



Initial Experience of Cutaneous Continent Urinary Diversion by Modified Penn Pouch Technique: Is It More Expedient than Ileal Conduit?

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Abstract

Introduction: In the current clinical practice, following cystectomy, either due to malignant or benign pathologies, the most common urinary diversion is in the form of ileal conduit. Quality of life is markedly decreased in patients with ileal conduit as they have to carry an external appliance with the poorest self-images that significantly reduce the desires of all forms of physical contact (sexual and non-sexual). Here we describe the initial experience of cutaneous continent urinary diversion following cystectomy that provides the patients with an external appliance-free life with good functional outcomes of the reservoir.

Methods : The hospital records of 6(six) patients during a period of 5 months were reviewed retrospectively who underwent cutaneous continent urinary diversion in Dhaka Medical College Hospital, Dhaka and Center for Kidney Diseases & Urology Hospital, Dhaka. Out of 6 (six) patients, 5(five) underwent radical cystectomy for muscle-invasive bladder cancer, and 1(one) patient underwent simple cystectomy for exstrophy bladder. For the creation of the reservoir modified Penn pouch technique was applied, and the appendix was used as a catheterizable cutaneous stoma for the continent mechanism. A peri-operative and short periods of postoperative outcomes, including complications, quality of life assessment, continence and ability to empty the reservoir by self-catheterization, was recorded.

Results : Among the 6 (six) patients, 5 (five) cases were following radical cystectomy for muscle-invasive bladder cancer, and 1 (one) was following simple cystectomy for exstrophy bladder. After a median follow-up of 6 weeks, the continence rate was 100%. All patients (100%) could empty the neo-bladder by self-catheterization every 4-8 hours. Patients were highly satisfied with this stoma as they could avoid external appliances.

Conclusion : Cutaneous continent urinary diversion is a successful method of neo-bladder construction following cystectomy for urinary bladder malignancy or severe functional and anatomical urinary bladder abnormalities with excellent functional outcomes. It needs skilled surgical techniques, and the decision on this method used should depend upon the indications and contraindications of surgery like renal functional status, patient anatomy, the physical and physiological condition of the patients and personal choice.

Keywords: Keywords:

Cutaneous continent diversion, modified Penn pouch, initial experience, outcomes.

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Introduction

Though there is a lack of exact data in our country, the incidence of urinary bladder (UB) cancer is increasing in our daily practice. Besides this, we also face the various congenital, anatomical and functional anomalies of UB that require cystectomy. Following radical or simple cystectomy, urinary diversion is the mandatory procedure. Bricker, in 1950, first introduced the uretero-ileal conduit and has become the standard method for urinary diversion during the last 70 years¹. Although the continent cutaneous urinary diversion is becoming popular worldwide, only 9% of urologists perform these types of continent diversions after cystectomy, which reflects the complexity of such procedures both for the physician and patients²⁻⁴. The ileal conduit is technically reproducible, easier to create and provides a satisfactory method of diversion, but it has a significant impact on the lifestyle of the patient. Several studies have found that conduit causes patients to restrict social and sexual activities^{5,6}. The common complaints of these patients with ileal conduit are fear of stomal leakage, odour, embarrassing self-images, and lack of sexual attractiveness and performance^{7,8}. In an attempt to address and overcome these problems associated with an ileal conduit, various continent diversions (Kock pouch, Caecal reservoir, Mainz pouch, Indiana pouch, Penn pouch, Mitrofanoff procedure and others) have been introduced and applied. The various aspect and successes have been described in the surgical results. However, there is little research devoted to the patient's psychological status and quality of life connected with these various types of urinary diversions⁹.

