J Wound Ostomy Continence Nurs. 2013;40(1):73-82.
Published by Lippincott Williams & Wilkins

CE OSTOMY CARE

Orthotopic Bladder Substitution (Neobladder)

Part I: Indications, Patient Selection, Preoperative Education, and Counseling

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Bladder substitution following radical cystectomy for urothelial cancer (transitional cell carcinoma) has become increasingly common and in many centers has evolved to become the standard method of urinary diversion. In determining the best type of urinary diversion for a specific patient, consideration must be given to both the morbidity associated with surgery and the potential positive impact on the patient's quality of life. Decision-making and perioperative care is ideally multidisciplinary, involving physicians and nurse specialists in urology, continence, and ostomy therapy. Physiotherapists may also be involved for pelvic floor muscle retraining. This article highlights preoperative considerations for patients undergoing radical cystectomy with a focus on issues specific to orthotopic bladder substitution as the method of urinary diversion. The second article in this 2-part series will outline postoperative strategies to manage these patients.

Introduction

Urothelial (bladder) cancer is the second most common urological malignancy, with transitional cell carcinoma or urothelial carcinoma comprising almost 90% of all primary bladder tumors in the Western world.[1-4] The incidence of urothelial cancer increases with age; 80% of patients are between 50 and 80 years of age. Although the majority of patients present with superficial bladder tumors, approximately 20% to 40% either present with or develop invasive disease. Over recent decades, radical cystectomy has emerged as the predominant treatment modality for patients with high-grade, invasive urothelial cancers and for those with less-invasive disease who fail treatment with bladder-preservation strategies. The ileal conduit has been the standard approach to urinary diversion following radical cystectomy for many years. More recently, however, orthotopic bladder substitution (or neobladder formation) emerged as an alternative to the ileal conduit. Various surgical techniques have been described; all involve the use of bowel to create a urinary reservoir that is anastomosed to the urethra.[5,6] Some clinicians now consider the neobladder to represent the "gold standard" in urinary diversion.[5]

Patients who require radical cystectomy have 3 choices in terms of urinary diversion, and clinicians must be knowledgeable regarding all options in order to provide appropriate patient education and counseling. The ileal conduit has been the traditional approach, but it provides no storage capacity and requires the patient to wear an external pouch for urine collection. The orthotopic neobladder provides a storage reservoir, and urine is eliminated through the urethra. Nevertheless, some patients with orthotopic neobladder experience leakage and others experience incomplete evacuation. A third option is construction of an abdominal reservoir with a catheterizable channel; this approach requires the patient to drain the reservoir at routine intervals via intermittent self-catheterization. Although much of the discussion in this article is appropriate for any patient undergoing cystectomy and urinary diversion, we will focus on the orthotopic bladder substitution as the considered form of diversion.

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DOI: 10.1097/WON.0b013e31827759ea

Indications

A definitive diagnosis of urothelial cancer is based on cystoscopy with biopsy, which enables the pathologist to determine the tumor grade and the depth of invasion into the bladder wall. Grading systems are designed to characterize the invasive potential of a particular tumor; urothelial tumors can be described as well differentiated, moderately well differentiated, or poorly differentiated. Poorly differentiated tumors are most likely to become locally invasive or metastasize, and well-differentiated tumors are less likely to become invasive. The tumor stage is the most important prognostic indicator and predictor of survival for patients with invasive urothelial tumors. Bladder cancer is normally staged and graded using the Tumour, Nodes, Metastsases (TNM) staging system, which stands for "tumor, node, and metastasis."[6,7] The TNM staging takes into account how deeply the tumor has grown into the bladder, whether the tumor has spread to the lymph nodes, and whether cancer has metastasized to other parts of the body. In addition, the patient must undergo additional diagnostic procedures to determine the presence of metastatic disease.

Depending on the tumor grade and stage of disease, radical cystectomy with extended pelvic lymphadenectomy and urinary diversion remains the gold standard for treatment.[8,9] Indications for radical cystectomy include tumor invasion into the muscle or prostate, carcinoma in situ lesions that are high-grade and refractory to intravesical chemotherapy or immunotherapy, recurrent multifocal superficial disease refractory to transurethral resection with or without intravesical therapy, and palliative surgery for symptomatic disease (pain, frequency, hematuria). Benign conditions refractory to conservative measures (eg, interstitial cystitis) may also necessitate cystectomy. For radical cystectomy in men, the prostate is almost always removed along with the bladder, although prostate-sparing cystectomy is being explored more often in the literature.[10] In women, the uterus, fallopian tubes, ovaries, and part of the vagina are usually removed, although vaginal and other adnexal-sparing procedures are being explored.[11] In all cases of malignancy, an extended bilateral pelvic lymphadenectomy is the oncological standard.[12]

