

# Continent ileovesicostomy after bladder neck closure as salvage procedure for intractable incontinence

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**Introduction.** We evaluated the success rate of continent vesicostomy using an ileal segment with sero-serosally embedded, tapered ileum for bladder augmentation with continent stoma following bladder neck closure (BNC) for severely damaged bladders or persistent urinary incontinence.

**Material and methods.** A total of 15 patients were treated for persistent urinary incontinence or non-reconstructible bladder outlet between 2003 and 2012. Underlying diagnosis included post-prostatectomy incontinence (n = 5), recurrent bladder neck stenosis (n = 5), neurogenic bladder (n = 3), urethral tumor recurrence following orthotopic neobladder (n = 1) and post-TVT and colposuspension incontinence (n = 1). All patients underwent open BNC, omental interposition and continent vesicoileostomy. The continent outlet was placed in the lower abdomen using a circumferential subcutaneous and skin plasty to avoid retraction. Data collected included age, underlying diagnosis, stoma site, time to complications and need for subsequent surgical revisions. All patients received a standardized questionnaire at the time of data acquisition and were personally interviewed.

**Results.** Median follow-up was 24 months (range: 2–111). Primary BNC was successful in all patients and primary continence rate was 86.7%. Two patients (13.3%) suffered from failure of the continence mechanism, caused by stoma stenosis at skin level and insufficiency of the bladder augmentation and stoma due to local infection. One additional patient developed a mild stomal incontinence without need for further reconstruction. Regardless of the number of revisions, at the last follow-up 93.3% of patients had a functional channel. All complications occurred within the first postoperative year.

**Conclusions.** This technique is an effective last resort treatment for patients with non-reconstructible bladder outlet.

**Key Words:** continent vesicostomy ◊ tapered ileum ◊ urinary diversion ◊ catheterization ◊ incontinence

## INTRODUCTION

Urinary incontinence is a well-known outcome associated with radical prostatectomy or small capacity, high-pressure, poorly compliant neurogenic or overactive bladder [1, 2, 3]. Procedures to correct post-prostatectomy incontinence (PPI) can be ef-

fective but have varying success rates depending on patient selection [2, 4]. Highly recurrent bladder neck stenosis (BNS) after radical prostatectomy or transurethral prostate resection is also a troublesome complication [5]. These devastating conditions with nonreconstructible bladder outlet or neurogenic bladder incontinence require a definitive resolution.

As a last resort treatment, there is still a role for continent augmentation cystoplasty (CAC) [1, 5–9]. Different techniques aim to provide urinary storage, protect the upper urinary tract and preserve renal function, establish continence and offer a suitable method of complete bladder emptying by using clean intermittent catheterization [7, 9, 10].

We present a safe technique described few years ago by Kaelble and Roth [11] for continence repair. Despite a reduction in the overall numbers of CAC operations being performed, it can be considered the ultimate therapeutic option in experienced hands [7, 10, 11]. The presented technique combines bladder neck closure, omental interposition, bladder augmentation and creation of a continent catheterizable channel (CCC) [12]. Nevertheless, this procedure could be accompanied by complications of different degrees which should be considered during indication [13]. We evaluated the outcomes and complications of continent ileovesicostomy for different incontinence forms.

## PATIENTS AND METHODS

A total of 15 patients with mostly severe urinary incontinence were referred to four different urologic centers between 2003 and 2012, of whom 5 were previously treated with radical prostatectomy and 5 with repeated bladder neck incision due to stenosis (Table 1). Three additional patients had a history of neurogenic bladder. In one case involving an orthotopic neobladder, a secondary urethrectomy with CCC was performed due to a local tumor recurrence. One patient with persistent incontinence after transvaginal tape implantation (TVT) and Burch–colposuspension received a continent diversion.

We retrospectively collected data from the records of all cases who underwent a CCC with reconfigured ileum as previously described by Kaelble and Roth [11]. All patients were seen for a follow-up at 3, 6, 12 and 24 months postoperatively.

The regimen of all four institutions for persistent urinary incontinence was bladder neck incision, according to Turner–Warwick in cases of BNS. Pa-

tients with recurrent incontinence and no repeated BNS were offered a transobturator sling surgery or an alloplastic sphincter prosthesis in severe cases. As a last resort treatment, an open urinary diversion and bladder neck closure was recommended.

