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Experience with urinary bladder substitution using detubularized ileocolonic segment in radical cystectomy.

Samrit Laornuan*

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Radical cystectomy with ileal conduit urinary diversion has been the conventional surgical procedure for early invasive cancer of urinary bladder. Yet, it creates considerable undesirable complications and is cosmetically unacceptable. A new surgical approach is proposed herein for treating such disease. Four patients (2 men and 2 women, age 54-68 years) who had early invasive bladder cancer underwent radical cystectomy and total urinary bladder substitution. The latter was done with the detubularized ileocolonic bowel segments. After a mean follow-up period of one year total urinary continence could be achieved in 3 cases. Metabolic complications (based on serum urea nitrogen, serum creatinine and serum electrolytes) and structural deterioration of upper urinary tract were not observed. The preservation of urinary tract continuity, urinary continence and lack of abdominal ileal stoma was well-accepted by both surgeons and patients. The authors recommend this operative procedure to be employed in early invasive bladder cancer.

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สัมฤทธิ์ ลออนวน, ประสบการณ์ในการผ่าตัดกระเพาะปัสสาวะใหม่ ในการรักษามะเร็งกระเพาะปัสสาวะระยะเริ่มแรก. จุฬาลงกรณ์เวชสาร 2538 เมษายน ; 34(4): 297-305

ระหว่างเดือนมกราคมถึงเดือนกรกฎาคม 2531 ได้ผ่าตัดผู้ป่วยมะเร็งกระเพาะปัสสาวะ 4 ราย โดยการตัดเอากระเพาะปัสสาวะออกหมด (*Radical cystectomy*) พร้อมกันกับใช้ส่วนของลำไส้ (*Ileocolonic*) มาตัดต่อเย็บสร้างเป็นกระเพาะปัสสาวะใหม่. รายละเอียดของเทคนิคการผ่าตัด, ผลการรักษาและข้อคิดเห็นเสนอ. จากการติดตามผลการรักษาในระยะ 9 ถึง 18 เดือนแรกเป็นที่น่าพอใจ ไม่พบว่ามีภาวะเสื่อมประสิทธิภาพของไต, กระเพาะปัสสาวะใหม่ทำงานได้ดี การที่ไม่มีรูเปิดที่หน้าท้อง (*Abdominal stoma*) การที่สามารถถ่าย และกลั้นปัสสาวะได้เกือบเหมือนปกติอาจจะเป็นที่ยอมรับ และเหมาะสมมากกว่าสำหรับผู้ป่วยที่มีอาชีพ และฐานะทางเศรษฐกิจอย่างเช่นผู้ป่วยในประเทศไทย.

Radical cystectomy is currently the curative measure of choice for early invasive cancer of urinary bladder. Once the bladder is removed, there are various optional operative procedures available for urinary diversion such as ureterosigmoidostomy, small or large bowel conduit. Among these, the Bricker's ileal conduit method is the most popular⁽¹⁾. Yet, patients usually find themselves difficult in accepting such procedure. Postoperatively, they suffer the distressing body image from the presence of abdominal stoma for urinary diversion, and the necessity to use external urinary appliances. Subsequent complications such as metabolic acidosis, urinary tract infection, nephrolithiasis and renal failure also make this procedure less attractive.⁽²⁻⁴⁾

Instead of urinary diversion, a detubularized bowel segment was used to create a neobladder, thus maintaining urinary tract continuity. Satisfactory result with this procedure has been reported by several authors⁽⁵⁻¹³⁾ since 1985. We report herein our experience at the Chulalongkorn University Hospital in urinary bladder substitution with detubularized ileocolonic segment after radical cystectomy.

Materials and Method

From January to June, 1988, 2 male and 2 female patients with early invasive transitional cell carcinoma of the urinary bladder had undergone an operation for total bladder reconstruction after radical cystectomy. Their ages ranged from 54 to 68 years. Presence of the carcinoma was confirmed by pathological examination of the biopsied specimen from cystourethroscopic examination.⁽¹⁴⁾ Absence of metastasis to bone, liver, spleen and lung was demonstrated by normal radionuclide scan, normal chest x-rays and normal liver enzymes. Other preoperative evaluations included excretory urography, complete blood count, blood urea nitrogen, serum creatinine and serum electrolytes.