The Penn pouch is the first continent diversion that employs the Mitrofanoff principle, where the appendix serves as a continent catheterize stoma. Two techniques have been reported; in one, the appendix with a button of the cecum is circumcised and reversing it on itself before tunnelled implantation. Alternatively, the appendix is left attached and buried into the cecum by rolling it back. A segment of the cecum and ascending colon up to the junction of the middle colic and ileocolic arteries is isolated along with a similar length of the ileum. Then there are mercurialized on its antimesenteric border to make the neobladder. The appendiceal tip is cut, spatulated and

Any neo-bladder reconstruction aims to provide a functionally near normal or normal UB in terms of low-pressure storage, voiding with continence, non-

refluxing, non-absorptive and with the ultimate aim of renal function preservation¹. Continent urinary diversion is an established treatment option, and our objective for this type of surgery is to presume that a person free from any external appliance can enjoy a better lifestyle than the patients wearing an ostomy bag.

Methods

Here, we performed 6(six) cases of cutaneous continent urinary diversions using the appendix as a self-catheterizable stoma. Patients were selected according to the indications and contraindications of continent diversions and, most importantly, the physical and psychological ability of self-catheterization and patient preference. We assessed and recorded the Perioperative outcomes, including complications; quality of life assessment like psychological, physical, social and sexual impact; continence and ability to empty the reservoir by self-catheterization etc. We also described our initial experiences regarding the surgical techniques we applied.

Patient selection

All candidates undergo pre-operative evaluation, including a detailed history, thorough physical examinations and investigations. Patients who are medically and surgically fit for this long period of surgery, muscle-invasive bladder cancer confined to the UB with no evidence of nodal or distance metastases and congenital anomaly of UB that require cystectomy are selected for this type of continent urinary diversion. Patients with previous abdominal and pelvic surgery, irradiation, renal failure, intestinal resection, inflammatory bowel disease or diverticulitis were excluded. Patients with mental impairment, hepatic dysfunction, associated comorbidities that cannot be optimized and compromised renal function with a serum creatinine level >2 mg/dl were also excluded from this type of diversion. All patients underwent a pre-operative workup of complete blood chemistry, cardiac, respiratory, hepatic and renal functional status with psychological status assessment. Counselling was done by informing the potential complications compared with ileal conduit regarding body image, lifestyle, sexual function etc. Finally, written consent was taken that also includes the permission of conversion to the ileal conduit technique per-operatively if a suitable vermiform appendix is not found.

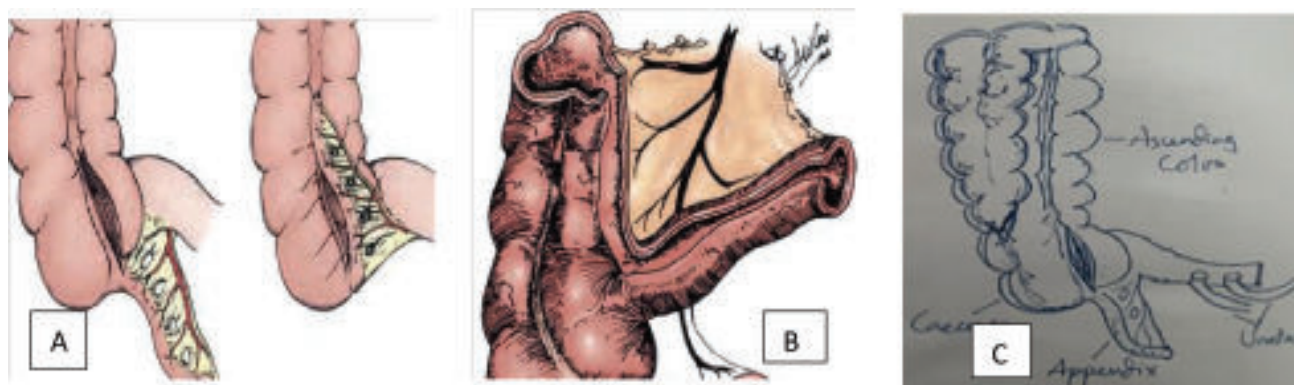


Figure 1 A & B: Penn pouch technique, C: A modified technique that we applied

Operative technique

We followed the techniques of Penn Pouch to create the reservoir with some modifications. The Penn pouch was the first continent diversion employing the Mitrofanoff principle, in which the appendix served as the continence mechanism and the caecum, ascending colon and terminal part of the ileum is used to create the reservoir.

