

Laparoscopic Augmentation Enterocystoplasty Through a Single Trocar

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OBJECTIVES	To report on the initial case and surgical technique of laparoendoscopic, single-site, subtotal cystectomy and augmentation enterocystoplasty performed through a single multichannel transumbilical port in a patient with neurogenic bladder.
METHODS	Laparoendoscopic, single-site, subtotal cystectomy and augmentation enterocystoplasty was performed in a 20-year-old woman with neurogenic bladder secondary to congenital sacral lipoma that had been operated on at 2 years of age. The patient had a long history of urinary incontinence and frequent and urgent urination. The imaging and urodynamic studies revealed a 100-mL bladder capacity with thickened walls, countless diverticula, and low compliance. The procedure was performed exclusively using a novel multichannel access port. Additional instruments included the 5-mm video laparoscope, SonoSurge, and flexible scissors. Subtotal cystectomy was initially performed by resecting 70% of the bladder. The ileal loop was exteriorized through the single port by detaching the valve, and the ileal pouch and bowel continuity were restored extracorporeally. The vesicoileal anastomosis was performed laparoscopically.
RESULTS	The operating time was 300 minutes, and the blood loss was <100 mL. No intraoperative or postoperative complications developed. The hospital stay was 6 days. The drain and Foley catheter were removed at 7 and 21 days postoperatively, respectively. Postoperative cystography confirmed a watertight anastomosis and increased bladder capacity. At last follow-up, the patient was performing intermittent self-catheterization to complete emptying.
CONCLUSIONS	Our initial experience with laparoendoscopic, single-site, subtotal cystectomy and enterocystoplasty through a single port was encouraging. The use of the larger diameter port significantly facilitated extracorporeal bowel reconstruction and can be used for various minimally invasive surgical procedures. UROLOGY xx: xxx, xxxx. © 2009 Elsevier Inc.

Recently, there has been an increasing use of ablative and reconstructive laparoscopic procedures through a single transumbilical incision.¹⁻⁸ This variant of laparoscopic surgery has received different names, including embryonic natural orifice transumbilical endoscopic surgery (E-NOTES), natural orifice transumbilical surgery (NOTUS), and single-port access (SPA). Most recently, a Single Port Consortium met and proposed the term “laparoendoscopic single-site (LESS) surgery” in an attempt to cover all laparoscopic procedures performed through a single abdominal incision.⁹⁻¹¹

The development of LESS surgery in urology has been exponential since its initial description in 2008, with

various ablative and reconstructive procedures successfully described.^{12,13}

We report the first case of laparoscopic augmentation enterocystoplasty performed by laparoscopy through a single transumbilical multilumen trocar (QuadPort, Advanced Surgical Concepts, Dublin, Ireland), detailing the surgical technique used.

MATERIAL AND METHODS

LESS subtotal cystectomy was performed in a 20-year-old woman with congenital sacral lipoma who had undergone surgery at 2 years of age and subsequently developed neurogenic bladder. She presented with a long history of urinary incontinence, frequent and urgent urination, and repeated urinary tract infections, with worsening symptoms during the previous 2 years. Cystoscopy revealed a small, thick-walled bladder with multiple diverticula and saccules. Urodynamic studies confirmed a hyperreflexic bladder with a capacity of 100 mL and low compliance.

The procedure was performed using a novel, multichannel single-port device (QuadPort, Advanced Surgical Concepts) that has four 12-mm openings protected by a gel valve. It also

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Submitted: October 8, 2008, accepted (with revisions): January 26, 2009