Urinary Diversion

Cystectomy requires urinary diversion. The 3 options for diversion are the ileal conduit, a continent urinary reservoir managed by intermittent self-catheterization, and the orthotopic neobladder (Figure 1). The formation of an ileal conduit requires isolating a 10- to 15-cm segment of ileum from the fecal stream, along with its mesentery and vascular supply, closing off the proximal end of the segment and implanting both ureters into the proximal end in a manner that allows reflux of urine, followed by bringing the other end through the abdominal wall to create a stoma. Urine is collected in an external pouching system worn at all times.

The second option is the continent cutaneous pouch. As the name suggests, the patient is "continent" or "dry" in that there is no continuous drainage of urine and therefore the need for a pouching system is negated. The continent urinary reservoir is constructed from a detubularized segment of the small or large bowel. A narrow catheterizable channel is created that is regularly catheterized to empty urine from the abdominal reservoir several times a day.

Patients who meet certain criteria may be offered the third type of urinary diversion, the orthotopic neobladder.

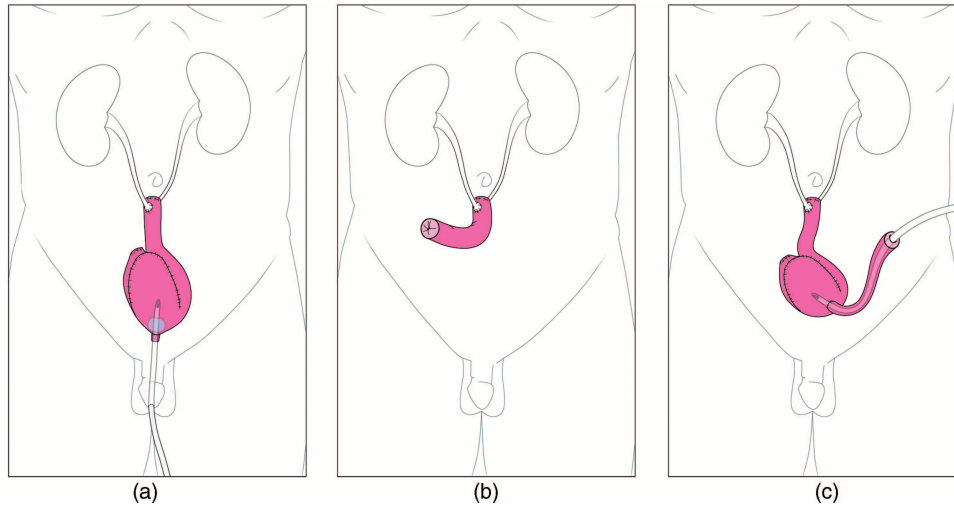

FIGURE 1. The 3 commonly used types of urinary diversion postcystectomy: (a) a continent orthotopic bladder substitution ("neobladder"), (b) an incontinent stoma, ie, an ileal conduit, or (c) a continent urinary reservoir into which patients perform intermittent self-catheterization. Figure illustrated by Walid Aziz. Copyright Nathan Lawrentschuk. Reproduced with permission.

Although called a neobladder or "new bladder," it is by no means a bladder because it is constructed from bowel. Construction of a neobladder requires creation of a large-capacity, low-pressure reservoir from colon or ileum; the reservoir is then anastomosed to the patient's native urethra (Figure 2). A segment of bowel (often 50-70 cm of ileum) is detubularized and shaped into a spherical reservoir for urine storage. The mesentery and associated blood supply is isolated and carefully preserved so as not to devascularize the now isolated segment. The ureters are implanted into this newly created reservoir and it is then anastomosed to the patient's native urethra—just like the bladder is reanastomosed to the urethra during a radical prostatectomy. The striated muscle component of the urethral sphincter mechanism (rhabdosphincter) is left intact in order to preserve continence. A patient typically will have temporary ureteral stents after the procedure (which may be internalized or externalized). The surgeon will also place a drain in the abdominal cavity, a urethral catheter, and possibly a suprapubic catheter. These catheters provide constant drainage of the neobladder and promote healing by preventing distention. These drains and catheters are discussed further and diagrammatically represented in part 2 of this series, which describes postoperative management of the patient undergoing construction of an orthotopic neobladder (Lawrentschuk et al, in press).

