ELSEVIER

Urologic Oncology: Seminars and Original Investigations ▮ (2016) ▮▮▮–▮▮▮

UROLOGIC ONCOLOGY

Original article

Lessons from 151 ureteral reimplantations for postcystectomy ureteroenteric strictures: A single-center experience over a decade

Vignesh T. Packiam, M.D.*, Vijay A. Agrawal, M.D., Andrew J. Cohen, M.D., Joseph J. Pariser, M.D., Scott C. Johnson, M.D., Gregory T. Bales, M.D., Norm D. Smith, M.D., Gary D. Steinberg, M.D.

Section of Urology, University of Chicago, Chicago, IL

Received 6 June 2016; received in revised form 27 September 2016; accepted 5 October 2016

Abstract

Objectives: Ureteroenteric anastomotic strictures are common after cystectomy with urinary diversion. Endoscopic treatments have poor long-term success, although ureteral reimplantation is associated with morbidity. Predictors of successful open repair are poorly defined. Our objective was to characterize outcomes of ureteral reimplantation after cystectomy and identify risk factors for stricture recurrence.

Patients and methods: We performed a retrospective review of 124 consecutive patients with a total of 151 open ureteral reimplantations for postcystectomy ureteroenteric strictures between January 2006 and December 2015. Baseline clinicopathologic characteristics and perioperative outcomes were examined. Predictors for stricture recurrence were assessed by univariable testing and univariate Cox proportional hazards regression.

Results: Most patients underwent preoperative drainage by percutaneous nephrostomy (PCN; 43%) or percutaneous nephroureterostomy (PCNU; 44%). Major iatrogenic injuries included enterotomies requiring bowel anastomosis (3.2%) and major vascular injuries (2.4%). Overall, 60 (48%) patients suffered 90-day complications, of which 15 (12%) patients had high-grade complications. Median length of stay was 6 days [interquartile range: 5, 8] and median follow-up was 21 months [interquartile range: 5, 43]. The overall success rate per ureter was 93.4%. On univariate analysis, the only significant predictor of stricture recurrence was preoperative PCNU placement compared with PCN placement or no drainage (success rates: 85.5% vs. 98.9%, respectively, $P = 0.002$). Cox proportional hazards regression demonstrated that preoperative PCNU placement yielded a hazard ratio of 10.2 (95% CI: 1.27–82.6) for stricture recurrence ($P < 0.005$). Stricture recurrence was independent of previous endoscopic interventions ($P = 0.42$). Stricture length was unable to be assessed.

Conclusions: Postcystectomy ureteral reimplantation was associated with relatively low rates of major iatrogenic injuries and high-grade complications. Preoperative PCN placement rather than PCNU may yield better results.

Keywords: Cystectomy; Percutaneous nephrostomy; Stricture; Ureteroenteric stricture; Ureteral reimplantation

1. Introduction

Radical cystectomy with urinary diversion is the gold standard treatment for muscle-invasive bladder cancer [1]. Benign ureteroenteric anastomotic strictures persist as common long-term complications despite refinements in surgical technique, consistently afflicting 3% to 10% of patients in large cystectomy series [2–5]. The etiology of benign ureteroenteric strictures is most commonly attributed to ischemia, suspected from suboptimal distal ureteral neovascularization from enteric segments [6]. Other potential risk factors relate to poor healing and inflammation are as follows: smoking, radiation, urinary tract infection (UTI), and urine leak [4–6].

Endoscopic treatments are often attempted as first-line management despite low success rates [7]. These treatments yield even poorer outcomes for strictures that are left sided, >1 cm in length, and with poor ipsilateral renal function [8–10]. Open ureteral reimplantation yields

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

* Corresponding author. Tel.: +1-773-702-9757; fax: +1-773-702-1001.
E-mail address: vignesh.packiam@uchospitals.edu (V.T. Packiam).

http://dx.doi.org/10.1016/j.urolonc.2016.10.005
1078-1439/

excellent success (>90%), although some surgeons avoid this surgery as first-line management owing to concerns of both iatrogenic and postoperative morbidity from reoperative laparotomy [9,11]. A clear understanding of the incidence of the most worrisome complications, including iatrogenic bowel and vascular injuries, is precluded by the small size of existing series.