Operative procedure

Bowel cleansing was accomplished with the standard 3 day mechanical and antibiotics bowel preparation. Prophylactic broad-spectrum systemic antibiotic was given preoperatively.

A left paramedian incision was made extending from the pubic symphysis to well above the umbilicus. The caecum and ascending colon were confirmed to be free of disease. Incision of the lateral peritoneal reflection from the caecum to hepatic flexure allowed for mobilization of the ascending colon. Appendectomy was performed as required. In the first three patients, the detubularized ileocolic segment was performed by the technique of Reddy, Lange and Fraley⁽¹¹⁾; a mesenteric

bowel pedicle, consisting of 20 cms. of ascending colon, caecum and 3 cms. of distal ileum was formed (fig. 1A). This pedicle is always supplied by the ileocolic artery, and usually also by the right colic artery, The ileal end of the pedicle was sutured closed with 000 chromic catgut and re-enforced with 000 interrupted silk sutures. An additional 15 cms. segment of distal ileum with its mesentery was isolated to serve as a patch on the caecum and ascending colon (fig. 1B). Bowel continuity was reestablished by performing an end to end, tension free ileocolonic anastomosis, using continuous 000 chromic catgut re-enforced with interrupted 000 silk sutures. An incision was made on the antimesenteric wall along the anterior taenia of ascending colon and extended into the caecum until only about 4 cms. of the reservoir remained tubular. The ileal segment was also incised on its entire antimesenteric wall (fig. 1C). The ileal patch was sewn onto the incised colonic segment, thus creating the posterior wall of the reservoir, using single layer continuous 000 polyglacin sutures (fig. 1D). In the 4th patient the technique for isolating and detubularizing the ileocolonic segment was that of Light and Englemann⁽⁶⁾: a 20 cms. of ascending colon including caecum and corresponding length of terminal ileum on a common vascular pedicle was used. This chosen segment was opened along the entire antimesenteric wall, commencing at terminal ileum, and continuing through the ileocecal valve, up to anterior taenia of the ascending colon and was reconstructed into a neobladder (fig. 2). The reimplantation of ureters differed from original reports in that the left ureter was brought under the sigmoid colon to join the right one without kinking, twisting or stretching, both were spatulated and fashioned into a funnelled single tube of about 3 cms. using interrupted 0000 chromic catgut sutures⁽¹⁵⁾. This conjoined ureters was then implanted into the ascending colon wall as an antireflux measure, along the lateral taenia with a submucosal tunnel of 3 cms. The ureteral end was amastomosed (mucosa to mucosa) to colonic mucosa using interrupted sutures of 0000 chromic catgut.⁽¹⁶⁾ Both ureters were intubated using either # 5 or # 8 infant feeding tubes. The creation of neobladder was finally completed by closing the anterior wall and cephalad end with single layer continuous 000 polyglacin sutures (fig. 1E). The radical cystectomy or cystoprostatectomy was performed according to technical standard of Skinner⁽¹⁷⁾ and Walsh⁽¹⁸⁾ with the exception of retaining bladder neck in the female and apex of prostate in the male for convenience of neobladder-urethral anastomosis. A buttonhole opening was then made at the dependent part of neobladder (usually at the caecum) and a neobladder-urethral anastomosis is completed over a 22F Foley catheter

using interrupted 00 catheter were brought out through a separate stab wound. The pelvic area was drained with closed suction drainage system and the abdominal incision was closed in a single layer fashion using continuous 0 polyglacin sutures. Ureteral stents and suprapubic

catheters were removed after 14 days. The average operating time was about 5 hours. A gravity filling and voiding cystourethrogram and intravenous urogram were obtained prior to discharge.