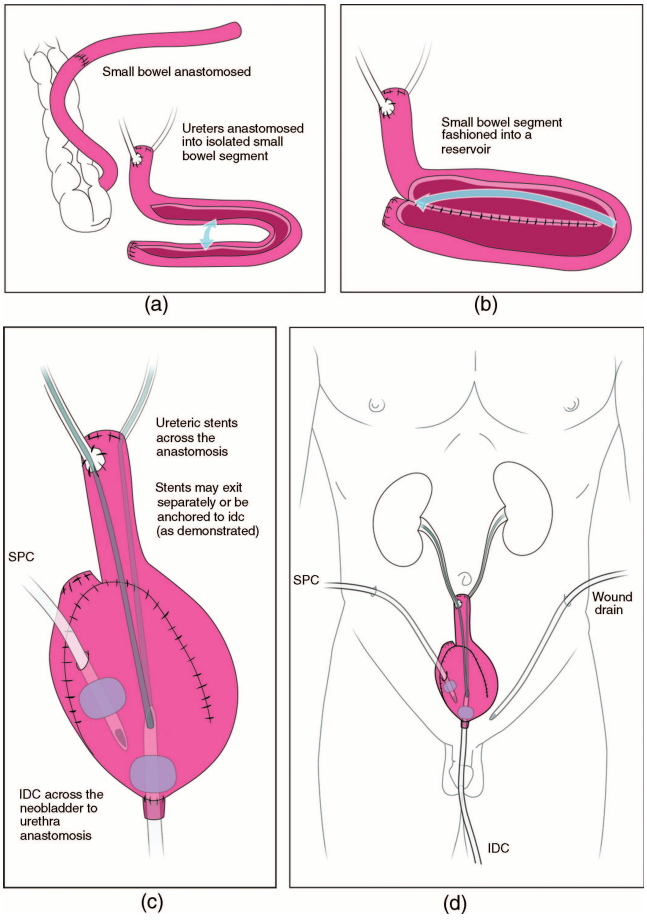

FIGURE 2. Orthotopic urinary diversion (Neobladder) construction (Studer-type): (a) A segment of small bowel (ileum) is isolated on its blood supply and the bowel re-anastomosed; (b) the neobladder is fashioned into a sphere from a tube with (c) sureteric tents entering from the kidneys down via the ureters into the neobladder along with a suprapubic catheter and per urethral catheter for drainage with (d) the neobladder in position and an additional drain external to the neobldder in the peritoneum. Figure illustrated by Walid Aziz. Copyright Nathan Lawrentschuk. Reproduced with permission.

Studies indicate that thorough education regarding options for diversion and the patient's active participation in treatment decisions are key to postoperative satisfaction, no matter what type of diversion is chosen.[13-15] Therefore, patients must be educated regarding the various options, and the final decision should be based on the patient's preference. In general, a neobladder has a higher complication rate and longer hospital stay than a conduit; thus, in specific cases patient or disease factors will favor the simpler ileal conduit.[13-16]

Patient Selection

Any patient who requires radical cystectomy, regardless of gender, is a potential candidate for orthotopic urinary diversion.[17] Certainly for younger patients, neobladders have gained increasing popularity following reports of improved health-related quality of life and postoperative voiding function.[18] However, there are some factors that are relative contraindications for a neobladder including more extensive disease or advanced age (Table 1).[18] Nevertheless, Saika and colleagues[19] reviewed their experience and reported that age is not a limiting factor for either neobladder or continent urinary reservoir as long as the patient retains the physical and cognitive function necessary for self-care. Therefore, it is important for the team to assess patients' overall function in a thorough manner preoperatively.

Another factor influencing diversion choice is the patient's understanding that there may be initial setbacks in learning to manage the neobladder, and his or her willingness to deal with such frustrations. The patient should

TABLE 1.

Minimum Patient Selection Criteria for Consideration of a Continent Urinary Diversion

Nonmetastatic disease
Negative biopsies from prostatic urethra (males) or bladder neck (females)
Adequate renal function (serum creatinine < 150 μmol/L)
Normal liver function
No active inflammatory bowel disease
Physical and mental ability to live with a neobladder
Compliance to routine follow-up

be made aware of the initial and sometimes long-term inconvenience of nocturnal incontinence associated with a neobladder, which occurs in up to 25% of men and up to 50% to 70% of women.[20] The patient will also need to consistently practice pelvic floor muscle exercises in order to gain optimal continence during physical activities; thus, the patient must have the cognitive and physical ability to perform these exercises and the commitment and persistence to practice them consistently.