Access is gained via an abdominal midline incision [11, 12]. The bladder neck is dissected, all scar tissue is excised and the ureters are stented. The bladder neck is closed in a two layered fashion using absorbable 5–zero Monocryl for the mucosa and absorbable 3–zero Monocryl for the seromuscularis. Additionally, omental interposition is performed to minimize fistula formation. The bladder is opened at the dorso-cranial aspect. Thereafter, the ileal U with serosally embedded, tapered ileum is created as described and sewn to the opening of the bladder, as in an ileocystoplasty (Figures 1 A–H). The continent stoma is placed in the lower abdomen using a circumferential subcutaneous and skin plasty (Figure 1I).

The primary outcome was stoma incontinence and surgical revision for stoma related complications, which included stenosis at skin level and stricture of the efferent segment. To standardize the data, time of reoperation was considered as time of complication. The Clavien classification was used to demonstrate the type of complications. Demographic data, underlying diagnosis, associated procedures and type of surgical revision were also collected. The status of the channel was assessed at the time of the last follow-up.

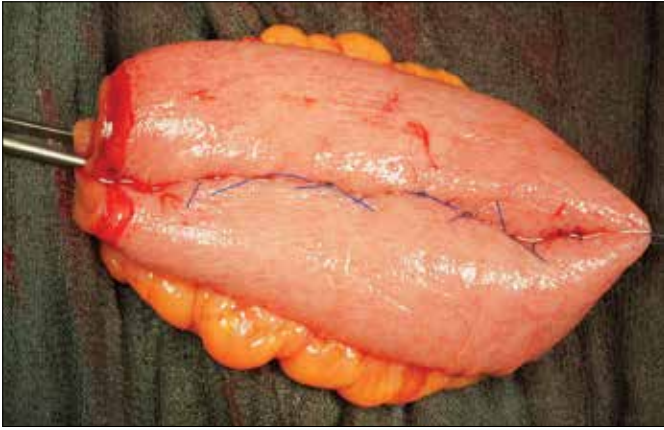
All included patients signed an informed consent form. As all presented data was collected retrospectively, the approval of the local ethics committee was not necessary.

**Table 1.** Surgical indications

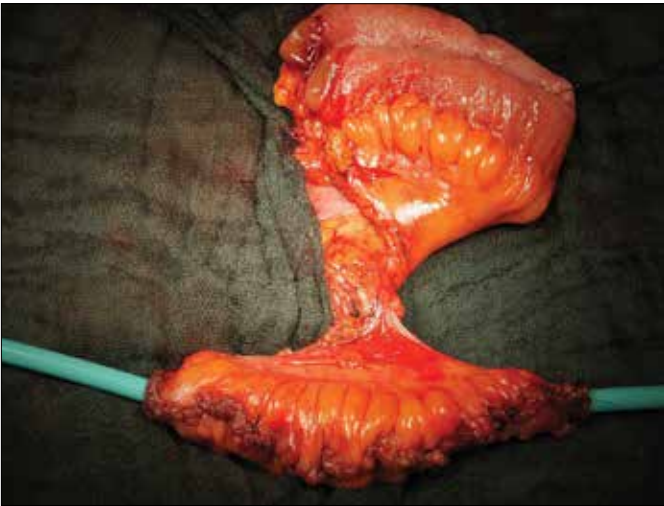
	n	%
Post–prostatectomy incontinence	5	33.3
Recurrent bladder neck stenosis	5	33.3
Neurogenic bladder	3	20
Urethral tumor recurrence following neobladder	1	6.7
Post–TVT and colposuspension incontinence	1	6.7



**Figure 1A.** 30 cm ileum is isolated and bowel continuity is restored by ileoileostomy [oral part (10 cm) on the right, distal part (20 cm) on the left side].



**Figure 1B.** The distal part of the isolated ileum is configured in a U-shape. The two limbs of the 'U' are sewn together by running seromuscular sutures near the mesentery of each side.



