Original Article

Radical cystectomy with a Y-shaped orthotopic ileal neobladder, early uretero-neobladder anastomosis outcomes at Khon Kaen Hospital

Theerayuth Somwung

Division of Urology, Department of Surgery, Khon Kaen Hospital, Khon Kaen, Thailand

Keywords:
Bladder cancer, radical cystectomy, neobladder, uretero-neobladder anastomosis

Abstract

Objective: To evaluate the clinical complications and functional outcomes associated with the modified Y-pouch neobladder technique, in particularly those related to the prevention of anastomosis stricture.

Materials and Methods: Functional outcomes and associated complications were evaluated in 25 patients (23 men, 2 women) who underwent radical cystectomy with Y-pouch neobladder by isolating 50 cm of the ileum between October 2010 and December 2020. Clinical complications included anastomosis stricture formation, hydronephrosis, pyelonephritis, vesical stone formation, and renal deterioration.

Results: No cases exhibited uretero-neobladder anastomosis stricture, urethro-neobladder anastomosis stricture, or vesical stones. In addition, no complications were observed in relation to metabolic acidosis. One year after surgery, daytime and nighttime continence rates among patients were 88% and 72%, respectively, with almost every case exhibiting near-normal voiding frequency. The average maximal neobladder capacity was 425.60±20.83 ml with a mean follow-up period of 2.8 years. There was a no statistically significant increase in creatinine with values of 1.45 mg/dl, 1.14 mg/dl, 1.21 mg/dl, and 1.35 ml/dl being recorded at preoperative baseline, 3, 6 and 12 months, respectively.

Conclusions: The Y-pouch neobladder created by isolating 50 cm of the ileum showed a low incidence of uretero-neobladder anastomosis and urethra-anastomosis stricture rate. In addition it was a straightforward procedure with a quickly reconstructed reservoir, had good functional outcomes which were comparable to most popular orthotopic neobladders, had no significant increase in postoperative creatinine levels and improved quality of life for patients.

Insight Urol 2022;43(1):41-50. doi: 10.52786/isu.a.47

Corresponding author: Theerayuth Somwung
Address: Division of Urology, Department of Surgery, Khon Kaen Hospital, Khon Kaen 40000, Thailand
E-mail: yuthurosiriraj@gmail.com
Manuscript received: December 10, 2021
Revision received: March 23, 2022
Accepted after revision: April 9, 2022

Introduction

In the Urology Department, radical cystectomy is performed on patients with muscle-invasive carcinoma of the bladder and in the case of some patients with recurrent T1 disease or CIS that has been unresponsive to intravesical chemotherapy.[1] Orthotopic neobladder in patients with radical cystectomy is recognized as the gold standard type of diversion[1] for improving the quality of life.[2,3] Several techniques for orthotopic neobladder surgery exist, including the Hautmann pouch3, Studer pouch[4], and T-Pouch.[5] One complication that can be encountered is ureteroneobladder anastomosis, which is caused by aggressive mobilization of the native ureter[6,7], and urethro-neobladder anastomosis, which is caused by tension on the neobladder by the native urethra.[6,7] A Y-pouch neobladder was first described by Dario Fontana with the bilateral chimney and vertical neobladder technique, which would permit minimal mobilization of the ureter with a consequential decrease in the occurrence of stricture uretero-neobladder anastomosis and free tension urethro-neobladder anastomosis with a consequent decrease in the rate of stricture of the urethra.[6-12]

Dario Fontana used Nesbit's technique (refluxing anastomosis) for uretero-neobladder anastomosis and a detubularized bowel segment with a non-absorbable mechanical stapler, which showed some incidence of stricture rate and development of a neobladder stone. In our research, we modified a Y-pouch neobladder by increasing the length of the chimney on both sides by 10 cm each, thus reducing ureter mobilization as well as reducing tension anastomosis between the native urethra and ileal reservoir. Using suture materials for the reconstruction of the ileal neobladder enabled assessment of the outcomes and complications in terms of any discernable differences.

Materials and Methods

A total of 25 patients (23 men, 2 women) who had undergone radical cystectomy with a Y-pouch neobladder at Khon Kaen Hospital from October 2010 to December 2020 were included in the study. All surgery was carried out by a single surgeon. The protocol of the study was approved by the Institute Review Board in Human Research of Khon Kaen Hospital (Study Number KEXP64042).

Inclusion criteria

1. Invasive bladder carcinoma or recurrent T1 disease or CIS
2. The intra-operative frozen-section analysis was performed at the urethral margin and bilateral ureter margin with negative tumor incidence
3. No bladder neck involvement in women
4. A serum creatinine < 2 mg/dl or an estimated creatinine clearance of ≥ 50 ml/min
5. The patients were informed in detail about the procedure they would undergo. The description included the associated risks, and all patients provided written informed consent.