Manual dexterity is also a key factor to successful adaptation to a neobladder. Approximately 30% of female patients and 5% of male patients require clean intermittent catheterization (CIC) of the urethra because of inability to adequately empty the neobladder completely or if mucous blockage occurs.[21] The patient should also be counseled that the neobladder is a *substitute* for his or her urinary bladder and that he or she will have to relearn the signals of "fullness" and strategies for effective emptying.

Relative Contraindications

Extensive malignant disease is a relative contraindication to construction of a neobladder (Table 2). If metastatic disease *is* present, the patient will be managed with neoadjuvant chemotherapy. Patients who respond well to chemotherapy may then be considered for cystectomy and potentially orthotopic neobladder, depending on other factors (Table 2). In some instances, patients with metastatic disease will require cystectomy prior to chemotherapy; in these situations, a conduit may be preferred since rapid postsurgical recovery is needed to enable earlier progression to adjuvant therapy. Specifically, the incision should be healed and the patient fully recovered from surgery prior to beginning chemotherapy. Finally, unexpected intraoperative findings may lead the surgeon to decide that a neobladder is contraindicated. Possible findings include local invasion into adjacent organs such as the prostate or discovery of lymph node metastasis during surgery. In each of these cases, the surgeon will opt for an ileal conduit because of the need to begin adjuvant chemotherapy as soon as possible. Furthermore, in the case of unexpectedly extensive invasion or nodal involvement, the patient may not live long enough to benefit from a neobladder. Patients receiving chemotherapy typically require placement of an indwelling catheter into the neobladder throughout the course of therapy. Indwelling catheterization is necessary because the gut mucosa preferentially absorbs chemotherapeutic agents, which would cause elevated serum levels and increased risk of complications.

TABLE 2.

Absolute and Relative Contraindications for Orthotopic Bladder Substitution (Neobladder)

Absolute Contraindications	Relative Contraindications
Presence of metastatic disease[a]	Advanced age (>70 y)
Tumor at prostatic urethra (male) or bladder neck (female)	Postoperative chemotherapy
Impaired renal function[b]	Radiation to pelvis
Impaired hepatic function	Bowel disease (eg, inflammatory bowel disease, cancer)
Physical disability to perform self-catheterization (eg, quadriplegia)	Body habitus and multiple prior abdominal surgeries[c]
Inability to understand the significance of and possible complications of a neobladder	Damaged rhabdosphincter or incompetent urethra
Inability or unwillingness to comply with patient demands associated with a neobladder	Impaired functional or comprehension status (eg, minor learning deficit, primary language different to treating team)

[a]Some clinicians believe minimal nodal disease not to be a contraindication.
[b]The renal function should be optimized prior to a cystectomy by a nephrostomy if felt to be due to obstruction before a neobladder is discounted.
[c]Obesity may be beneficial to having a neobladder but if overly excessive or if severe bony defects may not be ideal. Multiple surgeries may indicate significant adhesions in some cases.

At the time of surgery, the prostatic urethra of male patients or bladder neck of females should be biopsied (either preoperatively or intraoperatively) to exclude invasive carcinoma or *carcinoma in situ*. Positive biopsies are usually an indication for urethrectomy, which is an absolute contraindication to neobladder due to loss of the sphincter and urethral passage. However, if partial urethrectomy can be performed with both preservation of the sphincter and establishment of at least a 1-cm cancer-free margin, the patient might still be a candidate for neobladder. In women, the surgeon must evaluate for tumor extension into the vaginal wall or perivaginal pedicles, which would generally be considered a contraindication to neobladder.[9]

Impaired renal function and abnormal liver function are also relative contraindications to continent urinary diversion. A serum creatinine level more than 150 mol/L (1.5 mg/dL) is generally considered to be a contraindication to continent diversion of any type.[22] Impaired renal function is considered a contraindication to creation of a neobladder because the gut mucosa preferentially absorbs urinary waste products, which raises the serum levels of urea and creatinine further distresses the renal function. However, patients whose renal function is compromised as a result of ureteral obstruction are not excluded unless preoperative placement of a ureteral stent or percutaneous nephrostomy fails to resolve the problem.

Patients with abnormal liver function are not ideal candidates for neobladder construction because the bowel used to create the reservoir could potentially resorb urinary waste products, limiting the liver's ability to effectively metabolize and excrete resorbed waste products. For example, patients with cirrhosis or abnormal liver function tests are not able to metabolize ammonia

properly and would experience an increased risk for liver failure following neobladder construction. Metabolic acidosis is another potential complication of neobladder construction, due to the potential for resorption of ammonium and chloride and excessive excretion of sodium and bicarbonate. These individuals may be better candidates for an ileal conduit that does not store urine.

