



Incisional and Parastomal Hernia following Radical Cystectomy and Urinary Diversion: The University of Southern California Experience

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Purpose: Hernia is a common complication following radical cystectomy and urinary diversion. We investigated the clinical and radiological evidence for parastomal and incisional hernias, and their risk factors in a large cohort.

Materials and Methods: Using an institutional review board approved prospective database we reviewed the records of 1,101 patients who underwent radical cystectomy from 2003 to 2013. Followup (median 57 months) was available for 670 patients. Of the 670 patients 92 underwent ileal conduit diversion using Turnbull stomas with a median followup 34 months. Patients were followed with computerized tomography cancer surveillance. Standardized criteria were used to define parastomal and incisional hernias by an expert radiologist. Multivariate logistic regression was done to identify independent predictors.

Results: Parastomal hernia was diagnosed in 21 of 92 patients (23%) with a mean age at diagnosis of 76.5 years. Incisional hernia was present in 125 of 670 patients (18.7%) with a mean age at diagnosis of 68.6 years. Five patients had both hernia types. Of patients with parastomal and incisional hernias 11 (53%) and 111 (88.8%), respectively, were male. Mean body mass index was 27.5 and 27.3 kg/m² in patients with parastomal and incisional hernias, respectively. Mean parastomal and incisional defect sizes were 3.8 and 2.4 cm, respectively. In 18 patients (85%) parastomal hernias were clinically and radiologically evident, 5 patients were symptomatic and 2 underwent repair. In 51 patients (40%) incisional hernias were clinically and radiologically evident, 34 were symptomatic and 48 underwent repair. Multivariate logistic regression showed significant associations of incisional hernia with age, gender, incision length, orthotopic diversion and body mass index. Parastomal hernia had no significant association.

Conclusions: Hernia is common after cystectomy and diversion. Age, gender, body mass index, incision length and diversion type are risk factors for incisional hernia. Multi-institutional prospective studies may better identify patients at high risk.

Key Words: urinary diversion, hernia, cystectomy, postoperative complications, risk

Abbreviations and Acronyms

BMI = body mass index

CT = computerized tomography

IH = incisional hernia

PH = parastomal hernia

RC = radical cystectomy

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BLADDER cancer is one of the most common genitourinary malignancies in the United States. It represents

4.5% of all new cancer cases with men more than 3 times more likely than women to be diagnosed with the

disease.¹ In 2015 there was an estimated 74,000 new diagnoses of bladder cancer.¹

It is well established that for muscle invasive bladder cancer RC with urinary diversion is the gold standard treatment. While the morbidity and mortality of this procedure continue to improve, RC is still a complex and morbid procedure to perform.

The morbidity of RC relates mostly to gastrointestinal, infectious and wound based short-term complications.² Long-term complications are often less reported and generally more difficult to follow. Most commonly, they include kidney, stoma, bowel, urinary tract infection, anastomosis site, wound and urolithiasis related complications.³

Nestled in the various other complications associated with RC are those related to wound/herniation. IH and PH are known complications of RC with multiple studies describing them as long-term postoperative complications.⁴⁻⁶ However, only a few studies have delineated the procedure specific incidence and diagnosis of hernia.^{4,7,8}

Given the minimal information available pertaining to the incidence of IH and PH in the setting of a changing landscape of RC care, we sought to characterize the clinical and radiological evidence for these hernias in patients who underwent RC.

MATERIALS AND METHODS

With institutional review board approval we queried our prospectively maintained institutional bladder cancer database for all patients who underwent RC and urinary diversion between 2003 and 2013.

The surgical technique for closure of the midline fascia at our institution was consistent. Interrupted figure-of-8 absorbable sutures were used before 2009 and running absorbable sutures were used after that. Also, Turnbull stomas were fixed to the anterior abdominal fascia with interrupted absorbable sutures.

Following RC patients at our institution are routinely followed with CT of the abdomen and pelvis every 3 to 6 months for the first 2 years postoperatively, every 6 months for the next year and annually thereafter.

We defined PH as any significant fascial defect or visualized protrusion of abdominal contents through the abdominal wall around the stoma. Based on a study by Walker fascial defects greater than 1 cm were considered significant.⁹ IH was defined similarly but through the incisional site rather than through the stoma. All clinically diagnosed hernias were confirmed by at least 1 CT and some patients were diagnosed only on radiological evidence. All imaging was reviewed and confirmed by an expert radiologist.

A number of demographic, patient and operative variables were included in analysis. Demographic variables included age, gender and BMI (categorized as BMI less than 30 kg/m², or 30 kg/m² or greater). Patient risk factors were Charlson comorbidity index, ASA® score and pathological stage as well as history of neoadjuvant and/or

adjuvant chemotherapy, radiation, smoking, diabetes, previous abdominal surgery and incision length (supra-umbilical vs infraumbilical). Incision length was categorized based on surgeon preference irrespective of BMI and pathological stage. Preoperative recorded laboratory variables included creatinine, hemoglobin, albumin and total protein. Surgical risk factors included estimated blood loss, operative time, length of hospital stay and postoperative wound infection.

The Pearson chi-square or Fisher exact test was used to examine associations between categorical, demographic and clinical variables. The Kruskal-Wallis test was used to test differences in nonnormally distributed continuous variables between groups or subgroups. Hernia-free survival was calculated from the date of RC to the date of the first documented clinical hernia, the date of death or the date of last followup if the patient did not experience a hernia. Kaplan-Meier plots were used to estimate the probability of hernia-free survival for each year after RC. The log-rank test was used to compare the differences of hernia-free subgroups. Through stepwise selection Cox proportional hazard models were used to evaluate independent prognostic factors for clinical outcomes in the multivariable setting. All p values were 2 sided with p < 0.05 considered statistically significant. SAS®, version 9.3 was used to perform all statistical analysis in this study.

RESULTS

A total of 1,101 patients underwent open RC for urothelial bladder cancer at our institution between 2003 and 2013. Of these patients 670 (60.9%) had radiological images available for review. Median followup was 57 months (range 1 to 149) in the entire cohort. Of the 670 patients 92 (13.7%) had an ileal conduit, which was fashioned uniformly with a Turnbull stoma. Ileal conduit specific median followup was 34 months (range 5 to 67).

Parastomal Hernia

PH was identified in 21 of 92 patients (22.8%) with an ileal conduit. Average \pm SD age of these patients was 76.5 \pm 8.7 years at diagnosis. Median time to the diagnosis of parastomal hernia was 11.5 months (range 1 to 37.2). Of the patients diagnosed with PH 11 (53%) were male. Mean BMI was 27.5 kg/m² (range 20.3 to 38.18). Mean stoma defect size detected on imaging was 3.8 cm (range 2 to 7). Of patients with PH 18 (85%) had clinical and radiological evidence of the defect, of whom 5 (28%) were symptomatic with a bulge and pain.

Two patients underwent surgical repair. Indications for repair included symptomatic hernia, stoma/appliance malfunction due to hernia and patient desire. Generally, smaller parastomal herniorrhaphy has been done in situ with or without mesh while larger defects required stoma relocation. Five patients had a PH as well as a IH. No

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