Ascending colon up to the junction of the right colic and middle colic artery, caecum, appendix and 8-10 cm of terminal ileum are isolated and resected with meticulous preservation of their blood supply. For resection, we have used linear cutter stapling devices. Then the appendix is buried into the adjacent taenia by rolling it back onto itself, making a 3-4 cm submuscular tunnel along the line of taenia. Here one of the modifications from the Penn pouch is that we have also submerged the base of the appendix in total into the caecum by seromuscular suturing of the caecal wall that helps to avoid the kinking of the appendix and may strengthen the continent mechanism.

Another modification is that we didn't longitudinally open and suture the terminal ileum to make the reservoir wall rather used for ureteral-ileal anastomosis with the hope that the ileocaecal valve may act as an anti-reflux mechanism. The third modification is that we created the reservoir by tabularizing the ascending colon and part of the caecum on its anti-mesenteric border with continuous seromuscular single-layer suturing.

The appendiceal tip is obliquely transected and spatulated. We have found it helpful to spatulate the distal tip of the appendix until it accommodates a catheter at least 12 to 14 Fr in diameter. Then it is brought out through the abdominal wall in the right iliac fossa after making a 'V' shape skin incision, and the stoma is created. A 5Fr feeding tube is used as a stent for each ureter-ileal anastomosis. A Foley catheter of 12 Fr is introduced through the appendiceal stoma, and a separate 16 Fr Foley catheter is placed into the neobladder for adequate drainage and irrigation of the reservoir.

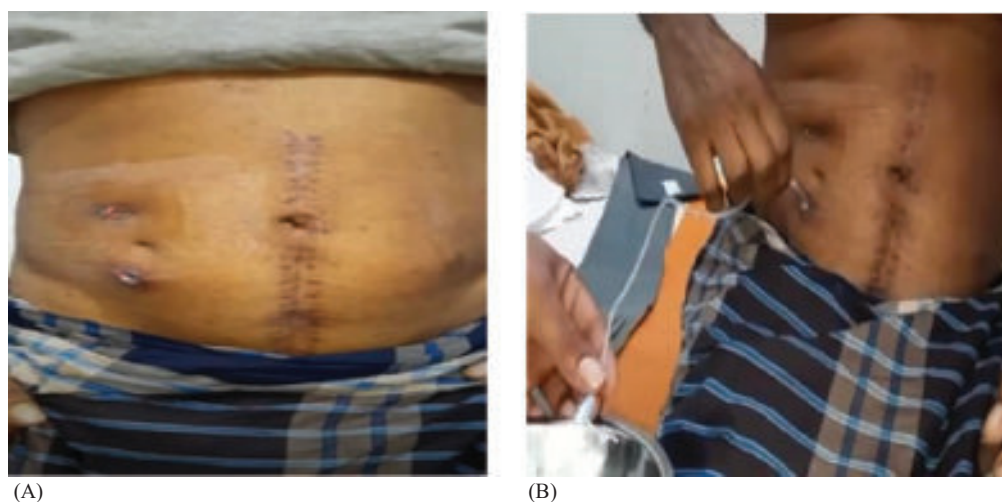


Figure 2 Following radical cystectomy for muscle-invasive bladder cancer, A: Free from any external appliance, B: Self-catheterization through the continent stoma.



Figure 3 A: Exstrophy UB of a 22 year old female, B: Self catheterization after recovery from surgery.