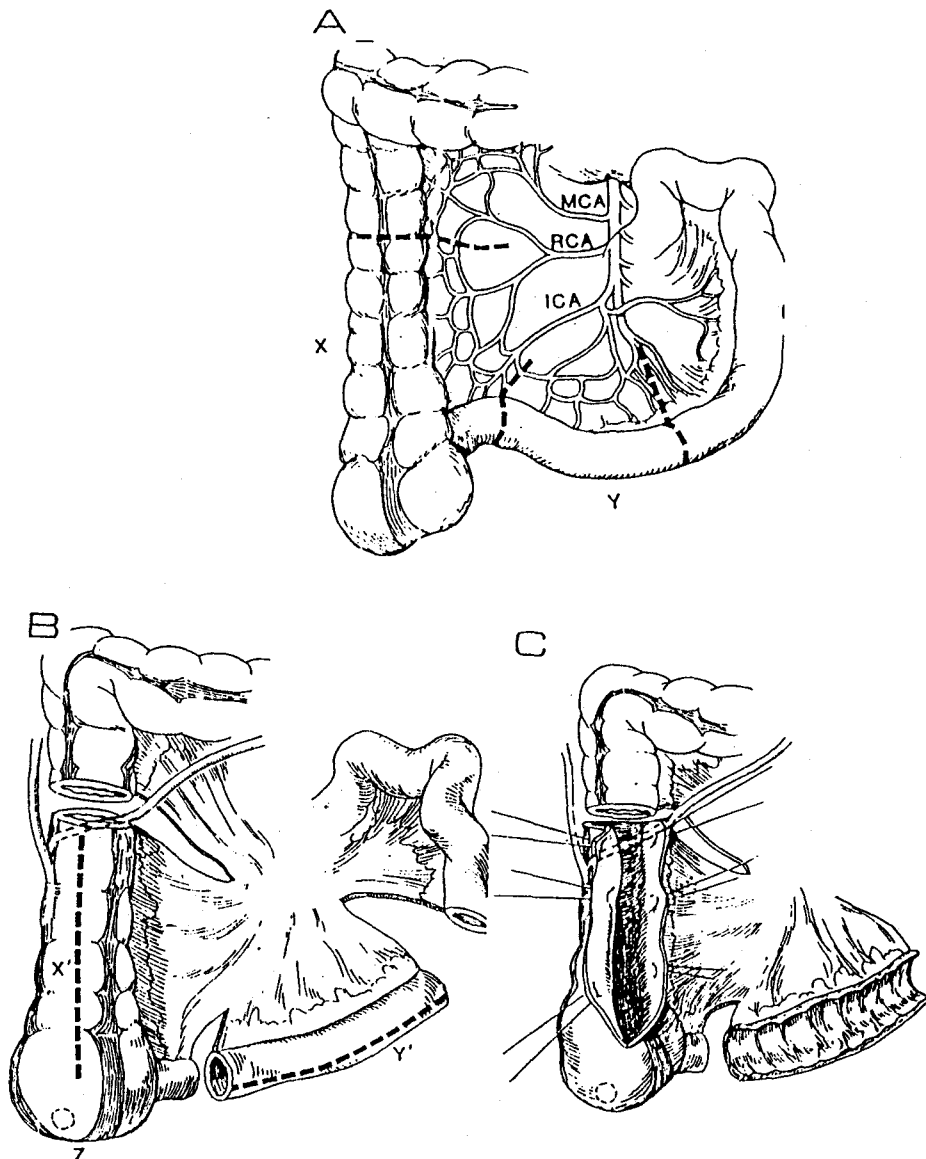


Figure 1. Modified from Reddy, P.K. et al. *J.Urol.* 138:459, 1987. Detubularized Ileocolonic neobladder: operative technique used on the first three patients. A, mesenteric bowel pedicle consisting of ascending colon and distal ileum as outlined. B, ureters are implanted into ascending colon in antireflux manner. C, detubularized colonic segment and ileal patch. D, ileal patch is sewn onto colonic segment with single layer of continuous sutures. E, completed detubularized ileocecal neobladder.

