

# Perioperative Preparation and Nutritional Considerations for Patients Undergoing Urinary Diversion



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## KEYWORDS

• Urinary diversion • Bladder cancer • Optimization • Cystectomy

## KEY POINTS

- Patients undergoing urinary diversion are at high risk for complications in the perioperative period.
- The exact cause of these complications remains poorly defined but is likely multifactorial.
- Improvements in perioperative care may decrease complications.

Urinary diversions (UDs) carry significant morbidity regardless of indication. (1–5) When used in combination with extirpative surgery for nonmalignant urologic disease, 35% to 73%<sup>1–3</sup> of patients experience complications postoperatively. When UD alone (without bladder removal) is performed, 30.6% of patients still experience postoperative complications.<sup>3</sup> UD in the setting of urologic malignancy carries an attributable complication rate of 11% to 29%, specifically related to the diversion, whereas patients who undergo UD after pelvic exenteration experience the highest rate of complications, affecting up to 59% of patients.<sup>3–5</sup> Thus, factors influencing perioperative outcomes are of great interest to practitioners attempting to decrease perioperative complications in patients undergoing UD for any indication.

A majority of UD is performed in the setting of a primary urologic malignancy, specifically muscle-invasive bladder cancer (MIBC), with UD after radical cystectomy (RC) the most common indication. Unfortunately this patient cohort is extremely vulnerable to the complications associated with UD because they are often affected by numerous comorbid conditions.<sup>4,5</sup> This review

describes the perioperative assessment and preparation as well as any nutritional considerations that may be used to minimize the known associated complications in patients undergoing UD. Ideally, perioperative preparation and optimization should be patient specific, addressing patient-specific factors, such as frailty, malnutrition, and comorbid disease states that may or may not be readily evident. Thus a systematic approach to patient preparation for patients undergoing UD should be undertaken.

## PERIOPERATIVE IMAGING

Perioperative imaging is essential for operative planning whether the indication for UD is benign or malignant. In the setting of benign disease, perioperative imaging can provide valuable information regarding the upper tracts, including presence of urolithiasis or obstruction, absence or malposition of a kidney, duplicated systems, or other anatomic variants. In addition, imaging may provide information regarding prior surgical interventions, abdominal/pelvic radiation, inflammatory bowel disease, or vascular graft placement.

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For MIBC, the European Association of Urology, National Comprehensive Cancer Network, and soon to be released American Urological Association guidelines incorporate clinical and radiologic staging as a common theme in their recommendations. Perioperative imaging plays a critical role in determining the most accurate clinical stage: extent of local tumor, lymph node involvement, concomitant upper tract, or distant organ disease, which ultimately determines treatment and prognosis. CT with excretory urography is the most widely available and used imaging modality, although not without limitation. Up to 42% of patients are up-staged at time of cystectomy using current imaging modalities,<sup>6</sup> with CT accuracy in predicting extravesical disease historically 35% to 55%.<sup>7</sup> Given the limitations of CT to accurately predict primary tumor stages, newer image modalities have been explored. MRI has been compared with CT and demonstrated no significant improvement in the detection of microscopic perivesical fat invasion,<sup>8</sup> although the sensitivity of detecting macroscopic perivesical tumor invasion was improved, with 73% to 96% for MRI<sup>9</sup> and 55% to 92% for CT.<sup>10</sup> When looking at the sensitivity of detecting lymph node metastases, MRI has shown the ability to accurately detect pelvic lymph node involvement in 80% of cases; however, specificity has not been as accurate. Looking to expand the accuracy of radiographic staging, the use of fluorodeoxyglucose–PET/CT has been studied in MIBC and found to accurately identify nodal metastatic disease in 48% of patients,<sup>11</sup> detecting up-staging in 20% of patients and changing treatment intent from curative to palliative in 8.5% of patients.<sup>12</sup> Currently the role of PET/CT in staging has been relegated to adjudicating equivocal findings on CT or MRI and is not recommended for routine staging of patients with MIBC. To date CT scans remain the recommended imaging modality due to their relatively low cost, their availability, and lack of proved superiority of other imaging modalities.

### PERIOPERATIVE LABORATORY TESTING

Preoperative laboratory testing is one of the critical components of determining candidacy for specific types of UDs.<sup>13</sup> In particular, the assessment of renal function is paramount to decisions regarding UD, because more than 70% of patients undergoing UD have greater than expected renal function deterioration after UD.<sup>14</sup> Renal function deterioration occurs with both continent and incontinent UDs alike, with 74% and 71% of patients, respectively, experiencing significant declines in renal function over time.<sup>15</sup> The significant factors in determining the

risk of renal function declines include preoperative estimated glomerular filtration rate, hypertension, diabetes, postoperative hydronephrosis, presence of proteinuria, pyelonephritis, and the development of postoperative ureteroenteric strictures.<sup>14,15</sup> Classically, patients with an estimated glomerular filtration rate greater than 40 mL/min are candidates for continent diversions whereas patients with renal function less than this are recommended for incontinent diversions. In some cases, there is an expected improvement in renal function after diversion due to relief of obstruction. In these cases, additional evaluation and/or testing by nephrology is useful to determine if renal reserve is adequate for a continent diversion.

Other than renal function, hepatic function should also be evaluated because of the increased risk of hyperammonemic encephalopathy in patients with hepatic dysfunction who undergo continent UD.<sup>13</sup> This disturbance occurs due to the increase in ammonium chloride absorption across the luminal surface of the diversion. The treatment involves drainage of the continent UD with a catheter, administration of neomycin, and protein restriction along with treatment of any liver dysfunction.

Finally, all patients undergoing UD in the setting of bladder cancer should have complete blood cell counts and a comprehensive metabolic panel for staging, to identify any other underlying metabolic issues that may become exacerbated with UD.

### MUSCLE INVASIVE BLADDER CANCER

Additional considerations must be given to MIBC perioperative preparation. Along with clinical staging with radiographic imaging, the roles of examination under anesthesia for clinical staging and administration of neoadjuvant chemotherapy are 2 crucial steps to perform prior to undergoing RC/UD. Although neither EUA nor CT alone is optimal for clinical staging of bladder cancer, the combination of EUA and cross-sectional imaging has a specificity of 89% and a negative predictive value of 74% for pathologic extravesical disease.<sup>16,17</sup> The role of prostatic urethral biopsy prior to orthotopic neobladder reconstruction remains controversial. Although several studies suggest an increased risk for patients with carcinoma in situ of the prostatic urethra, others support frozen section analysis of the urethral margin as the only predictive factor.<sup>18</sup>

Based on 2 well-performed randomized controlled trials, neoadjuvant multiagent cisplatin based chemotherapy should be offered to patients preparing to undergo RC/UD for MIBC,<sup>19,20</sup> which correlates with a long-term survival benefit of 5%

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