**When is bladder augmentation necessary?**

Some conditions (such as myelomeningocele, posterior urethral valves, radiation therapy, certain types of chemotherapy, tuberculosis, or interstitial cystitis) cause the bladder to become very small and hold a limited volume of urine at high pressures. Incontinence and kidney damage are typical results of such dysfunctional bladders. For these patients, relief of symptoms and protection of the kidneys requires that the bladder be increased in size (bladder augmentation).

In other situations, such as surgery for cancer, the bladder must be removed. For these patients, a new reservoir must be created (bladder substitution) with a pathway for drainage of the urine either through the normal channel (urethra) or through a new passage (stoma).

Bladder reconfigurations are big operations and usually require the use of intestine to replace a bladder or to make it larger. Intestine must be opened and re-routed, and for at least 5 days after the surgery, the entire gut is paralyzed so that the stomach may be continuously drained of its own fluids and swallowed air by a nasogastric rube until the gut resumes its own function.

**What are some problems associated with bladder augmentation and substitution?**

**Catheterization:** Intestine does not function like normal bladder and many patients need to use intermittent catheterization to empty their bladders. Some patients develop difficulty with catheterization late after reconstruction and
may require cystoscopy or stomal revision.

**Mucous formation:** Intestine produces mucous, whereas normal bladder does not. Sometimes the mucous production is excessive and causes blockage. This is usually treated by medicines irrigated into the bladder or reservoir, and usually mucous formation decreases with urine.

**Intestinal complications:** Leakage of intestine contents (peritonitis) is a potential early complication and blockage (bowel obstruction) can occur just after surgery or even years later. Abdominal pain, cramps, diarrhea, or constipation should always receive prompt attention, and usually requires surgery.

**Urinary complications:** Early after surgery, urinary leakage through the wound (fistula) is a risk. This is not common, but if it occurs it may require further surgery. Infection, stone formation, blood in the urine and blockage of flow from kidneys or bladder reservoir are potential problems in patients with reconfigured urinary tracts. Any changes in the urine or any new pains should be evaluated promptly.

**Metabolic acidosis:** One important job of the kidney is removal of waste products, including acids. The bladder normally does not reabsorb the waste products, but intestine can reabsorb some waste products (especially acids) and return them to the body’s circulation. Metabolic acidosis is a likely result of this. It is detected by simple blood tests and corrected by daily medicine. Sometimes, changes in body salts, minerals and fluids and affect bone growth and cause kidney or gall stones.

**Urinary incontinence:** This may be related to pressure waves within the augmented or substituted bladder. Other causes include incompetence at the
normal or reconstructed valves (sphincters), urinary infection, bladder stones, or excessive times between intermittent catheterization. Any new urinary leakage should be evaluated promptly.

**Perforation:** Among the augmented and substituted bladders, there has been a small percentage of spontaneous perforation. This may be due to over-distention (because of excessive times between catheterization), puncture by a catheter, disruption at a suture line, weakness in a part of the bowel wall, abdomen, shoulder pain, blood in the urine, fever, or generalized "sickness." This is a life-threatening complication that requires urgent evaluation and surgical repair may be necessary.

**Malignancy:** Cancers can form in any patient’s normal intestine and they occasionally occur in the intestine used for urinary tract reconstruction. In addition, the abnormal bladder can also develop malignancy. Bladder surveillance by urine analysis, cytology, ultrasound, X-ray cystogram, and cystoscopy should be performed at appropriate intervals for the rest of the life of the patient.

The final word for patients with urinary tract reconfiguration is lifelong surveillance. We recommend yearly evaluation of the patient’s catheterization routine and continence - in addition to general history and need to be performed. Blood pressure, urine analysis, and blood tests (CBC, creatinine and electrolytes) need to be performed. Urinary tracts should be monitored by yearly ultrasound. In older patients, bladder cytology should be checked, periodic cytology should be checked, and periodic cystoscopic inspection of the bladder or its substitute would be wise. Any change in status or new symptoms must be evaluated promptly.

**What is the process for postoperative bladder care?**
After the operation there will be several tubes. When you are all healed the last tube will come out. You will have to irrigate the bladder regularly - if there is a lot of mucus you may have to do so each day or if the urine is clear, you may need to do so only once a week. You will need to be regularly followed by your doctor at least once a year.