Exclusion criteria

1. The patient had an underlying medical condition or could not undergo an operation under general anesthesia.
2. The patient had problems with the small intestine and was unable to manage the intestines for the neobladder.

Our research studies were divided into a primary outcome and secondary outcomes, as indicated by the information below.

Primary outcome

1. Uretero-neobladder anastomosis stricture

Secondary outcomes

1. Urethro-neobladder anastomosis stricture
2. Vesical stone
3. Daytime and nighttime continence
4. Bladder capacity
5. Renal function outcome

Criteria for Uretero-neobladder anastomosis stricture

1. Clinical flank pain
2. Persistent and or progressive hydronephrosis identified from ultrasound, IVP or CT scan
3. Approved for surgery by diuretic renal scan

Criteria for Urethro-neobladder anastomosis stricture

1. Poor stream of urine
2. A 22 Fr cystoscope could not be passed through the anastomosis. Classification of the degree of stricture is either grade I (> 17 Fr but < 22 Fr), grade II (< 17 Fr) and grade III (pinhole).[14]

Criteria for laparoscopic radical cystectomy

1. Clinical T1, T2, no bulky mass, without lymphadenopathy
2. No obesity
3. No previous surgery

Radical cystectomy was performed in male patients. Intra operative cystoscopy with 22 Fr cystoscope was performed before surgery for evaluation of urethra diameter for the pre op baseline measurement. Anterior pelvic exenteration was performed in women using the technique proposed by Campbell-Walsh Urology (10th ed). Laparoscopic radical cystectomy was carried out with an open small incision 5 cm at the lower umbilicus midline for extracorporeal ileal neobladder with uretero-neobladder anastomosis reconstruction. The skin was then closed with intracorporeal suturing and knot-tying urethro-vesical anastomosis was performed (Figure 1). In the case of females, we utilized an omental flap to sew to the vaginal stump by placing it behind the neobladder to support the back of the pouch and to prevent acute angulation of the posterior pouch-urethral junction and pouch-urethral fistula.[4]

The Y-pouch neobladder was constructed by isolating 50 cm of the ileum, 15 to 20 cm proximal to the ileocecal valve. The isolated intestinal segment was arranged in a Y shape with two central segments of 15 cm and two chimney limbs of 10 cm. The two central segments were brought together and detubularized, and the continuous unlock single-layer technique was used with Vicryl® 2-0 for neobladder reconstruction. The uretero-neobladder anastomosis was then performed at the dorsolateral aspect of the two limbs with simple Monocryl® 4-0 sutures using the Bricker technique (refluxing technique)[8,9] (Figure 2). Ureteral stents were positioned and brought out through the dorsal aspect neobladder and then through the anterior abdominal wall. The two limbs were then fixed to the psoas muscles and then recovered with posterior peritoneum for the prevention of internal bowel hernia. The next step for urethro-neobladder anastomosis was performed with four to five sutures in Vicryl®, Taper Point, UR-6, which remained sutured to the urethra immediately after bladder removal to prevent native urethral mucosa retraction. The everted mucosa was fixed with CCG 4-0 at the urethral opening of ileal neobladder, which assists in the prevention of urethro-neobladder anastomosis stricture and the retaining 20 Fr Foley catheter (Figure 3). Suprapubic cystostomy catheters were placed in the first 2 cases. The Jackson-Pratt drain was fitted. The abdominal wall was closed; layer closure being used as the sequential closure of each fascial layer to prevent postoperative incisional hernias. Any fascial defects will reduce efficiency in completely evacuating the neobladder so need to be minimized.[10,11]

The ureteral stents were removed 14 days after surgery by removing them on successive days to prevent urosepsis. The bladder catheter was retained for 21 days. All patients were enrolled onto a perineal rehabilitation program to improve the early continence rate. A periodic evaluation of post-void residual volume was carried out. Renal ultrasonography was performed pre-operatively and postoperatively at 1 3, 6, 12 months for the evaluation of persistent or progressive hydronephrosis, with follow up every year, with CT scan or IVP if there was persistent hydronephrosis. Cystoscopy was carried out every year for the evaluation of the recurrence of tumor, vesical stone, and urethral stricture, and VCUG for the evaluation of neobladder capacity and vesicoureteral reflux. A voiding chart was filled out at 12 months and then every subsequent year (Figure 4).

The following parameters were investigated in the study: Intraoperative and postoperative complications (classified as early and delayed), uretero-neobladder anastomosis, stricture, urethro-neobladder anastomosis stricture, neobladder stone, daytime and nighttime continence, and urinary frequency. Continence was evaluated using a detailed patient questionnaire. The degree of continence was classified as good (completely dry), satisfactory (using no more than one pad per day or night), and poor (using more than one pad per day or night).[7] Renal function was evaluated using serum creatinine values pre-operative and post-operative at 3, 6, 12 months. Change in creatinine from preoperative baseline value was compared as a continuous variable using the paired- simple T-test. A $p \leq 0.05$ was used to denote statistical significance.

