26 Bladder Augmentation With or Without Urinary Diversion

Raymond R. Rackley, Joseph Abdelmalak, and Jonathan Ross

INTRODUCTION

Augmentation cystoplasty (AC) is used as a reconstructive technique for creating a compliant, large-capacity urinary storage unit to protect the upper urinary tract and can provide urinary continence when more conservative management fails. The standard enterocystoplasty involves anastomosing an adequate-sized, well-vascularized patch of bowel with the urinary bladder. This procedure is classically performed through an open laparotomy incision utilizing various segments of the gastrointestinal system: stomach, ileum, cecum, and ascending and sigmoid colon. However, no intestinal segment is a perfect physiological substitute for a native bladder, and all have the potential for a variety of complications, including urinary tract infection, stone formation, small bowel obstruction, metabolic complications, fistula formation, and, rarely, malignancy transformation. The choice of the bowel segment is based on the primary clinical requirements of the patient and the secondary preference of the surgeons. Recently, the laparoscopic approach to bladder augmentation as outlined has become the primary approach for procedures of augmentation enterocystoplasty. As demonstrated below, the technical steps in performing a laparoscopic bladder augmentation are designed to emulate its open surgical counterpart in every aspect, producing similar functional results with an improved recovery.

INDICATIONS AND PATIENT SELECTION

AC is indicated in chronically contracted bladders caused by tuberculosis, schistosomiasis, interstitial cystitis, neurogenic bladder dysfunction (resulting from spinal cord injuries), multiple sclerosis, myelodysplasia, and detrusor instability. In addition, various congenital conditions can result in a small, poorly compliant bladder that requires augmentation. For patients with physical disabilities who are unable to catheterize themselves via the urethra, a continent catheterizable abdominal stoma may be required in addition to a bladder augmentation.

A few contraindications to AC include bowel disease (Crohn’s disease), abnormal or short bowel (especially after radiotherapy), bladder tumors, and severe radiation cystitis. Significant renal impairment may be a relative contraindication for AC in some patients.

PATIENT PREPARATION

A complete evaluation of the upper and lower urinary tract is required, including blood urea nitrogen, serum creatinine, serum electrolytes, whole blood cell count, urinalysis, urine culture (when appropriate), renal ultrasonography, intravenous pyelography, a urodynamic study, and cystourethroscopy.

A clear liquid diet may be given to the patient for 2 d before the operation, and a bowel preparation is performed 1 d prior to the operation. Prophylactic antibiotics for bowel and urinary tract are required, as is antifungal medication when indicated. Barium enema is necessary to rule out diverticulosis if the sigmoid colon will be used. Many patients with neurological diseases have chronic constipation and may need more time for an adequate bowel preparation.

SURGICAL TECHNIQUE

The patient is placed in the supine position, and pneumatic compression stockings are applied to both legs. After induction with general anesthesia and endotracheal...
intubation, an oral gastric tube is inserted; both arms are tucked and protected along the sides. A 20 French urethral catheter is placed to provide effective intraoperative urine and pelvic fluid drainage. Depending upon an open or laparoscopic approach, either a midline incision or a lower abdominal transverse incision versus laparoscopic port placement is performed.

**BLADDER MOBILIZATION AND CYSTOTOMY**

The bladder is distended with saline instillation through the urethral catheter. The loose areolar tissue surrounding the bladder is bluntly dissected to expose the anterior bladder neck and perivesical spaces. A transverse wide U-shaped cystotomy incision is created, with the apex approaching the anterior bladder neck and the base extending posteriorly past the mid-coronal plane of the bladder dome. This type of cystotomy ensures a large disruption of the bladder musculature to increase the linear length of the bladder wall for bowel anastomosis. Other options may include a midline sagittal or mid-transverse cystotomy.

The surgical technique of enterocystoplasty has the following prerequisites: (1) selection of an optimal segment of bowel based on a broad, well-vascularized mesenteric pedicle, (2) isolation of the bowel segment, (3) reestablishment of bowel continuity and closure of the mesenteric defect, (4) detubularization and reconfiguration of the bowel segment without peritoneal Soiling of bowel contents, (5) bladder mobilization with formation of an adequate-sized cystotomy, (6) creation of a tension-free, watertight, full-thickness circumferential anastomosis of the bowel to the bladder, and (7) confirmation of adequate postoperative urinary drainage.

**BOWEL SELECTION AND MOBILIZATION**

Various segments of bowel can be used for augmentation depending on the clinical requirements of the patient and the preference of the surgeons. A length of 15–20 cm is usually desirable to attain an adequate augmented bladder capacity.

In ileocystoplasty, the initial step is identification of the ileocecal junction. Then a 20- to 25-cm segment of ileum at least 15 cm proximal to the ileocecal junction is required.

In sigmoidocystoplasty, a loop of sigmoid colon is identified. The sigmoid colon is the preferred segment of bowel for harvesting if the patients can easily perform intermittent catheterization via the urethra and a continent catheterizable stoma formation is not required. In addition, many patients may have a redundant sigmoid segment secondary to neurogenic bowel dysfunction.

In ileoceccystoplasty, the cecum and ascending colon are used for the bladder augmentation, and 10–12 cm of terminal ileum are used to create the catheterizable conduit and stoma at the umbilicus. The peritoneum lateral to the cecum and ascending colon and the peritoneum of the terminal aspect of the Z line are incised, and the entire right colon and terminal ileum are mobilized.

The preselected loop of bowel is isolated with its pedicle between bowel clamps. Care is taken to prevent any twisting of the mesenteric pedicle and to ensure proper proximal-distal orientation of the loop. The excluded bowel segment is draped in moist warm sponges and then irrigated thoroughly with normal saline until the returning irrigation is clear. The antimesenteric border of the bowel is incised using electrocautery. For the small bowel or sigmoid, a U-shaped plate is created by a side-to-side anastomosis with 2-0 vicryl sutures (Fig. 26.1). Bowel continuity is reestablished using a gastrointestinal anastomosis stapling device, and the mesenteric window is closed.

For patients requiring a catheterizable stoma, the right colon and the terminal ileum are utilized and are extracorporealized through the laparoscopic port site for reconstructive purposes. Following detubularization of