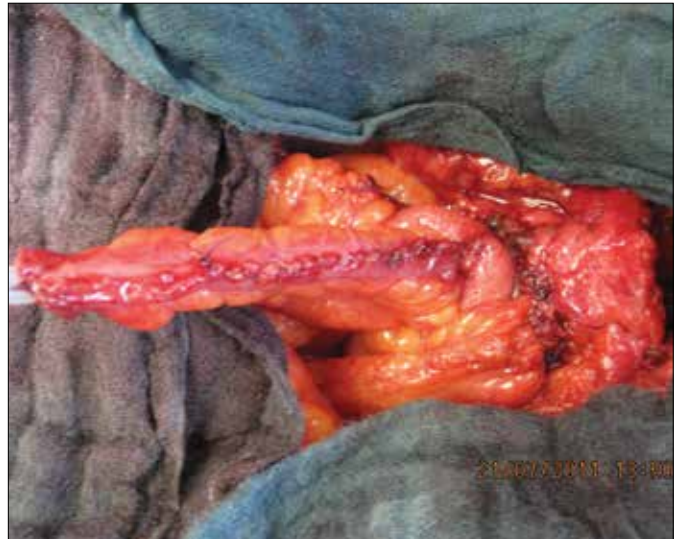
**Figure 1C.** The oral part of the isolated ileum segment is tapered over an 18 F open-end catheter.



**Figure 1D.** The distal part of the isolated ileum is opened antimesenterically.



**Figure 1E.** The tapered ileum is placed and anastomosed to the sero-serosal, inner part of the 'U'. At the entrance of the 'U' the distal opening of the tapered segment is fixed with the free margins of the inner bowel segments. The sero-serosal tunnel is then closed by interrupted running sutures.



**Figure 1F.** This U-shaped segment with the embedded tapered ileum is then sutured to the opened bladder by running sutures again, as an ileozystoplasty.

Statistical analyses were performed with SPSS, version 11.5.1.

## RESULTS

Primary BNC was successful in all patients and the primary continence rate was 86.7% (Table 2). At least two subsequent surgical revisions were performed in two patients (13.3%), including stomal revision at skin level successfully reconstructed by buccal mu-



**Figure 1G,H.** The efferent ileum-segment is placed at the lower abdominal quadrant. The stoma location depends on its length and mobility. It should be carefully planned to allow easy access by the patient, preferably with the dominant hand. For tension-free channel fixation, a circumferential incision is made to minimize the stricture risk. The skin flaps are mobilised down to the rectus fascia and sutured with the stoma margins with single sutures.



**Figure 1I.** Cosmetic and functional excellent result, two years postoperatively.

cosa and a septical infection of the augmented bladder in another case, resulting in insufficiency of the pouch and stoma. No stomal prolapse occurred. Indications for surgical revision included stomal stenosis at skin level in one (6.7%) and insufficiency of the augmented bladder in another patient (6.7%). One additional patient suffered from a mild stomal incontinence without need for further reconstruction. Regardless of the number of revisions, at the last

**Table 2. Results**

	n	%
Continence	13	86.7
Incontinence	1	6.7
Stricture	0	0
Stenosis at skin level	1	6.7
Stricture of the efferent segment	0	0
Insufficiency of bladder augmentation/stoma	1	6.7
Prolapse	0	0
Revision	2	13.3

follow-up 93.3% of patients had a functional channel. The rate of the two most frequent complications (stenosis and augmentation/stoma insufficiency) was recorded within the first postoperative year, followed by a complication-free period. No patient developed ureteral obstruction. The median follow-up was 24 months (range: 2 to 111).

Early postoperative complications included a wound infection in one patient and an incipient ileus conservatively treated with drugs in another case (Clavien I, 13.3%, Table 3). One patient suffered from paralytical ileus which required parenteral management (Clavien II, 6.7%). In another case involving a wheelchair user, a severe complication occurred due to a septical infection of the augmented bladder causing insufficiency of the stoma (Clavien IVa, 6.7%). This patient was treated by the removal of the bladder augmentation and stoma as well as permanent insertion of a suprapubic vesicostomy tube.