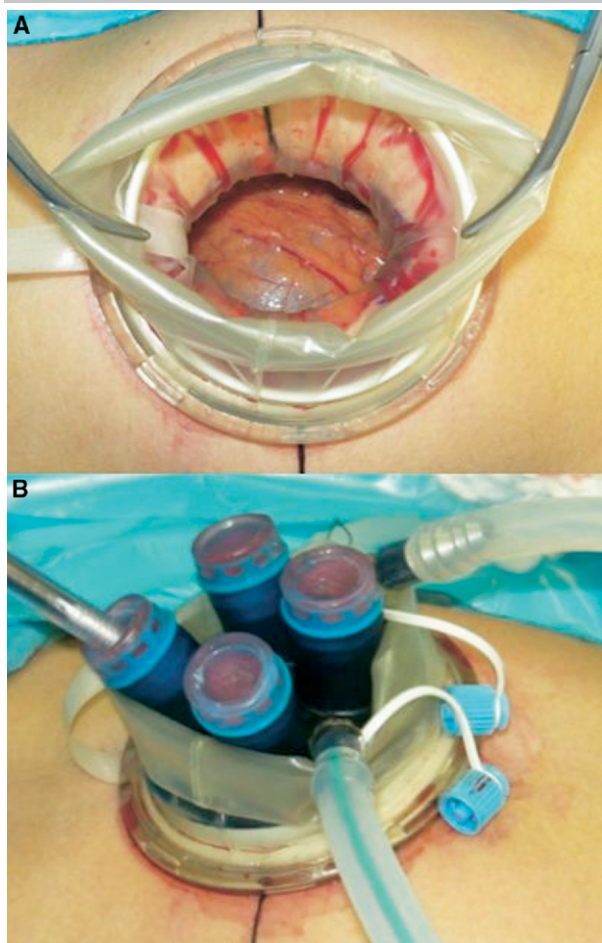


Figure 1. Quad port introduced into peritoneal cavity (A) with and (B) without valve.

incorporates separate channels for gas insufflation and evacuation.

The procedure was performed with the patient under general anesthesia and placed in the dorsal decubitus position with a Trendelenburg tilt and her upper and lower extremities adducted. The QuadPort was introduced into the peritoneal cavity through a 5-cm longitudinal transumbilical incision. The 5-mm flexible-tip videoscope (EndoEYE, Olympus Medical, Tokyo, Japan), SonoSurge, and flexible scissors (Cambridge Endo), as well as the other standard laparoscopic instruments, were used through the port to perform the procedure. No extraumbilical skin incisions or additional trocars were used (Fig. 1).

The bladder was initially mobilized, and approximately 70% of the diseased bladder was resected above the trigone using ultrasonic shears. The flexible-tip monopolar shears also facilitated bladder wall excision.

With the ablative stage finished and having checked the hemostasis, a 60-cm segment of the terminal ileum was identified and its mesentery sectioned at 15 and 75 cm from the ileocecal valve using ultrasonic shears. A marking silk stitch was placed through the proximal bowel wall to maintain orientation. The isolated ileal segment was exteriorized through the ring of the QuadPort by disconnecting the valve. The 60-cm segment of ileum was isolated and bowel continuity re-established using a stapled anastomosis. The 60-cm ileal loop was irrigated and detubularized. The patch of ileum was recon-