Postoperative Care

We routinely practised nasogastric tube drainage for 4-5 days and allowed oral diet on the 4-5th postoperative day (POD). We didn't irrigate the reservoir continuously. Rather, one hourly flushing of the pouch with normal saline through both catheters. Blocking of both catheters started from the 14th POD, initially hourly, then gradually increased the blocking duration up to the 21st POD. On the 21st POD, a pictogram is done to check for any leaking, and the stoma catheter is removed first, keeping the percutaneous reservoir catheter blocked. Then the patient was taught to self-catheterise the stoma, and the percutaneous reservoir catheter was released on that day or the next day.

Outcomes measures

Basic demographic and clinic-pathological parameters of the patients were recorded. Per-operative data includes the operative time, blood loss, type of cystectomy, and any significant complication/

difficulty, and the post-operative data includes the wound infection, wound dehiscence, anastomotic leakage, metabolic derangement, febrile illness, length of hospital stay, continence, ability to self-catheterization and personal satisfaction.

Statistical analysis

All the gathered data were tabulated and analyzed using Microsoft Excel Worksheet.

Results

Total 6 (six) patients underwent cutaneous continent urinary diversion, out of them one (16.7%) following simple cystectomy for exstrophy of UB and five (83.3%) following radical cystectomy for nonmetastatic muscle-invasive bladder cancer. The age range (median) of the patients was 22-63 (52) years, and the median BMI was 25 kg/m². The duration of operative time was 250-320 minutes, which was almost equal to the duration of ileal conduit creation. Using bipolar diathermy with a sealing device (Ligasure) and multiple stapling

Table I. Demographic and clinicopathological parameters of the patients, n=6

Characteristics		Results	
	Age, years, range (median)	22-63(52)	
Sex, n (%)	Male	4(66.7)	
	Female	2(33.3)	
	BMI, kg/m ² , range(median)	22-28(25)	
Bladder pathology, n (%)	MISC	Clinical T2N0M0	5(83.3)
		Pathological T2N0	4(66.7)
		T2N1	1(16.7)
Type of cystectomy	Exstrophy UB	1(16.7)	
	Radical (open)	5(83.3)	
	Simple (open)	1(16.7)	

devices during surgery significantly reduces the total operating time in our study.

Post-operatively 1 (16.7%) patient each developed wound infection and wound dehiscence. Wound infection can be a significant problem in this type of surgery, and for the prevention of it, several measures like improvement of the nutritional status of the patient, appropriate bowel preparation, adequate per-operative padding, thorough peritoneal wash and wound cleaning with normal saline, changing the draping sheet and gloves before closure etc. are mandatory. Wound dehiscence developed in a patient with exstrophy of UB and was managed successfully. In our study, 6 (100%) patients were continent after removal of catheters from the reservoir at 3 weeks post-operatively and were able to empty their neo-bladder by self-catheterization. Although in a study, neo-bladder created using appendix as stoma, the continence rate was found to be 96%¹⁹. Most of the patients (83.3%) are highly satisfied with this type of diversion for their self-image and free from any external appliance.

Table II. Outcome variables of the patients who underwent cystectomy with cutaneous continent urinary diversion, n=6

Variables	Outcomes
Operative time, min, range (median)	250-320 (270)
Wound infection, n (%)	1 (16.7)
Wound dehiscence, n (%)	1 (16.7)
Length of hospital stay, days, range (median)	12-15 (13)
Post-operative continence, n (%)	6 (100)
Ability to self-catheterize, n (%)	6 (100)
Satisfaction, n (%)	Highly satisfied
	Satisfied
	5 (83.3)
	1 (16.7)

Discussion

After creating the continent reservoir, continence can be defined as the patient's ability to voluntarily retain urine and void voluntarily¹⁰. This gives the patients a superior quality of life, avoiding needing an external appliance and the associated emotional and social problems¹¹. Different segments of the intestinal tract can be used to create a continent reservoir, either using small or large bowel or in a combination of these two. Principles include opening and tabularization to make a larger capacity and low-pressure reservoir¹². To provide a larger capacity reservoir should be created with a large radius. The combination of these principles creates a high-compliance, low-pressure reservoir.