Predictors for stricture recurrence after ureteral reimplantation are also poorly understood. Although etiologies may be similar to those originally responsible for initial stricture formation, intervening percutaneous, and endoscopic treatments before ureteral reimplantation pose potentially avoidable risk factors. Performance of these procedures in addition to ureteral stenting can be associated with infection, inflammation, and fibrosis, compromising long-term outcomes in the relatively poorly vascularized ureteroenteric anastomosis [12,13].

We sought to rigorously characterize outcomes from our large series of 151 ureteral reimplantations and subsequently identify risk factors for stricture recurrence following ureteral reimplantation.

2. Patients and methods

2.1. Study population

Institutional review board approval was obtained for this study. We retrospectively identified 124 consecutive patients who underwent open ureteral reimplantation between January 2006 and December 2015 for ureteroenteric strictures after radical cystectomy. We excluded reimplantations performed with concomitant conversion to different urinary diversion.

Strictures were diagnosed by ultrasound or computed tomography imaging on routine follow-up or for pain, elevated creatinine, or UTI. When diagnosis of obstruction was equivocal, renal scintigraphy was obtained. No percutaneous decompression was performed for patients with stable creatinine and immediately scheduled reimplantation. Incidentally, visualized strictures in reimplanted contralateral ureters during open exploration were also not decompressed. Percutaneous nephrostomy (PCN) decompression was performed for all other strictures. Attempts at stent internalization and percutaneous nephroureterostomy (PCNU) placement were routinely made if anterograde nephrostogram showed passage of contrast through the stricture. Given their poor long-term success [8,11], percutaneous endoscopic treatments including stricture dilation and endoureterotomy were only attempted for patients with poor overall clinical status or for select right-sided strictures. After endoscopic treatment, nephroureteral stents were removed to assess for treatment success, and ureteral reimplantation was performed if obstruction recurred in patients with good overall clinical status. Biopsies were performed if recurrent malignancy was suspected from clinical history or imaging or both.

Our surgical technique for ureteral reimplantation in this setting has previously been published [8]. Briefly, a midline abdominal incision is made and the strictured ureteroenteric segment is identified and excised until healthy tissue is evident. Neobladders without chimney modifications involve incision of the neobladder with reimplantation of ureters into the posterior wall. Hautmann neobladders with chimney modifications afford easier repairs; the chimney is readily dissected and brought proximally, sometimes even mobilized under the sigmoid mesentery for long left strictures. For ileal conduit and Indiana pouch strictures, a midline laparotomy incision is made and the diversion is followed from the fascia to the level of the ureteroenteric stricture. These strictures are often associated with adhesions to areas of prior lymphadectomy and the iliac vessels. After excision of the stricture, the ureter is spatulated and reimplanted in an end-to-side Bricker fashion for ileal conduits, Indiana pouches, and the chimney of Hautmann neobladders. Running vs. interrupted anastomotic suturing technique was performed based on surgeon preference. Iatrogenic deserosalizations were oversewn and enterotomies were managed with excision of affected bowel and stapled anastomosis.

A 6 Fr ureteral stent was left for 6 weeks postoperatively. A routine perioperative pathway was instituted and did not change over the course of the study. All patients underwent annual surveillance laboratories and imaging either locally or at our institution.

2.2. Assessment of data

Operative reports and patient charts were reviewed to create this database immediately before this study. Specifically, baseline characteristics, perioperative outcomes, and stricture recurrence were assessed. Select major postcystectomy complications were examined based on factors that have been implicated with stricture formation. Preoperative urinary drainage categorization (none, PCN, and PCNU) was based on the type of drainage present in the operating room. Patients with prior PCNU converted to PCN were considered PCN, and vice versa. Attempted conversions of PCN to PCNU, replacements of PCNU with PCN, and endoscopic dilations, incisions, and biopsies were recorded. Complications were assessed rigorously as recommended [14] with additional stratifications based on timing (<30 days, 30–90 d), and Clavien-Dindo classification (low [1–2] and high [3–5]) [15]. Treatment failure or stricture recurrence, was defined as radiographic or clinical signs or both of recurrent obstruction requiring renal drainage or repeat ureteral reimplantation or both or nephrectomy.

2.3. Assessment of risk factors for stricture recurrence

Owing to potentially differing conditions for each stricture in bilateral reimplantations (i.e., left PCN and right PCNU), success rates of repair were calculated per ureter during assessment of risk factors for stricture recurrence.