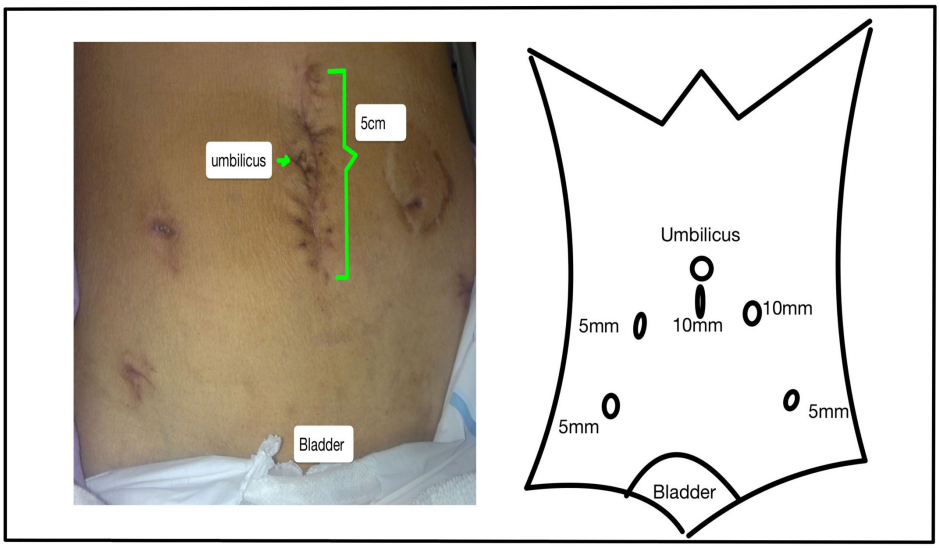

Figure 1. A laparoscopic radical cystectomy with a 5 cm small open incision on the lower umbilicus midline for an extracorporeal ileal neobladder with uretero-neobladder anastomosis reconstruction and intracorporeal suturing and knot-tying urethro-vesical anastomosis

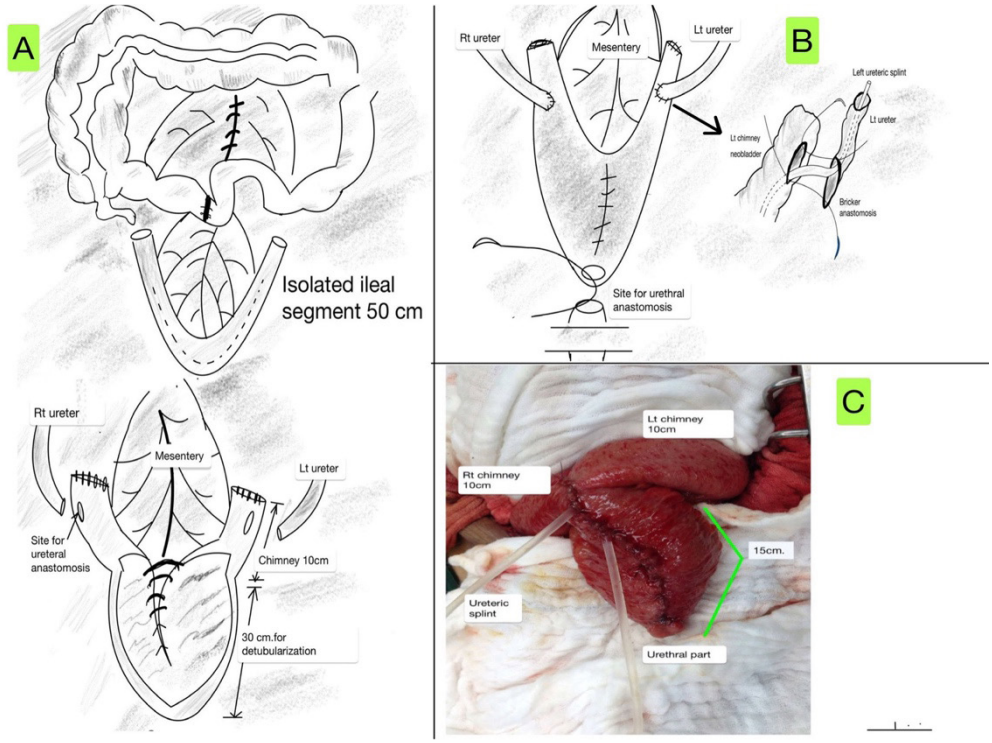

Figure 2. A: Shows the Y shape with isolated ileal segment 50 cm, two central segments of 15 cm and two chimney limbs of 10 cm. B and C, show the uretero-neobladder anastomosis as performed with the Bricker technique (refluxing technique) and the urethral part of the neobladder with everted mucosa for prevention of anastomosis stricture