A previous history of pelvic irradiation or inflammatory bowel disease should not be considered as absolute contraindications, although postoperative complication rates are higher in these patients.[23] Neobladder construction may be feasible in certain situations. For example, neobladder construction may be reasonable in patients whose radiation fields were limited and did not involve the entire bowel, patients who underwent radiation therapy but retain a normal appearing bowel upon visual inspection, and persons with inflammatory bowel disease that does not involve the small bowel and that has been quiescent for a long period. Patients with significant functional impairments or persons residing in long-term care may be better served by an ileal conduit because it is easier to manage as compared to the neobladder.[24]

TABLE 3.

Preoperative Assessment and Education of Patients Undergoing Radical Cystectomy and Urinary Diversion in the Preoperative Outpatient Setting

Specific Issue	Health Care Professionals Involved	Goals
Explanation of procedure risks, complications, and pathways	Surgeon, urology nurse, continence physiotherapist, stomal-ostomy nurse	Understand procedure risks, benefits and set expectations, address concerns Identify suitable and unsuitable candidates for orthotopic diversion vs conduit
Psychological counseling and adjustment	Surgeon, urology nurse psychologist	Access to support groups and reliable literature/ multimedia/web sites Appropriate referral for "at risk" patients
Pelvic floor and neobladder training	Urology nurse, continence physiotherapist	Pelvic floor, bowel, and sexual education
Stoma vs orthotopic diversion	Urology nurse, continence physiotherapist, stomal-ostomy nurse	Stomal education as this remains a possibility in all cases (always marked)—life with a stoma vs orthotopic diversion
Preoperative medical assessment	Anesthetic team, urologist	Identify potential medical issues and coordinate workup, education on postoperative pain management

Preoperative Education and Counseling

Characteristic of most complex oncological procedures, a multidisciplinary approach is indicated in the patient undergoing radical cystectomy with construction of an orthotopic neobladder. This team usually involves physicians, specialist urology nurses, ostomy nurses, physiotherapists, and, if indicated, a psychologist (Table 3). Preoperative counseling should include advantages and disadvantages of the various types of urinary diversions from the surgeon, the ostomy nurse, and the continence specialist, with other team members involved as needed. Patients and families should be provided with relevant literature regarding the proposed cystectomy and urinary diversion. The patient must be allowed adequate time to have his or her queries answered and should be assisted to select the type of diversion that best meets his or her needs; patients who are actively involved in the decision regarding type of diversion report better quality of life.[14,15] These preoperative education and counseling sessions also give the treating team the opportunity to identify each patient's specific concerns and needs.

Medical Assessment

Medical assessment should be carried out by an experienced member of the urology team. A thorough medical history and systematic physical examination should be undertaken. Any patient who is taking anticoagulants (eg, aspirin, warfarin, clopidogrel) should have his or her underlying condition understood and reassessed if required. All such agents should be discontinued before the surgery to minimize the risk of intraoperative bleeding. Any other medical issues should be dealt with by referring patients to the appropriate specialists. For example, patients with diabetes should have an endocrinology consult with the goal of optimizing their glycemic control preoperatively to ensure good wound healing.

Anesthetic Assessment

In addition to providing a thorough assessment relative to anesthesia risks and concerns, the anesthesiology team should counsel patients about the mode of anesthesia and its potential complications, the use of different lines (eg, central venous catheter and arterial line), and different options for postoperative pain control (eg, epidural and patient-controlled analgesia).

Urology Nurse/Continence Nurse and Continence/Pelvic Floor Physiotherapist

Patients must clearly understand the basics of neobladder or continent diversion management, and patients undergoing neobladder construction must be educated regarding neobladder management, the possibility of intermittent

catheterization, and the importance of pelvic muscle exercises. This education may be provided by a urology nurse specialist, continence nurse specialist, or continence physiotherapist. These specialists provide the education and counseling critical to ensuring that patients have appropriate expectations, the knowledge and skills necessary to achieve a functional neobladder capacity of 400 to 500 mL, the ability to perform clean intermittent self-catheterization or CIC (in case of retention), and the ability to accurately perform pelvic floor muscle exercises (to reduce the incidence of stress incontinence and promote early return of continence). Specifically, CIC is taught to every patient in the outpatient setting even though it may never be utilized in the postoperative period.

Education regarding bowel management and prevention of constipation pre- and postoperatively is also an essential component of the patient's education. The continence/pelvic floor physiotherapist will also provide support and treatment for female patients presenting with postoperative issues of dyspareunia and pelvic pain.