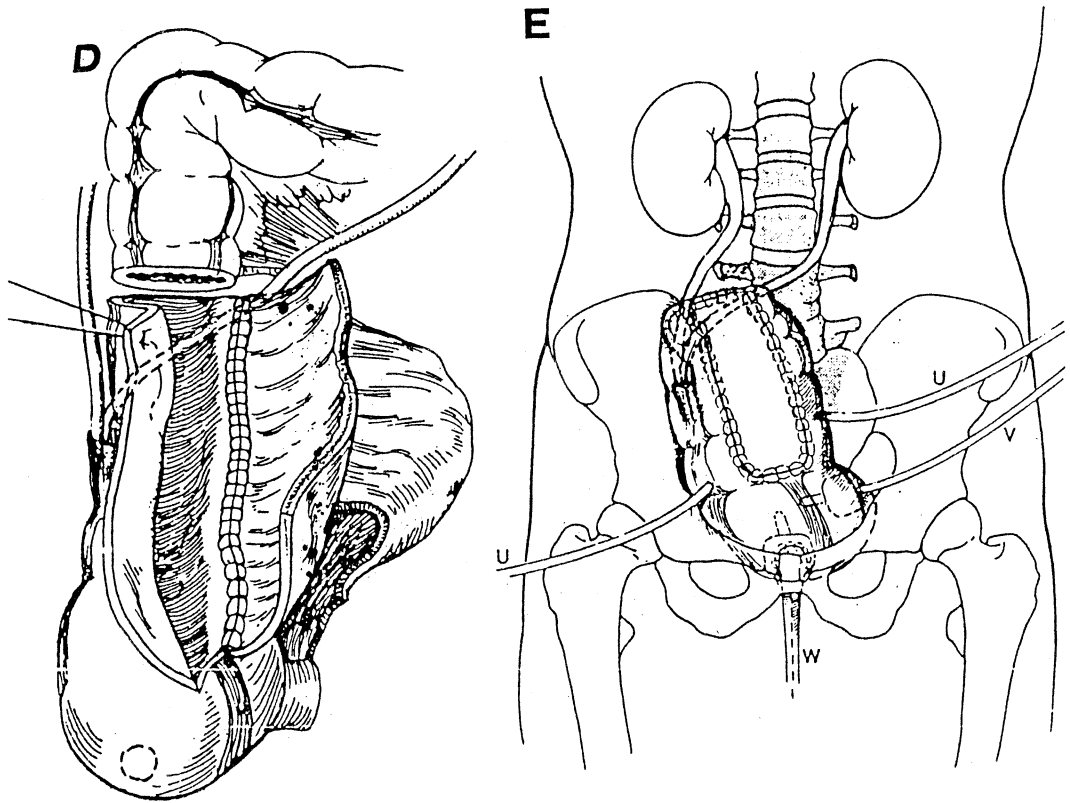


Figure 1. (Continued)

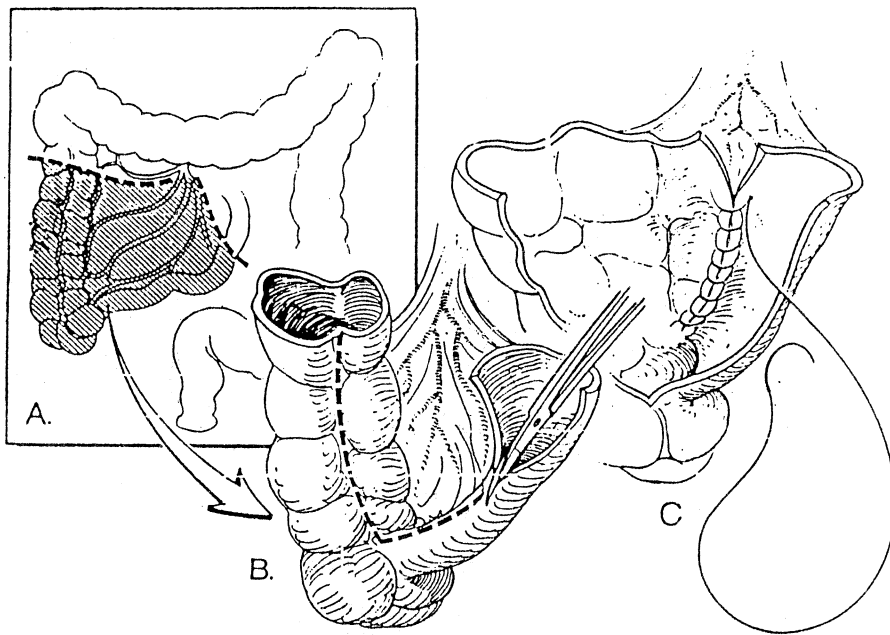


Figure 2. From Light, J.K. et al. Urol.Clin.N.Amer. 13:261, 1986 Detubularized Ileocolonic neobladder: operative technique used on the fourth patient. A, Ileocolonic segment selected on a common vascular pedicle. B, detubularized technique. C, reconstruction of the posterior wall of the neobladder.