Results

All 25 patients (23 men, 2 women) were considered eligible for the study, and the mean follow-up postoperative was 2.8 years (range 1.5-7 years). Two patients underwent laparoscopic radical cystectomy with intracorporeal suturing and knot-tying urethra-vesical anastomosis. Their mean age was 61.9 years (range 43-72) (Figure 5). The primary outcome in the study showed zero (0%) cases of uretero-neobladder anastomosis stricture, and the secondary outcome showed zero (0%) cases of urethro-neobladder anastomosis stricture. There were zero (0%) cases of neobladder stone, however bowel ileus occurred

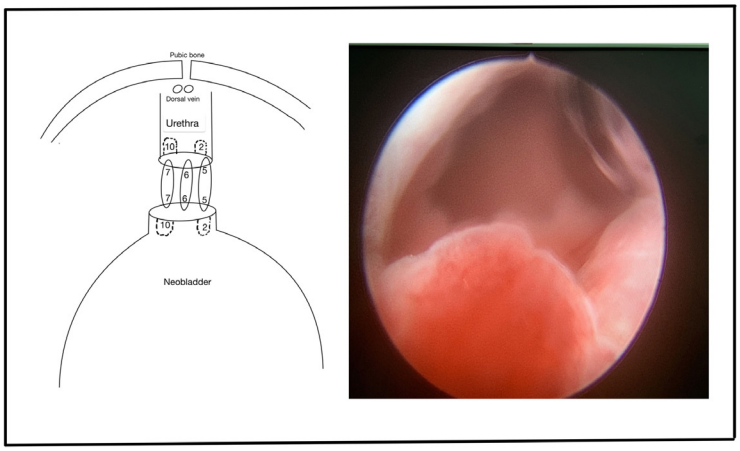

Figure 3. Shows an urethro-neobladder anastomosis which was performed with 2, 5, 6, 7, 10 o' clock simple sutures. Also showing a post operative cystoscopy with 22 Fr sheath with no urethro-neobladder stricture

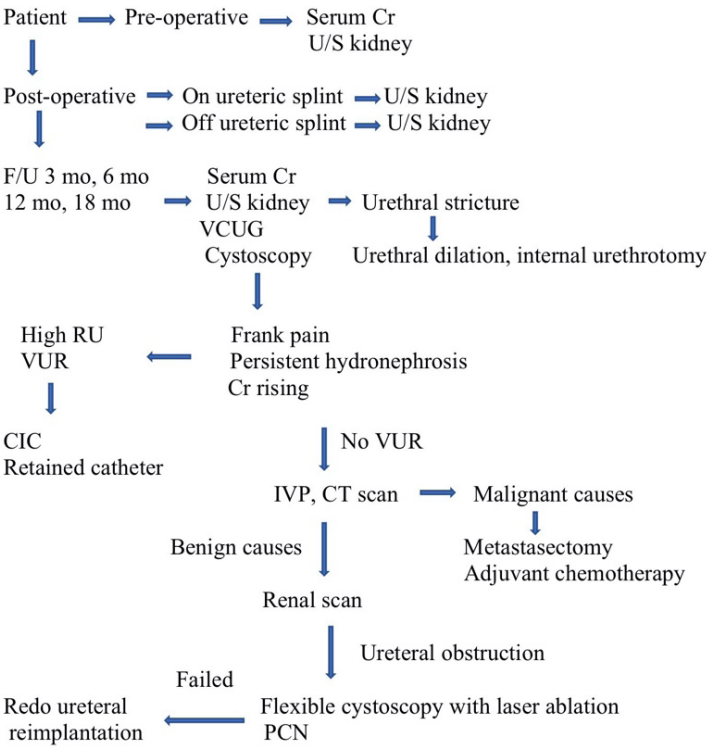

Figure 4. Showing the algorithm for investigation and management in patient follow up

in 3 cases involving conservative management. 2 cases had vesico-cutaneous fistula via the supra-pubic cystostomy tract after mucous obstruction in the first 2 cases in our study. These were managed conservatively with an increased amount of manual bladder irrigation, 1 case pT2 with neoadjuvant chemotherapy had a small bowel obstruction at the 1 year follow up. In our study, 1case pT3b cancer died 2 months after surgery therefore was excluded from the study. At the 2 year follow up it was also found that two patients had died due to the progression of the pT3b cancer. In our research, we assessed cystoscopy evaluation concerning recurrent tumors, vesical stones, and urethro-neobladder anastomosis strictures, which revealed no stones, and no urethro-neobladder anastomosis stricture. One patient with stage pT1 was found to have a recurrent tumor in the penile urethra. VCUG was assessed for bladder capacity and vesico-ureteral reflux, which found 1 female case with underlying DM and HT with high residual urine and bilateral hydronephrosis identified in the ultrasound follow up, but there was no hydronephrosis after retention of the Foley catheter, and bladder capacity at 425.60 (SD±20.83) ml in a range between 390.00-460.00 ml. One case who was treated with neoadjuvant chemotherapy had had a small bowel obstruction which was identified at the 1 year follow up (Figure 6).