Another important aspect of this type of diversion is to make the patient continent, and various techniques are used for this. Based on different principles, a continent urinary diversion should be adequate volume, high compliance with a low-pressure reservoir; intact continent mechanism; non-refluxing; relatively simple to construct; easy to self-catheterization; avoid revision surgery and have a good cosmetic appearance.

Continent urinary diversion can be of three major categories; rectal bladder, which allows passage of urine through the rectum; the second group, an orthotopic voiding pouch that requires an intact sphincter mechanism and the third group is a cutaneous continent urinary diversion, which involves catheterization to empty the neobladder¹⁰. These three different techniques have various merits and demerits. Four different techniques can be used for the creation of continent mechanism; appendiceal techniques or ileocaecal valve plication, tapered or imbricated terminal ileum and ileocaecal valve, intussuscepted nipple valve and hydraulic valve-Benchekroun nipple. Here, we applied the principles of Penn pouch with some modifications using caecum, ascending colon and appendix as a stoma that provides excellent cosmetic, functional and continent outcomes.

A cutaneous continent reservoir needs to use a catheter to empty several times per day. Failure to catheterize regularly can create serious complications like acute renal failure, infection or perforation. To understand and perform this, the selected patients must have an adequate cognitive function and hand-eye coordination¹³. The Stoma port is usually placed in the lower abdomen, either in the umbilicus or in the right iliac fossa, for cosmetic purposes, and for patients in wheelchairs, it should be in the umbilicus. We placed the stoma site on the right iliac fossa in all cases for their convenience, as all of our patients are right-handed.

Incontinence rates in catheterizable reservoirs are relatively low (2-16%)¹⁴. The continence rate is rather better for the appendix stoma and ileocaecal valve compared to others¹⁵. Night time incontinence rate is more than daytime incontinence. Continence rates improved with time with increasing the neobladder capacity¹⁶. In our study, we recorded a 100% continence rate at removing all the catheters three weeks post-operatively.

Adapting urinary diversion into the patient's life is very important to recover the quality of life. Various studies have found no difference in functional, emotional, social, physical and health-related quality of life between continent catheterize pouches and orthotopic neobladder¹⁷. Here we observed excellent patient satisfaction with this type of urinary diversion. Few studies have addressed the lifestyle adjustments of patients who underwent ileal conduit urinary diversion. Patients with ileal conduit express their difficulties coping with the external appliances, fearing leakage and embarrassing bad urine odour. These patients may notice significant changes in their perception of the physical image with loss of sexual or non-sexual physical contact, attractiveness and sexual performances. Unfortunately, surgeons are interested in only the technical aspects of surgery and Jones and associates reported that these patients get inadequate discussion of sexual problems before surgery and no guidance offered post-operatively⁹.

We reported some limitations in our study. There is a very small sample size, and we failed to capture all diversion-related complications, especially long-term outcomes after surgery that includes metabolic complications, deterioration of renal functions and other surgical aspects like stoma, reservoir or uretero-intestinal anastomosis related and recurrence of malignancy. Additional prospective studies with long-term outcomes are warranted.

In summary, a continent cutaneous urinary diversion is associated with excellent continence and functional, psychological and cosmetic outcomes. Therefore, it should be considered in appropriately selected patients, especially patients with benign UB pathology requiring cystectomy, as a valid alternative to the ileal conduit.

Conclusion

Continent cutaneous urinary diversion is an established treatment option following cystectomy. Unfortunately, this surgery is performed at a very lower rate than the ileal conduit. We found an excellent continence rate and patient satisfaction, which is very high with an acceptable incidence of complications. Cutaneous continent urinary diversion provides a superior self-image and physically and emotionally satisfactory results. It also offers excellent satisfaction regarding sexual activity and non-sexual physical contact. However, an appropriate pre-operative preparation, an explanation of potential physical and

lie-style changes and solving the problems encountered post-operatively with long-term follow-up are critical for the maximum satisfaction of the patients.

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