Provision of appropriate written materials regarding the procedure and pathways is important, as is repeat consultation with the patient and the family. The nurse specialist also serves as a care coordinator and patient advocate, which is critical for patients dealing with a variety of care providers. Finally, the nurse specialist counsels patients regarding peer support groups and other services that will be available in the postoperative period.[25] There is significant crossover between the education provided by nurses and the education by physiotherapists, which provides helpful reinforcement of key content. It is thus important for all team members to be knowledgeable in regard to care pathways and expectations.

Pelvic Floor Muscle Exercises

Pelvic floor muscle exercises are a critical component of rehabilitation for the neobladder patient. Pelvic floor muscle exercises should be properly taught preoperatively and reinforced throughout the first 12 months postoperatively; most patients will benefit from lifelong adherence to a pelvic muscle exercise program.[26] Some recent data suggest that pelvic muscle exercise will promote both earlier restoration of continence and better overall continence.[27] While further studies are required, it is clear that patients will benefit from appropriate education provided by a specialist nurse or a continence physiotherapist or both.[26]

Ostomy Care/Stomal Therapy

Even when the patient is scheduled for a continent diversion or neobladder, the ostomy nurse should see the patient preoperatively to mark a stoma site and to give the patient the opportunity to wear a pouch for 24 hours. This is important because intraoperative findings may prevent creation of a neobladder or continent diversion, and an ileal conduit may be required; patients should always be counseled about this possibility.

Psychological Assessment

Ideally a psychologist should be available to assist the patient and the family to deal with the stress and anxiety of a cancer diagnosis as well as the stress related to surgery and urinary diversion. In most instances, the urology nurse and ostomy nurse specialists will also be involved in providing emotional and psychological support. If depression is suspected, the patient should be assessed and treatment initiated preoperatively. In very rare instances of marked psychological instability, the decision may be made to defer surgery or to proceed with an ileal conduit as opposed to neobladder or continent urinary diversion. All patients (and families) are offered the opportunity to discuss their cases with a patient via the cancer council to help them psychologically prepare for surgery and to, in some instances, assist with decision making.

Bowel Preparation

Since urinary diversion involves the use of intestinal segments, bowel preparation is a necessary preoperative step. There are several ways to achieve this and different surgeons or institutions tend to adopt different protocols. Some protocols involve a "low-residue" approach, that is, clear liquids the day before surgery and enemas the evening before surgery. Other protocols are more aggressive, with transition to a clear liquid diet 2 days before surgery and administration of an oral osmotic bowel-cleansing solution the day before surgery. Patients should be instructed that a clear liquid diet includes water, tea, and coffee without milk, clear broth, juices without pulp (eg, apple, cranberry, white grape), gelatin, and sport-type high-carbohydrate beverages. It should be acknowledged that aggressive bowel preparation with oral osmotic agents has not been shown to reduce the incidence of postoperative complications such as ileus[27,28]; however, aggressive protocols are still utilized in many centers. While bowel preparation is being abandoned for many colonic procedures, those procedures do not involve anastomosis of bowel to the urinary tract, and definitive papers regarding the need for aggressive bowel preparation prior to cystectomy and urinary diversion are yet to be published. Thus, some form of bowel preparation remains the "standard of care" in most centers.

Perioperative Care and Complication Prevention

Patients are usually admitted on the day of surgery. Prophylactic antibiotics with amoxicillin/clavulanic acid or cephalosporin, an aminoglycoside, and metronidazole

are given during surgery and may continue up to 48 hours postoperatively. Deep vein thrombosis prophylaxis with either standard heparins or low-molecular-weight heparins is started intraoperatively and should be continued throughout the entire hospitalization. In our center, patients are taught to administer anticoagulant subcutaneous medications daily; this is continued until 21 days postsurgery. Bowel function usually returns within 7 to 10 days, so total parenteral nutrition is indicated only if the patient experiences prolonged ileus. The objectives and importance of pulmonary physiotherapy and early mobilization should be emphasized to the patient preoperatively.

Education Regarding "Fast Track" Perioperative Approaches

Nurses have led the way in the development of enhanced recovery protocols involving standardized perioperative care plans or "fast track" (FT) approaches. These have now emerged as tools to assist cystectomy patients.[29] In general, the principles of FT protocols for visceral surgery incorporate innovative approaches to analgesia, bowel preparation and feeding, use of chewing gum to stimulate the bowel, and drainage management.[16] The evidence for such approaches has not been firmly established, but early data suggest that FT approaches may hasten discharge and certainly do not prolong discharge. In particular, feeding was completed significantly earlier in those on an FT protocol.[30] Nurses are the key drivers of any FT or expedited care pathways and must educate patients on what to expect and the typical length of stay in their institution.