Table 1. Patient characteristics

Comorbid conditions	N
Hypertension	4
Diabetes mellitus	1
Gout	1

Table 2. Demographic data and post-operative complications and outcomes

Data	N
Number of patients	25
Sex	
Male	23
Female	2
Age (years)	61.88±7.091
X±SD	43-72
Postoperative follow-up	
X±SD	2.84±1.25
Range	1.50-7.00
Primary outcome complication n (%)	
Uretero-neobladder anastomosis	0 (0)
Secondary outcome complications n (%)	
Urethro-neobladder anastomosis stricture	0 (0)
Neobladder stone	0 (0)
Bowel ileus	3 (12)
Wound infection	1 (4)
Vesico-cutaneous fistular	2 (8)
Small bowel obstruction	1 (4)
Bladder capacity (ml)	
X±SD	425.60±20.83
Range	390.00-460.00

Table 3. Mean preoperative creatinine, 3 months, 6 months, and 12 months

Time	mean	SD	P-value
Pre op	1.45	0.75	
3 months	1.15	0.59	0.010*
6 months	1.21	0.36	0.042*
12 months	1.35	0.47	0.250

*Denotes statistical significance

Mean preoperative creatinine was 1.45 mg/dl (SD 0.75). Creatinine measurements showed a statistically significant decrease from preoperative baseline at 3 months and 6 months and but was not statistically significant at 12 months.

Table 4. Showing daytime urination and nighttime urination 12 months after surgery

	Good	Satisfactory	Poor
Daytime	23	2	0
Nighttime	18	7	0

Discussion

Quality-of-life issues are becoming increasingly important when selecting the type of urinary diversion in patients and are likely to play a larger role in the future management of those undergoing lower urinary tract reconstruction after cystectomy. One of the perceived advantages of the various forms of continent urinary diversion (particularly orthotopic diversion) is the presumptive improvement in quality of life compared with a conduit form of diversion.[10,11] Orthotopic neobladder reconstructions are technically more challenging and time-consuming for the surgical team but it has been shown that early morbidity and mortality associated with cystectomy and orthotopic diversion are not increased compared with an ileal conduit.

Complications in radical cystectomy and diversion are common, and many are severe and potentially life threatening.[4,12] Most complications include bleeding, infection, and cardiovascular and pulmonary events, as well as uretero-neobladder anastomosis stricture, urethro-neobladder anastomosis stricture, neobladder stone, and bowel dysfunction (diarrhea and vitamin B1 malabsorption).

Uretero-neobladder anastomosis stricture is among the major causes of renal damage and

