2 years, respectively. Clinical diagnosis of parastomal hernia was documented in 93 patients and 37 were symptomatic. Of 16 patients with clinical parastomal hernia referred for repair 8 had surgery. On multivariable analysis female gender (HR 2.25; 95% CI 1.58, 3.21; $p < 0.0001$), higher body mass index (HR 1.08 per unit increase; 95% CI 1.05, 1.12; $p < 0.0001$) and lower preoperative albumin (HR 0.43 per gm/dl; 95% CI 0.25, 0.75; $p = 0.003$) were significantly associated with parastomal hernia.

Conclusions: The overall risk of radiographic evidence of parastomal hernia approached 50% at 2 years. Female gender, higher body mass index and lower preoperative albumin were most associated with the development of parastomal hernia. Identifying those at greatest risk may allow for prospective surgical maneuvers at the time of initial surgery, such as placement of prophylactic mesh in selected patients, to prevent the occurrence of parastomal hernia.

Key Words: hernia, risk factors, cystectomy

ILEAL conduit remains one of the most commonly used diversions after radical cystectomy. Despite more than 60 years of experience, stomal complications remain a substantial problem with a reported incidence

of up to 60%.¹ Parastomal hernia, defined as an "incisional hernia related to an abdominal wall stoma," is one of the most frequent complications following stoma formation and has a negative impact on quality of life after

RC.²⁻⁴ Its incidence varies widely depending on the definition used, the length of followup and whether the diagnosis is made clinically or radiographically.⁴ Up to 30% of patients with a PH require surgical intervention, most commonly due to discomfort, poor fit of the ostomy appliance, or rarely due to obstruction, bowel perforation or strangulation.^{2,5,6} There is a paucity of data about the natural history and risk factors associated with the development of PH after RC and ileal conduit. Most data are adapted from studies in patients undergoing colostomy and ileostomy, in whom issues such as obesity, malnutrition, increasing age, history of radiation exposure and increased intra-abdominal pressure from chronic coughing, constipation or ascites have been cited as potential risk factors.^{2,7-10} Technical factors such as the type of stoma created, the size and location of the abdominal wall defect through which the stoma is formed, and preoperative marking of the stoma site by a wound-ostomy nurse may also impact the risk of PH formation.¹¹⁻¹⁴ Therefore, we determined the prevalence and risk factors for parastomal hernia developing after radical cystectomy and conduit diversion for bladder cancer.

MATERIALS AND METHODS

Patients

This was a retrospective, institutional review board approved study of consecutive patients who underwent open RC and ileal conduit at Memorial Sloan-Kettering Cancer Center between January 2006 and October 2010. Patient records were reviewed for documentation of PH on clinical examination, symptoms attributable to the PH, clinical management, referral for PH repair, dates of PH surgery and its indication, and outcome of the repair. The patient characteristics of interest included age, gender, BMI measured at RC, diabetes, smoking history, COPD, estimated blood loss, preoperative albumin, history of prior abdominal surgery and hernia repair, preoperative radiation therapy, neoadjuvant chemotherapy and stoma type (end stoma vs Turnbull loop conduit). All Turnbull loop stomas were performed by a single surgeon (BHB).

Surgical Technique

Patients were evaluated preoperatively by a wound-ostomy certified nurse to mark the stoma location. Conduits were isolated from the ileum by standard techniques and the decision to perform an end stoma or Turnbull loop conduit was determined by surgeon preference. After reestablishing bowel continuity and closing the mesenteric defect to prevent internal hernias, a circular segment of skin and subcutaneous fat at the predesignated stoma site was excised. A cruciate incision was made in the anterior rectus fascia and the fibers of the rectus muscles were separated longitudinally to allow the passage of 2 fingers through a second incision in the posterior rectus fascia. The ileum was passed through the abdominal wall defect and maturation of the stoma was

completed. The decision to place supporting sutures at the level of fascia was made according to surgeon preference.

Definition and Classification of PH

All postoperative cross-sectional imaging scans (computerized tomography or magnetic resonance imaging) obtained for routine oncologic followup were reviewed for the presence of a PH by a radiologist blinded to all clinical data. PH was defined as radiographic evidence of the protrusion of abdominal contents through the abdominal wall defect created by forming the stoma. When present, PH grade was recorded using a previously published classification system of type 1—hernia sac that contains the prolapsed bowel loop forming the stoma, type 2—contains abdominal fat or omentum herniating through the abdominal wall defect created by the stoma and type 3—contains herniated loops of bowel other than that forming the stoma (figs. 1 to 3).¹⁵

Statistical Analyses

Univariable Cox regression was used to determine associations between development of PH and patient characteristics. Patients in whom PH did not develop were censored at the last time in which they were hernia-free. Additional models for BMI and preoperative albumin were created using restricted cubic splines with knots at the tertiles to account for nonlinearity. A multivariable Cox model was created which included all significant patient characteristics from univariable analysis to assess the association of each when combined in a single model. In addition, we tested for any effects of differential schedules of followup imaging examinations. Because patients underwent a different number of imaging examinations during different periods, separate linear regression models for each patient characteristic were created to ensure that these were not associated with the number of imaging examinations a patient had. The outcome for these models was the number of imaging examinations a patient underwent within 2 years of surgery. Patients with less than 9-month radiographic



Figure 1. Type 1 parastomal hernia

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