Follow-up investigations included biweekly determination of blood urea nitrogen, serum creatinine and electrolytes during hospitalization, and periodically thereafter. The follow-up period was 9-18 months (average, 12 months).

Result

There was no operative mortality. One patient developed a small neobladder-cutaneous fistula requiring secondary closure. All four patients reported a sensation of bladder fullness before emptying. They were able to void spontaneously and gained continence gradually within a few days after catheter removal. The frequency of urination ranged from four to six hours. The postoperative blood chemistry showed a mild degree of metabolic acidosis in two patients (Table I). However, it gradually

returned to normal within a few weeks. All patients experienced a certain amount of mucous in the urine which gradually disappeared. There was no vesicoureteral reflux on the postoperative cystograms. The upper urinary tract architecture was also normal (Fig. 3&4). The longest period of follow-up is now one and a half year, the first patient was totally continent in the daytime and occasionally incontinent at nighttime. The other three patient were fully continent day and night. Renal function as judged by serum urea nitrogen and creatinine remained unchanged (Table 1). Cystoscopically, the interior of this detubularized bowel segment was clean of mucous. Urodynamic studies of the neobladders showed low pressure reservoir, high compliance and adequate filling. (capacity more than 500 ml). There was low amplitude contractions at full capacity.

Table 1. Postoperative result.

Pt.	Age/Sex	Continence		Blood Chemistry		
		Day	Night	BUN/Cr.	Cl-	HCO ₃
SJ	54 F	yes	occ. enuresis	27/1.6	111	21
PH	68 F	yes	yes	6/0.7	104	28
SS	68 M	yes	yes	23/0.5	102	21
LT	60 M	yes	yes	20/1.6	108	18

NC = no change.

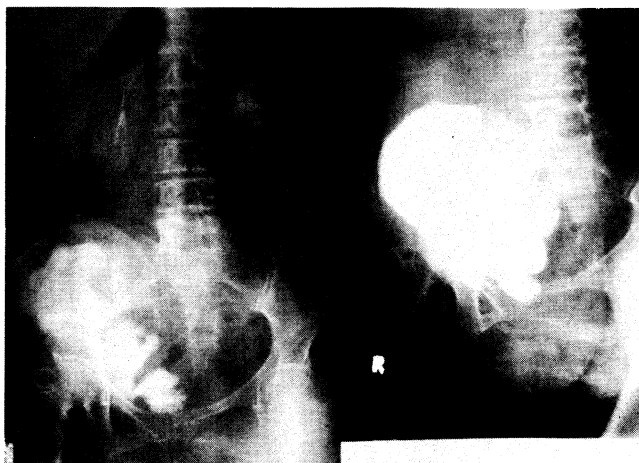


Figure 3. Postoperative radiographic evaluation of the second patient. Left, excretory urogram: normal appearance of upper urinary tract on. Right, cystogram: large capacity and quite smooth neobladder's wall with absence of vesicoureteral reflux.