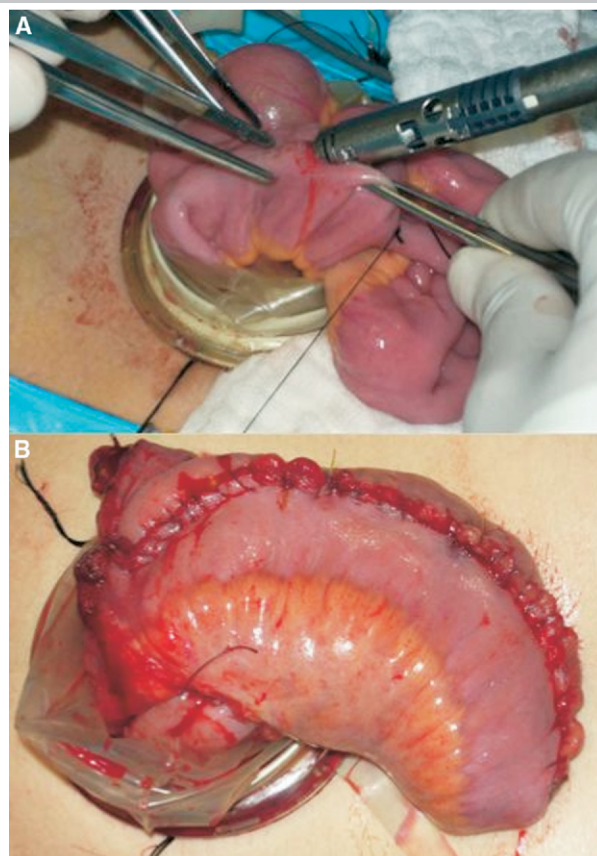


Figure 2. (A,B) Pouch of ileum reconstructed extracorporeally.

structed extracorporeally to form a pouch in preparation for subsequent augmentation cystoplasty (Fig. 2). The reconstructed bowel and pouch were reinserted inside the abdomen, the valve was reattached, and pneumoperitoneum was re-established.

The correct orientation of the pouch was confirmed intracorporeally, and the pouch was anastomosed to the trigone with 2-0 polydioxanone sutures placed using intracorporeal laparoscopic suturing. A conventional straight needle driver was used to place the sutures. A combination of intracorporeal and extracorporeal knot tying was used for the anastomosis. The flexible articulating needle driver (Cambridge Endoscopic Devices, Framingham, MA) was selectively used for this step. A 20F Foley catheter was placed in the bladder, and a Blake drain was left at the level of the pelvis and exited through the umbilical incision. The augmented bladder was filled and water tightness confirmed before closure.

RESULTS

The operating time was 300 minutes, and the blood loss was <100 mL. No intraoperative or postoperative complications developed. The hospital stay was 6 days. The drain and Foley catheter were removed at 7 and 21 days postoperatively, respectively. Postoperative cystography at 1 month after surgery confirmed complete healing and improved bladder capacity (Fig. 3). The patient was dry and voiding spontaneously. At last follow-up, she was performing intermittent self-catheterization to complete

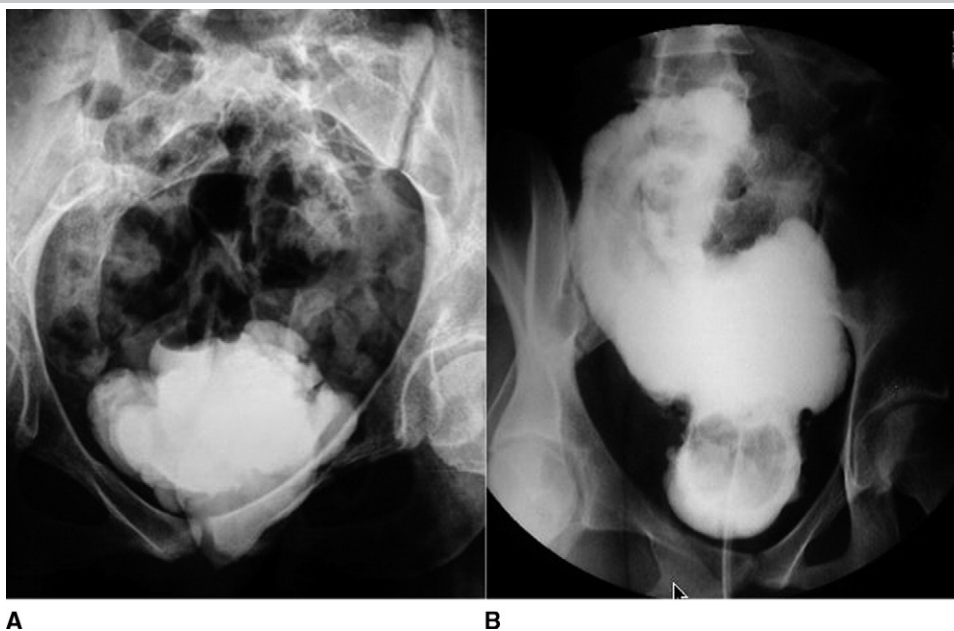


Figure 3. Cystogram (A) before and (B) 1 month after surgery.