Nutrition

All patients should be assessed in terms of nutritional status, and any nutritional deficiencies should be corrected preoperatively with the help of a dietitian. This is particularly relevant for bladder cancer patients as many of them experience significant weight loss prior to surgery and they may already be in a partially catabolic state. All patients should be placed on a high-protein diet and also a high-carbohydrate diet; such diets are also helpful in preparing patients for surgery due to the catabolic state and rebuilding required. Patients who are unable to eat well may need oral supplemental dietitian-initiated protein and carbohydrate supplements and those patients unable to keep up with such demands may warrant preoperative parenteral or intravenous supplements.[31,32] In addition, patients should be encouraged to incorporate foods rich in vitamin B_{12} and folic acid into their diet following discharge from the hospital.[22] Common sense also dictates that hydration and a high-fiber diet are essential to maintenance of normal bowel function both preoperatively and postoperatively; hydration is also important to normal renal function. General advice such as getting adequate rest and sleep and avoiding excessive alcohol and stimulants should also be emphasized.

Neobladder Voiding and Training

The technique of voiding through the newly constructed neobladder needs to be explained to the patient preoperatively, taught during the postoperative inpatient phase, and continually reinforced postdischarge. These patients do not experience the normal sensation of bladder filling and must learn to recognize the sensation associated with filling of the reservoir. Initially, patients should be instructed to void "by the clock"; the schedule for timed voiding is Q2 hours at baseline and is gradually increased to Q4 hours as reservoir capacity increases. Patients should be instructed to adhere meticulously to the established schedule and should use an alarm clock to assure that they empty the reservoir at routine intervals during the night. This very gradual increase in the voiding interval provides for progressive stretching of the reservoir, from an initial capacity of around 200 mL to a final capacity of around 500 mL. Patients must be counseled regarding the potential complications associated with overfilling of the reservoir: incomplete emptying and retention, urinary tract infection, and metabolic abnormalities.

In addition to being taught the importance of scheduled voiding, patients must be taught the procedure for effectively emptying the reservoir. Since the neobladder is acontractile, the patient needs to voluntarily open the sphincter and then must use the Valsalva maneuver to empty the neobladder via increased intra-abdominal pressure. Some patients benefit from the use of manual pressure exerted over the neobladder to promote emptying. Men may find that they can empty more effectively in the sitting position, at least initially when they are "learning" how to void with a neobladder. Although most patients with a neobladder empty completely, all patients should be taught how to carry out CIC. The ability to perform CIC also enables the patient to address potential problems such as urinary retention secondary to a mucous plug, which is common, or due to a kinked neobladder neck or stricture, which are uncommon.[33]

Pelvic Floor Education

Pelvic floor muscle exercise programs are individualized for each patient, based on assessment of correct activation, muscle strength, muscle endurance, and the ability to functionally brace (ie, to initiate and maintain a pelvic floor contraction prior to activities causing a sudden increase in intra-abdominal pressure).

Many men have strong pelvic floor muscles at baseline; for these individuals, the focus of pelvic exercise programs is on correct activation of the pelvic floor muscles and instruction regarding the activation of these muscles in various functional positions and just prior to activities that increase intra-abdominal pressure (the Knack

maneuver).[34] Patients should be taught to strengthen the pelvic floor muscles via a structured pelvic muscle exercise regimen; this is particularly important for men with less pelvic muscle strength at baseline. Attention is directed toward correct activation, strength training, endurance training, and functional bracing. Recommendations regarding the exercise program, frequency, and repetitions are as follows: Exercises should be performed no more than 3 times per day. For strength training, patients are instruction to perform 12 repetitions with a maximum "hold" time of 6 seconds. For endurance training, patients are instructed to hold for 60 seconds (or longer if possible). Patients are also taught to practice functional bracing in dynamic positions through the day. Programs are individually tailored and reassessed at each visit with the continence physiotherapist.