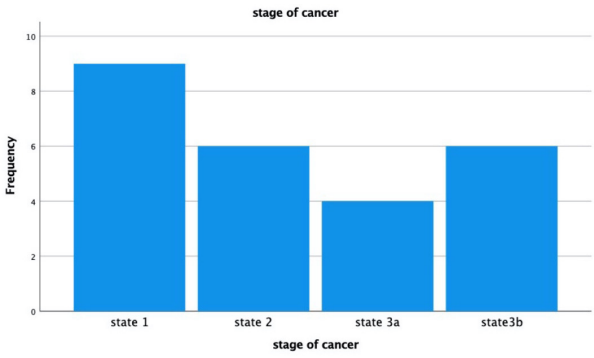

Figure 5. Showing post-operative pathological states of cancer

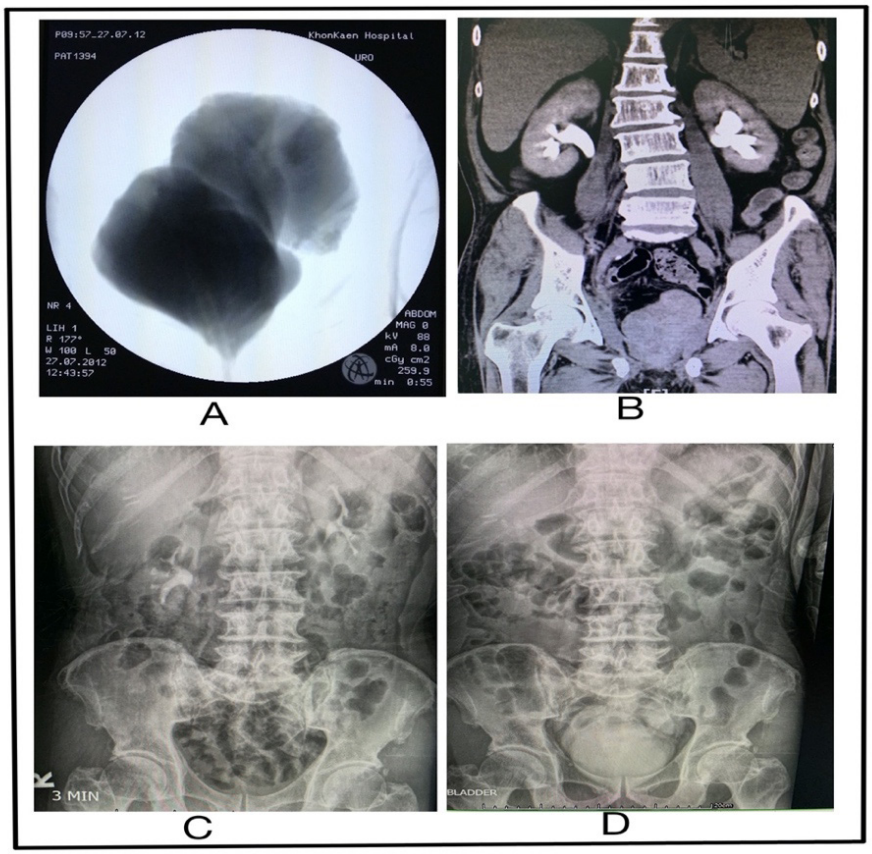

Figure 6. A: VCUG showing evaluation of VUR and bladder capacity at 12 months. B: CT scan showing kidney function 6 months after surgery. C and D, IVP showing kidney function and y pouch neobladder shape

morbidity. It is usually difficult to treat, whether endoscopically or surgically.[13] The most frequent causes are the use of a non-refluxing technique, tension on the anastomosis, kinking of the ureter, and excessive mobilization with consequent devascularization, as well as periureteral fibrosis due to urinary perianastomotic leakage.13 Strictures can also occur in ureters that have been brought under the sigmoid with extensive mobilization.[10] Pantuck et al.[13] reported a statistically significant increase in the rate of strictures for ureteral-neobladder anastomosis when a non-refluxing technique was performed (13% for non-refluxing anastomoses versus 1.7% for refluxing anastomoses). This study also confirmed that the presence of ureteral reflux with a large volume, low-pressure neobladder does not cause an increase in pyelonephritis, urolithiasis, or renal failure. Similar to the non-refluxing method, it is technically easier to perform and poses less risk of stricture.[13] Urethro-neobladder anastomosis stricture has a reported incidence of 2.7% to 8.8%. The frequent causes are tension on the anastomosis between the ileal neobladder with native urethra and short mesentery ileal neobladder. Failure due to apposition in the bladder neck mucosa to the urethral mucosa[14] is a problem that may be solved with a Y-pouch neobladder.

The ileal vertical (Y-pouch) neobladder described by Fontana et al. (2004)[6,7] was performed by isolating 40 cm of the ileum. The isolated intestinal segment was arranged in a Y shape with two central segments of 14 cm and two limbs of 6 cm. It is easy to perform and requires significantly shorter operative times (mean 90 minutes) using a non-absorbable mechanical stapler. Therefore, ureteral neobladder anastomosis can be easily performed on the posterior wall of each ileal limb without the need to mobilize the ureter. The vertical neobladder reduces the tension between the ileal neobladder and the native urethra compared with other orthotopic neobladders that provide two limbs. The Y-neobladder does not have any statistically significant urodynamic differences compared with the other mainly used neobladder.[3,6,7,15,16] In this study one (2%) case of stricture of the right ureteral-neobladder anastomosis occurred, three patients (6%) developed

neobladder stones, and two (4%) cases developed stricture of the urethro-neobladder anastomosis. Based on these findings it can be stated that late complications persist, including anastomosis stricture and vesical stones.

In our research, we constructed a modified Y-pouch neobladder performed by isolating 50 cm of the ileum and increasing the length of the chimney on two sides to 10 cm each using the reconstruction of the ileal neobladder with absorbable suture materials using the Bricker technique (refluxing technique). The results showed low occurrence uretero-neobladder anastomosis, urethro-neobladder anastomosis stricture, or vesical stone formation. Increasing the length of the chimney reduced ureter mobilization as well as tension on both anastomoses between the ileal neobladder with the native ureter, and the native urethra to improve the apposition of the bladder neck mucosa to the urethral mucosa.[14] Placing temporary ureteral stents for 14 days helped decrease early urinary leak and stricture at anastomotic sites.[17-19] This reduced the incidence of anastomosis stricture as a result.

Vesical stones have been found to form in 4 to 6% of cases[20-24], with the most likely cause to be chronic acidosis and strictures of the pouch and accumulation of mucus.14 The use of non-absorbable metal staple materials for the construction of the neobladder[7,17,18] in our study resulted in zero cases probably because of the lack of vesico-urethral anastomosis stricture and the use of absorbable suture materials.