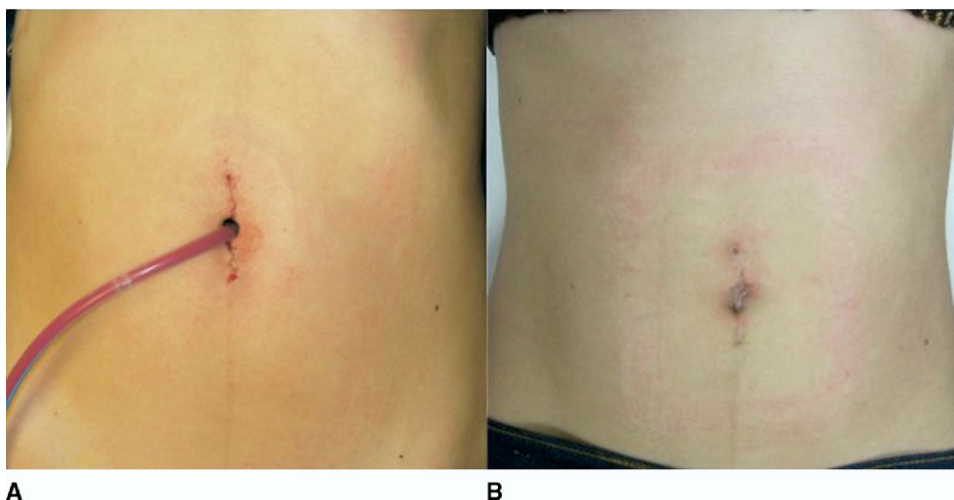


Figure 4. (A) Blake drain through umbilical incision, and (B) cosmetic result.

bladder emptying. The cosmetic result was very good, with minimal scarring (Fig. 4).

COMMENT

The presence of a low-compliance, small capacity bladder often requires surgical augmentation using bowel if medical treatment fails with the aim of preserving upper tract function and treating incontinence. Because of the small bladder with multiple diverticula, and to avoid deformities such as hourglass of the new neobladder, we decided to excise 70% of the bladder.¹⁴

Laparoscopic augmentation cystoplasty has been successfully used for the surgical treatment of neurogenic bladders. Although laparoscopic augmentation has been reported using exclusive intracorporeal techniques, many centers have performed the bowel work extracorporeally in an attempt to reduce the operative time.¹⁵⁻¹⁷

Recently, attempts have been made to further reduce the morbidity and improve the cosmesis of laparoscopic surgery by consolidating the access through a single trans-umbilical incision. Various ablative and reconstructive surgical procedures have been performed using a variety of specialized multichannel ports, as well as multiple standard laparoscopic ports inserted through a single abdominal incision, often concealed within the umbilicus. These groups of procedures have recently been termed LESS surgery. We previously used a novel multichannel port that had 3 inlets (TriPort, Advanced Surgical Concepts) to perform LESS procedures. The QuadPort used in the present case is a larger version of the TriPort and incorporates 4 channels and can be retained through a larger abdominal incision ≤ 6 cm in length. This makes it uniquely suited to performing various laparoscopic procedures requiring bowel resection and anastomosis that

can be safely performed extracorporeally by detaching the valve of the port from the retaining ring to facilitate exteriorization of the bowel segment.^{18,19}

To our knowledge, this is the first report of LESS augmentation cystoplasty. We believe the procedure was technically straightforward and could be an attractive alternative to conventional laparoscopy for patients requiring bladder augmentation.

CONCLUSIONS

The results of our study have shown that LESS enterocystoplasty is technically feasible. The unique design of the larger multichannel access device, the QuadPort, facilitates the extracorporeal portion of the bowel loop isolation and pouch creation. Additional clinical studies of larger groups of patients are necessary to compare the efficacy with that of standard laparoscopy and open surgery.

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