Role of Continence Physiotherapist

The patient is seen once or twice prior to surgery and is then followed up 3 to 4 days after discharge from hospital. Ongoing reviews continue until the patient has normal bladder function and is continent. Topics and skills addressed by the continence physiotherapist include the following: education regarding bladder function and the continence mechanism; education regarding bowel management and prevention of constipation postoperatively; introduction to neobladder training and what to expect postoperatively; education regarding the anatomy and function of the pelvic floor; pelvic floor muscle assessment, to include perineal assessment and digital rectal examination; instruction in pelvic muscle exercise program (strengthening exercises); instruction in pelvic muscle relaxation and the use of Valsalva maneuver to empty the bladder; strategies for managing dyspareunia and pelvic pain (if needed); support and reassurance for the patient and family; and advice regarding return to work and active exercise.[34]

Metabolic Consequences

Salt-loss syndrome and metabolic acidosis are the most common metabolic complications following an ileal neobladder substitution. This is due to the prolonged contact of urine with the bowel mucosa and is most likely to occur during the early postoperative period. This is because the mucosa becomes atrophic and altered over time, which reduces the potential for electrolyte resorption; in addition, there is adjustment in the homeostatic mechanisms controlling electrolyte balance and hydration. These adaptive responses make long-term issues less likely. The most common metabolic complication is hyperchloremic and hyperkalemic metabolic acidosis requiring prompt treatment. Therefore, the patient should be warned of symptoms such as lethargy, fatigue, dehydration, and potential weight loss, and should be taught to report these symptoms promptly so that treatment can be initiated. This is very important because metabolic acidosis can induce bone demineralization by impairing vitamin D synthesis and osteoclast activation. Therefore, it is important to treat even mild metabolic acidosis with alkalinizing medication.

Bowel Management

The type and length of bowel used for urinary diversion may lead to certain malabsorptive problems. Resection of the ileocecal valve may result in decreased bowel transit time and bacterial overgrowth, which, in turn, can cause malabsorption, steatorrhea, and diarrhea.[35] If more than 100 cm of terminal ileum is resected, patients will need ongoing vitamin B_{12} supplementation as the terminal ileum is the sole site for vitamin B_{12} and bile acid absorption. However, these problems can be avoided if the terminal ileum and ileocecal valve are preserved. Patients should always be told that normal bowel habits after a bowel resection will take some time to return as a varying degree of ileus is often expected. Patients should also be counseled regarding measures for prevention of constipation postoperatively; these measures include adequate fiber and fluid intake, proper position for defecation (back straight rather than rounded and feet flat on the floor or stepstool), and coordination between abdominal and pelvic floor muscles (full relaxation of the pelvic floor muscles followed by Valsalva maneuver).

Long-term Outcomes: Voiding and Continence

Patients undergoing orthotopic neobladder procedures have been reported to have a daytime continence rate of 70% to 95%.[36] However, up to 25% of patients with orthotopic neobladder report significant degrees of nocturnal incontinence, so patients should be educated regarding strategies, such as regular toileting and the use of continence aids, for managing this potential problem.

In terms of ability to effectively empty the neobladder with pelvic floor relaxation and Valsalva, approximately 4% to 10% of male patients and up to 40% of female patients require the use of intermittent self-catheterization.[36]

Patients should be counseled to abstain from any sexual intercourse for 6 weeks following surgery. Male patients should be counseled preoperatively that 15% to 50% of men will have erectile dysfunction,[37] even if a nerve-sparing approach is used. Penile rehabilitation has now been utilized with good effect in men undergoing cystoprostatectomy.[38] Thus, patients should be educated preoperatively regarding the outcomes associated with nerve-sparing procedures and should also be counseled regarding the benefits of early oral therapy with phosphodiesterase-5 (PDE5) inhibitors and intracavernosal injections as well as the availability of vacuum therapy and inflatable penile prostheses.[39]

Women may experience dyspareunia in 30% to 40% of cases.[40] However, some improvement should be anticipated 3 to 6 months after surgery. As with men, such issues should be raised and dealt with preoperatively. Vaginal sparing procedures or minimal vaginal excision are the preferred surgical approaches for sexually active women.

All patients will need to be monitored for the development of any new upper tract tumors by using various imaging modalities. Patients who have chosen neobladder also are at some risk for urethral recurrence. Indications for adjuvant chemotherapy, including evidence of nodal involvement or positive surgical margins, should be discussed with every patient.

Conclusion

Most patients with muscle-invasive bladder cancer require radical cystectomy and urinary diversion. It can be a challenging task to decide which urinary diversion will be best suited to the individual patient. Orthotopic neobladder is an increasingly popular option, but patients should be carefully screened to assure that they meet selection criteria. In addition, any patient undergoing cystectomy and urinary diversion must be educated and counseled regarding long-term management and both the advantages and disadvantages of the orthotopic neobladder. A multidisciplinary approach to preoperative and postoperative management is paramount.

ACKNOWLEDGEMENT

We acknowledge Walid Aziz, a 3D Medical Animator, Designer, and Interactive Developer from the university of Toronto for his medical illustrations.

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