Fistulous Complications following Radical Cystectomy for Bladder Cancer: Analysis of a Large Modern Cohort

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Purpose: Fistula formation is a rare and poorly described complication following radical cystectomy with urinary diversion. We sought to identify patients who experienced any type of fistulous complication and we analyzed risk factors for formation as well as management outcomes.

Materials and Methods: We retrospectively reviewed the records of patients who underwent radical cystectomy for bladder cancer at our institution. Patients who experienced any fistula were identified. Risk factors, management strategies and outcomes were analyzed. Patients underwent initial conservative treatment and those in whom this treatment failed underwent surgical repair. Univariable and multivariable analyses were performed to identify predictors of fistula formation as well as the need for surgical repair.

Results: Of the 1,041 patients 31 (3.0%) experienced fistula formation. Median time to fistula presentation was 31 days. Enterodiversion was the most common fistula type, noted in 54.8% of patients, followed by enterocutaneous and diversion cutaneous treatment in 29.0% and 12.9%, respectively. On multivariable analyses a history of radiation therapy (OR 3.1, p = 0.03) and an orthotopic neobladder (OR 3.1, p = 0.04) were predictors of fistula formation. Conservative management was successful in 41.9% of cases. There were no predictors of failed conservative management. Of patients who required surgical repair success was achieved in 94.4% at a single operation.

Conclusions: Fistulas are rare after radical cystectomy and they are most common between the urinary diversion and the small bowel. A history of radiation therapy and a orthotopic neobladder are risk factors for formation. When required, surgical repair is generally successful at a single operation.

Key Words: urinary bladder neoplasms, urinary bladder fistula, cystectomy, urinary diversion, risk factors

Abbreviations and Acronyms

BMI = body mass index
CCI = Charlson comorbidity index
ONB = orthotopic neobladder
RC = radical cystectomy
RT = radiation therapy
SBA = small bowel anastomosis
UTI = urinary tract infection

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RADICAL cystectomy with urinary diversion is the standard of care in patients with localized, muscle invasive bladder cancer and high risk, nonmuscle invasive bladder cancer.[1,2] Despite its wide application RC carries a significant risk of postoperative morbidity with approximately 60% of patients experiencing some form of complication.[3–5] Fistulous complications are rare following RC, developing in 0.3% to 2.6% of cases.[3,6–8] Given this low incidence of postoperative fistula formation, management strategies and outcomes are poorly defined in the literature. We sought to identify patients who experienced fistula formation after RC at

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our institution, ascertain risk factors for formation and characterize management and outcomes.

MATERIALS AND METHODS

Study Population

Following institutional review board approval we retrospectively reviewed our institutional database and identified patients who underwent RC between January 2007 and December 2015. Only patients who underwent the procedure for a diagnosis of bladder cancer were included in study. There were 1,041 patients who met inclusion criteria. Patients who experienced any fistulous complication were identified and compared to the remaining cohort. All fistula types were included in analysis. Management strategies and outcomes of patients with fistula were determined by reviewing the medical charts. Patients who were successfully treated conservatively were compared to those who required surgical repair. Time from RC to fistula presentation and time from fistula presentation to surgical repair were analyzed.

RC was performed by multiple high volume surgeons at a single facility. Most operations were open and 65 (6.2%) were performed with robotic assistance. The surgical technique of RC was surgeon dependent but a few maneuvers of significance to this study should be mentioned. For ONB creation folded U-shaped reservoirs (eg a Studer pouch) and W-shaped reservoirs (eg a Hautmann pouch) were created according to surgeon preference.[9] In females vaginal sparing is standard when oncologically feasible. Lastly it is standard practice to perform omental interposition, when available, between the SBA and the surrounding tissues.

Fistula Diagnosis and Management

Time to fistula presentation was ascertained from the first date of symptoms consistent with possible fistula formation (eg pneumaturia, incidental radiographic findings of air in the urinary system, recurrent UTIs or passage of feculent debris via the wound, urine or the vagina). Imaging studies were used to confirm the suspicion of fistula formation. The degree of initial conservative management was performed on a case by case basis with diversion of urine with urethral or nephrostomy catheters, a low residue diet and/or hyperalimentation. If and when conservative treatment was determined to have failed based on the individual clinical scenario, patients underwent surgical repair. The original operating surgeon performed the fistula repair. When the assistance of an additional surgical service was required, this was noted.

Our approach to fistula repair involves reentry through the previous lower midline abdominal incision. Upon successful entry into the abdomen our first maneuver is to free all bowel from the pelvis. We next identify the previous SBA, of which the purpose is multidimensional. The SBA is often the site of fistula formation.[7] In patients with an ONB identifying the SBA often proves to be the quickest way to identify the ONB afferent limb. The afferent limb is another common site of fistula formation and its isolation is also necessary during ureteral reimplantation, which is often concomitantly required during these procedures. If the fistula tract has not yet been encountered, its location may often be recognized by the presence of dense, fibrous connections between surrounding structures. Additional maneuvers may be performed conditional to the fistula type (eg instillation of a colored agent in the urinary diversion, vagina or wound). While the fistula location may be suggested on preoperative imaging, more often it is not precisely defined.

After it is identified the involved tissue is transected and the 2 sides of the fistula tract are excised. Primary closure of each site is performed specific to the involved tissue or organ. Optionally a tissue sealant may be applied to the repair site. Bowel diversion and operative site drainage are done at surgeon discretion. Finally the omentum or other available adipose tissue is mobilized and used as an interposition between the repaired areas of the fistula tract.

Statistical Methods

Descriptive analyses of the groups were performed with the Pearson chi-square or the Fisher exact test for categorical variables and the Student t-test for continuous variables. Multivariable logistic regression was done to identify predictors of fistula formation using the selected covariates, including patient age, gender, CCI, BMI, history of abdominopelvic RT, history of neoadjuvant chemotherapy, urinary diversion type and pathological T stage. Multivariable logistic regression was also performed to identify predictors of failed conservative management using selected covariates, including a history of abdominopelvic RT, urinary diversion type and fistula type. All hypothesis testing was 2-sided with $p < 0.05$ considered statistically significant. All statistical analyses were performed with STATA®, version 13.1.

RESULTS

The study cohort included 1,041 patients, of whom 31 (3.0%) experienced fistula formation. Median followup was 11.4 months (IQR 5.2–20.7) in the entire cohort and 12.8 months (IQR 7.1–24.1) in the fistula forming group. Table 1 shows patient characteristics stratified by fistula. There was no difference in patient age, gender, race, BMI, CCI, pathological stage or neoadjuvant chemotherapy exposure between the 2 groups. Additionally, on univariable analysis neither the type of urinary diversion nor a history of abdominopelvic RT were predictors of fistula formation. However, after adjustment in a multivariable logistic regression model RT (OR 3.10, 95% CI 1.13–8.56, $p = 0.029$) and ONB (OR 3.12, 95% CI 1.08–8.95, $p = 0.035$) were independently predictive of fistula formation (table 2). In the 6 fistula forming patients with a history of RT the reasons for RT were cervical cancer in 3, bladder cancer in 1, urethral cancer in 1 and melanoma of the groin in 1. These 6 cases comprised 1 ONB, 1 continent cutaneous pouch and 4 ileal conduits.

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