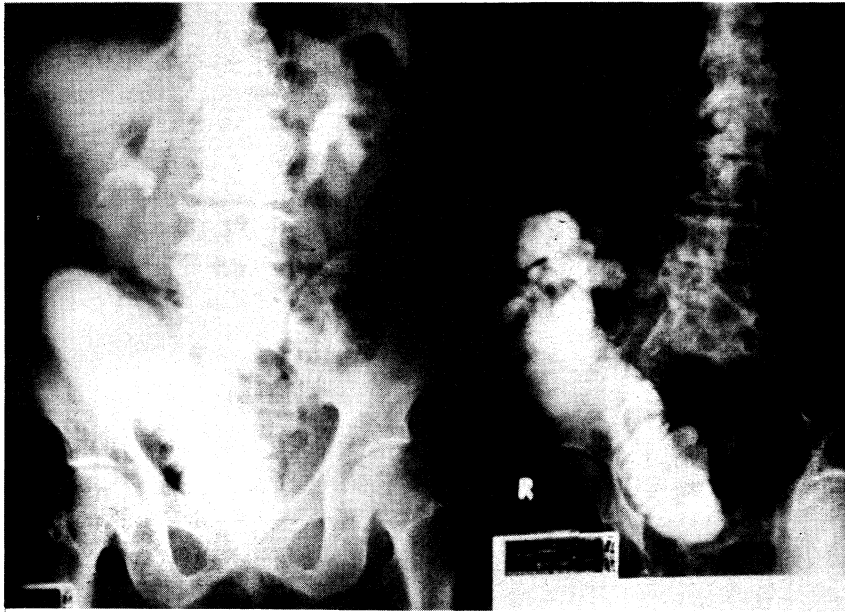


Figure 4. Postoperative radiographic evaluation of the third patient. Left, excretory: urogram normal appearance of upper urinary tract on. Right, cystogram: elongated shape neobladder with haustration of the wall without evidence of vesicoureteral reflux.

Postoperative care

Patients were taught a new voiding maneuver. It consisted of abdominal straining, relaxation of pelvic floor and additional suprapubic manual pressure, if needed. Periodic post-voiding residual urine was determined to assess the efficiency of emptying. All patients were told to expect some amount of mucous in the urine during the initial postoperative period. They were so told that it would gradually decrease within few months.

Discussion

For successful restoration of urinary tract function, bladder reconstruction from the bowel must fulfill the requirements of 1) creation of low pressure reservoir of adequate capacity, 2) antirefluxing ureteral implantation that avoids obstruction and 3) reliable control of urinary continence with easy emptying of the reservoir. Clinical experience with urinary bladder substitution using a variety of intact bowel segment had generally been disappointing. This is because of incontinency and upper urinary tract damage from high pressure generated by sustained contractions of the closed loop intestinal segment.⁽¹⁹⁻³⁴⁾ This intact bowel-segment neobladder creates a functional small capacity, poor compliance reservoir. Urinary leakage is unavoidable if the pressure generated by organized peristaltic contractions exceeds outlet resistance.

To overcome this harmful contraction, detubularization is accomplished by a longitudinal incision through smooth muscle of the isolated bowel segment. The procedure will disrupt directional peristalsis, create a low pressure, high compliance reservoir. It can accommodate larger volume of urine and, thus, reduces the risk of urinary leakage.⁽³⁵⁻³⁷⁾

Although technical advancement in restoring continuity of the urinary tract after radical cystectomy is feasible, the procedure is still limited to a select group of patients. Those with less chance of tumor extension into the urethra, who has concern about disfigurement or burden of an abdominal stoma, may benefit from this operation. To empty the neobladder efficiently, patients must be taught of new voiding maneuver. However patients usually master the technique in a short period of time. The mucous in the urine may be bothersome initially and may need manual irrigation periodically while suprapubic catheter is in place. Thereafter, mucolysin drug orally such as acetylcystein is helpful.

The author's initial experience with this surgical technique is very encouraging. Technically, the procedure employed on the last patient in this report was superior to the one that has been used on the first three. It accomplished not only total detubularization, of the selected bowel segment but consumed less operation time as well. For patients, this procedure maintained continuity

of the urinary tract without an abdominal stoma, and preserved the dignity of voiding per natural urethra with good control of urinary continence. Sustained metabolic derangement, upper urinary tract deterioration, renal failure and urinary infection were not observed postoperatively. The risk of malignancy at the site of ureterocolonic anastomosis was unlikely since there was no fecal contamination.⁽³⁸⁾ The reliability of these techniques will

become clear only with more experience. Extended follow-up is required to determine the long-term fate of the detubularized ileocolonic neobladder.

In conclusion, urinary bladder substituting procedures may be more applicable and more acceptable for selected patients with early in asive urinary bladder cancer than the supravescical urinary diversion. More experience is required to support its superiority.

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