One year after the procedure, the average bladder capacity was 425.60 ml, with good capacity of the Y-ileal neobladder, and effective voiding at suitable intervals, enabling the achievement of good daytime and nighttime continence for the vast majority of our patients. These functional outcomes are similar to those of other ileal neobladder types.[3,4,5,7] Only one female case had a high residual urine issue requiring intermittent catheterization, which improved after 1 year of bladder training. One case had penile urethral recurrence; a procedure using a transurethral endoscopic laser was effective in rectifying this issue.

Renal function, and urinary diversion following cystectomy must be effective for the maintenance of the upper urinary tract. Storage of urine in the bowel has not been shown to be inherently damaging to the kidneys; renal deterioration is often due to identifiable and reversible causes, such as ureterointestinal stricture, high pressure storage and chronic infection with associated renal scarring.[25,26]

Lantz et al. reported a statistically significant rise in serum creatinine from preoperative baseline following cystectomy and Studer neobladder reconstruction with ureteric stricture rate was 17.9%.[25] In our study we found no statistically significant rise in serum creatinine during the 12 months follow up checks with no occurrence of anastomosis stricture. However, there is a tendency for it to increase as observed during a longer follow up period, an increase in the rise of serum creatinine being influenced by patient age, sex and lean body mass. There is also evidence that intestinal segments used for urinary diversion might absorb creatinine from the urine.

Advantages of a Y-pouch neobladder

1. A vertical neobladder can be modified to increase the length of the ileal bowel segment to 40-60 cm without causing short bowel syndrome.

- Chimney length can be modified depending on native ureter length and free tension between anastomoses.
- Tension can be freed between the ileal reservoir and native ureter, resulting in the apposition of the bladder neck mucosa to the urethral mucosa, and thus reducing the incidence of urethro-neobladder anastomosis stricture.
- Crossing can be eliminated of the left ureter as in the Studer ileal neobladder
- The minimal dissected native ureter will preserve the blood supply to the ureter and prevent the occurrence of uretero-neobladder anastomosis

2. The use of Bricker (refluxing) uretero-vesical anastomosis, separate left-right site chimney and temporary ureteric stent decreased evidence of uretero-neobladder anastomotic stricture and facilitating endoscopic management of anastomosis stricture but must be closely followed up with CIC or retain the Foley catheter if there is a high residual urine to prevent upper tract deterioration

3. Laparoscopic radical cystectomy is easier and faster with intracorporeal suturing and knot-tying urethra-vesical anastomosis

4. Sutures made of absorbable materials can be used for the construction of the neobladder, thus decreasing the risk of vesical stone formation

5. Free tension between ileal neobladder mesentery with native urethra and everted mucosal urethral part of neobladder may prevent occurrence of urethro-neobladder anastomosis stricture

Conclusion

The orthotopic neobladder in patients undergoing radical cystectomy for bladder carcinoma is a presumed improvement in terms of quality-of-life compared with a conduit form of diversion. The procedure to implement a y-pouch ileal neobladder is straightforward, the reconstruction of the reservoir takes a relatively short time and the functional outcomes are similar to those of other ileal neobladder types. Although additional follow-up is necessary, our preliminary results have been very encouraging.

Conflicts of Interest

The author declares that there were no conflicts of interest.

