Robot-Assisted Laparoscopic Augmentation Ileocystoplasty: a Case Report

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Augmentation cystoplasty is suitable for a contracted bladder with low compliance that is refractory to conservative treatment. However, the procedure is associated with operative morbidity such as a long surgical wound, postoperative pain, and a long hospital stay. With the goal of reducing the morbidity associated with open surgery, minimally invasive surgery is increasingly being performed as laparoscopic and robotic surgeries. Here we report an initial case of robot-assisted laparoscopic augmentation cystoplasty using the ileum in a male patient with a contracted bladder.

Key Words: Urinary Bladder; Neurogenic; Robotic; Laparoscopy

Patients with a spinal cord injury in the upper micturition center can experience irreversible injury in the upper urinary tract due to a reduction in bladder capacity and an increase in intravesical pressure. Clean intermittent catheterization (CIC) with anticholinergic administration can be applied first in order to maintain lower intravesical pressure and to improve the urinary symptoms. When that treatment fails, operative treatments such as sphincterotomy, suprapubic cystostomy, and bladder augmentation are used [1-4].

Here we report the operative method and results of a successful case of robot-assisted laparoscopic augmentation ileocystoplasty that was conducted in a patient with neurogenic bladder after spinal cord injury.

Case

A 54-year-old male patient visited with urge urinary, weak stream, and urinary incontinence. He had undergone spondylosyndesis 5 years previously because of comminuted fractures in his spine at T12 and L1 caused by an accidental fall. Urodynamic study showed his maximal bladder capacity to be reduced to 130 ml and intravesical pressure to be increased to 89 cmH2O. His frequency of daily voiding was 12 times, his functional bladder capacity was 100 ml, and his frequency of night urination was four times.

In the voiding cystourethrogramic image, grade I vesicoureteral reflux was observed on the right side when 70 ml of contrast medium was injected (Figure 1). In the renal ultrasonography, grade II hydronephrosis was observed on the right side. In the abdominal CT, multicentric renal scars and atrophy were observed in the right kidney. Anticholinergics and CIC were administered, but the urination disturbances and recurrent urinary tract infections continued. The decision was made to treat surgically because we observed irreversible changes in the patient’s upper urinary tract.

The peritoneal approach was used with the pa-
Figure 1. Voiding cystourethrogramic findings. The preoperative image shows the contracted bladder with vesicoureteral reflux on the right side (A). The postoperative image at 7 months shows the enlarged bladder capacity without vesicoureteral reflux (B).

Figure 2. Port site of robot-assisted augmentation ileocystoplasty: a camera port with a 12-mm trocar at the superior umbilical crease, two robot-arm ports with 8-mm trocars at the lateral borders of the rectus muscle between the umbilicus and anterior superior iliac spine (ASIS), one robot-arm port with an 8-mm trocar at 2 cm above the right ASIS at the level of the umbilicus, and an assistant port with a 12-mm trocar at 2 cm above the left ASIS.

Figure 3. Postoperative findings including a cystostomy catheter and a Jackson-Pratt drain.

tient under general anesthesia. A Veress needle was inserted around the umbilicus, and a pneumoperitoneum was formed. For the robot camera port, a 12-mm trocar was put on the upper umbilicus, and 8-mm trocars were inserted through the hypogastrium for the three robotic working arms. For assistant arms, a 12-mm trocar was inserted at 2 cm above the left anterior superior iliac spine (Figure 2).

First, a 6-cm incision was made from the front to the triangle of the bladder along the sagittal plane, and four points of the bladder were fixed to open it. After stopping gas was injected, the laparoscope was removed, and an additional 4-cm skin incision was made on the lower abdomen. Around 15 cm of the long segment was pre-
served at the proximal ileocecal and 15 cm of ileal segment was freed. The freed ileal segment was washed to be incised vertically along the boundary of the opposite side of the mesentery. A U-shaped ileal pouch was formed by consecutive sutures of the medial and the lateral of the incised phase. After the ileal pouch was put into the abdominal cavity, a 12-mm trocar was again equipped on the umbilicus, the camera was equipped, and the robot arms were united to each port. The ileum and the bladder were connected with continuous or simple sutures by using 3-0 absorbable suture (3-0 Vicryl®). A suprapubic cystostomy was formed by using an 18 Fr. Foley catheter and a drainage tube was retained at the end of the operation (Figure 3).

The operation took 300 minutes. The estimated bleeding was about 225 ml, and no transfusion was needed. The pain could be controlled by administration of oral analgesics, and the patient could walk by the third postoperative day. On postoperative day 10, cystography was conducted to verify that no urinary efflux existed and to remove the urethral catheter. The patient was discharged on the 14th postoperative day without specific postoperative complications. In voiding cystoureterogram images taken during the 7th postoperative month, the bladder capacity was increased to 350 ml and no vesicoureteral reflux was observed (see Figure 1). The functional bladder capacity was increased to 280 ml, the night urinary frequency was reduced to twice, the residual urine was measured to be 5 ml or less, and the patient did not need CIC.

Discussion

Bladder augmentation is a radical approach to treating neurogenic bladder with reduced compliance. It is a safe and effective treatment with urinary continence rates of 58% to 100% and protection of the upper urinary tract postoperatively [5]. In 1995 Docimo et al. [6] first reported laparoscopic bladder augmentation using the greater curvature of the stomach. In 2000, Gill et al. [7] reported three cases of laparoscopic bladder augmentation using different long segments including the ileum, right large intestine, and left intestine.

Recently, laparoscopic operation using the Da Vinci robot was developed. Robot-assisted laparoscopic operation has merits such as a device with seven degrees of freedom high-resolution, three-dimensional pictures; direct-view movement and removal of hand shaking. These merits are sufficient to attract the interest of urologists because the procedure has a rapid learning curve and its operational results can be equivalent to those of the existing open surgery or laparoscopic operations [8].

When a replaced bladder is formed by using the ileum, it can be formed by internal suturing with only laparoscopic operation or by external suturing after 2 to 3 cm of expanded skin incision around the trocar. We selected the external approach, because transillumination can be applied when the mesentery is incised, resulting in the preservation of blood flow in the ileum and the ability to complete the ileal end-to-end anastomosis more safely. Also, the method has merits including that it can prevent intraperitoneal contamination by visceral contents, which reduces both the risks of postoperative intraperitoneal abscess and the operative time. However, it has a shortcoming in that the additional incision to expose the ileum causes a cosmetic problem.

Until now, most research on robot-assisted laparoscopic augmentation ileocystoplasty has focused on patients who are children. All of the research has emphasized the shortened recovery and cosmetic superiority of the method, including rapid walking and dieting postoperatively and less administration of analgesics, and have reported satisfactory operative results [9]. In the follow-up, the patient was satisfied on a cosmetic basis because of the considerably small scar, and his quality of life was enhanced. We successfully conducted a robot-assisted laparoscopic augmentation ileocystoplasty and have reported its merits, including rapid postoperative recovery, and cosmetic superiority. Robot-assisted laparoscopic augmentation ileocystoplasty can be another option for bladder augmentation, although long-term follow-up observation may be needed.
References