References

1. Stein JP, Lieskovsky G, Cote R, Groshen S, Feng AC, Boyd S, et al. Radical cystectomy in the treatment of invasive bladder cancer: long-term results in 1,054 patients. J Clin Oncol 2001; 19:666-75.
2. Cerruto MA, D' Elia C, Siracussano S, Gedeshi X, Mariotto A, Niero M, et al. Systematic review and meta-analysis of non RCTs on health related quality of life after radical cystectomy using validated questionnaires: better results with orthotopic neobladder versus ileal conduit. Eur J Surg Oncol 2016;42:343-60.
3. Hautmann RE, de Petriconi R, Gottfried HW, Kleinschmidt K, Mattes R, Paiss T, et al. The ileal neobladder: complications and functional results in 363 patients after 11 years of follow-up. J Urol 1999; 161:422-7.
4. Abol-Enein H, Ghoneim MA. Functional results of orthotopic ileal neobladder with serous-lined extramural ureteral reimplantation: experience with 450 patients. J Urol 2001;165:1427-32.
5. Studer UE, Burckard FC, Schumacher M, Kessler TM, Thoeny H, Fleischmann A, et al. Twenty years' experience with an ileal orthotopic low-pressure bladder substitute lesson to be learned. J Urol 2006; 176:161-6.
6. Fontana D, Bellina M, Fasolis G, Frea B, Scarpa RM, Mari M, et al. Y-neobladder: an easy, fast, and reliable procedure. Urology 2004;63:699-703.
7. Stenzl A, Colleselli K, Poisel S, Feichtinger H, Pontasch H, Bartsch G. Rationale and technique of nerve-sparing radical cystectomy prior to an orthotopic neobladder in the female. J Urol 1995;154:2044-9.
8. Davis NF, Burke JP, McDermott T, Flynn R, Maneckshа RP, Thornhill JA. Bricker versus Wallace anastomosis: a meta-analysis of ureteroenteric stricture rates after ileal conduit urinary diversion. Can Urol Assoc J 2015;9:E284-90.
9. Benson MC, Olsson CA. Continent urinary diversion. Urol Clin North Am 1999;26:125-47.
10. Skinner EC, Skinner DG, Stein JP. Orthotopic urinary diversion. In: Wein AJ, Kavoussi LR, Novick AC, Partin AW, Peter CA, editors. Campbell-Walsh Urology. 10th ed. Philadelphia: Elsevier Saunders; 2012. p. 2446-94.
11. Konety BR, Allareddy V, Herr H. Complications after radical cystectomy: analysis of population-based data. J Urol 2006;68:58-64.
12. Pantuck AJ, Han KR, Perrotti M, Weiss RE, Cummings KB. Ureteroenteric anastomosis in continent urinary diversion: long-term results and complications of direct versus non-refluxing techniques. J Urol 2000;163:450-5.
13. Kim BK, Song MH, Du SH, Yang WJ, Song YS. Neovesical-urethral anastomotic stricture successfully treated by ureteral dilation balloon catheter. Korean J Urol 2010;51:660-2.
14. Madersbacher S, Mohrle K, Burkhard F, Studer UE. Long- term voiding pattern of patients with ileal orthotopic bladder substitutes. J Urol 2002;167:2052-7.
15. Studer UE, Danuser H, Merz VW, Springer JP, Zingg EJ. Experience in 100 patients with an ileal low pressure bladder substitute combined with an afferent tubular isoperistaltic segment. J Urol 1995; 154:49-56.
16. Suriano F, Daneshmand S, Buscarini M. Use of non-absorbable staples for urinary diversion: a step in the wrong direction. Urol Int 2013;90:125-9.
17. Abreu SC, Fonseca GN, Cerqueira JBC, Nobrega MS, Costa MR, Machado PC. Laparoscopic radical cystectomy with intracorporeally constructed Y-shaped orthotopic ileal neobladder using non-absorbable titanium staples exclusively. Urology 2005;66:657.
18. Mattei A, Birkhaeuser FD, Baermann C, Warncke SH, Studer UE. To stent or not to stent perioperatively the ureteroileal anastomosis of ileal orthotopic bladder substitutes and ileal conduits? Results of a prospective randomized trial. J Urol 2008;179:582-6.
19. Almassi N, Cha EK, Vertosick EA, Huang C, Wong N, Dason S, et al. Trends in Management and Outcomes Among Patients with Urothelial Carcinoma Undergoing Radical Cystectomy from 1995 to 2015: The Memorial Sloan Kettering Experience. J Urol

2020;204:677-84.
20. Stein JP, Skinner DG. Orthotopic Urinary Diversion. In: Wein AJ, Kavoussi LR, Novick AC, Partin AW, Peter CA, editors. Campbell Urology. 9th ed. Philadelphia: Elsevier Saunders; 2007. p. 2613-48.
21. Berglund RK, Herr HW. Surgery for Bladder Cancer. In: Wein AJ, Kavoussi LR, Novick AC, Partin AW, Peter CA, editors. Campbell-Walsh Urology. 10th ed. Philadelphia: Elsevier Saunders; 2012. p. 2375-85.
22. Skinner EC, Skinner DG, Stein JP. Orthotopic Urinary Diversion. In: Kavoussi LR, Wein AJ, Novick AC, Partin AW, Peter CA, editors, Campbell-Walsh Urology. 10th ed. Philadelphia: Elsevier Saunders; 2012. p. 2497-506.
23. Tanaka T, Kitamura H, Takahashi A, Masumori N, Itoh N, Tsukamoto T. Long-term functional outcome and late complications of Studer's ileal neobladder. Jpn J Clin Oncol 2005; 35:391-4.
24. Lantz AG, Saltel ME, Cagianos I. Renal and functional outcomes following cystectomy and neobladder reconstruction. Can Urol Assoc J 2010;4:328-31.
25. Sirikul T, Sriplakich S, Amantakul A. Comparison of open and laparoscopic radical cystectomy as regards long-term oncological outcomes for bladder cancer. Insight Urol 2021;42:123-30.
26. Ramart P, Chaiyaprasithi B, Pradniwat K, Ratanarapee S, Amornvesukit T, Taweemonkongsap T, et al. Outcome of open radical cystectomy with pelvic lymph node dissection for bladder urothelial cancer in Siriraj hospital between 1998-2003. Thai J Urol 2010;31:27-39.