## DISCUSSION

Despite a reduction in the overall numbers of CAC operations being performed, there remains a role for continent urinary diversion. The procedure is indicated as part of the treatment pathway for both neurogenic and idiopathic detrusor overactivity, if less

**Table 3. Complications**

Clavien classification	N	%
I	2	13.3
II	1	6.7
IIIa	0	0
IIIb	0	0
IVa	1	6.7
IVb	0	0
V	0	0
Total	4	26.6

invasive treatments such as intravesical injection of botulinum toxin A and neuromodulation have failed [1, 8]. Additionally, for unsatisfied patients with BNS recurrence or persistent PPI after a number of previous transurethral and open reconstructive operations [4, 5, 6, 14], bladder neck closure and continent ileovesicostomy is the last resort treatment for permanent recurrence-free survival [7]. Currently, the concept of the Mitrofanoff principle is a basic tool in reconstructive surgery, using a wide range of tissues for CCC creation [10]. Flap and nipple valves are the most predominantly used, and continence rates reported are generally high [9]. However, only a few studies compared the outcomes of different efferent segments reaching a high level of evidence. Randomized studies do not exist. The common problem of all the published series is the high risk of surgical revision in up to 39% of all patients [7, 9, 10, 13, 15]. The efferent segment of CCC is even more vulnerable to complications [9]. Predominantly, stomal stenosis and urinary incontinence are the main reasons for reinterventions [9, 10].

There is an ongoing debate on the influence of tissue type used for CCC creation on the subsequent development of channel related complications [9, 10]. The appendix is generally a preferred choice for continent diversions, following intussuscepted ileal nipple and a reconfigured Yang–Monti tube, and they all have well established data on results and complications [9]. Furthermore, there are no significant differences in outcome compared with different continent vesicostomy techniques [7]. Comprehensive review of the literature demonstrated that there is no single universally applicable efferent segment in continent urinary diversion [9]. The complications of CAC appear to be more than counterbalanced by a high level of patient satisfaction with the procedure.

Two previous reports have focused on time to complications. Thomas et al. found channel related complications in 23% of 117 continent stomas during a mean

follow-up of 28.4 months. No problems were seen after 20 months, leading them to conclude that most channel related complications occur in the first post-operative year [16]. Welk et al. demonstrated channel problems in 21% of 67 patients with CCC, with most developing in the first two years after reconstruction [17]. In this study, the relative rates of stenosis and incontinence did not differ significantly during early and late follow-up [17]. Our complication rate is in accordance with the published series [7, 10, 15, 16, 17]. Despite a lack of longer follow-ups, all revisions were performed within the first postoperative year.

A key aspect is the choice of the stoma site [10, 18]. It should be carefully planned to allow easy access by the patient and provide a direct route to the reservoir without kinks [10]. Moreover, it should be as cosmetically satisfactory as possible. A circumferential subcutaneous and skin plasty avoids traction to the channel and allows good stomal fixation [12].

The good results of the serosa lined extramural ileal valve as a continent urinary outlet in the large study of Abol–Enein et al. [19], as well as the study by D'Elia et al. of troubleshooting following Indiana pouch incontinence [20] encouraged Kaelble and Roth to use the revision technique in 5 patients with an incontinent modified Mainz pouch [11]. After achieving success in all cases they also applied this technique for bladder augmentation and an umbilical stoma following BNC. This technique has withstood the test of time [13] and is an effective, last resort treatment for patients with non-reconstructible bladder outlet or persistent urinary incontinence.

#### ABBREVIATIONS

BNC – bladder neck closure  
 BNS – bladder neck stenosis  
 CAC – continent augmentation cystoplasty  
 CCC – continent catheterizable channel  
 PPI – post prostatectomy incontinence  
 TVT – transvaginal tape

## References

1. Biers SM, Venn SN, Greenwell TJ. The past, present and future of augmentation cystoplasty. *BJU Int.* 2011; 109: 1280–1293.
2. Nitti VW. Editorial. Long-Term continence after surgery – what can we tell patients? *J Urol.* 2012; 187: 1157–1158.
3. Elliott DS. Editorial. Can we better predict and treat urinary incontinence after prostatectomy? *J Urol.* 2012; 187: 789–790.
4. Seweryn J, Bauer W, Ponholzer A, Schramek P. Initial experience and results with a new adjustable transobturator male system for the treatment of stress urinary incontinence. *J Urol.* 2012; 187: 956–961.
5. Pfalzgraf D, Beuke M, Isbarn H, Reiss CP, Meyer–Moldenhauer WH, Dahlem R, Fisch M. Open retropubic reanastomosis for highly recurrent and complex bladder neck stenosis. *J Urol.* 2011; 186: 1944–1947.
6. Pfister D, Eppelen R, Porres–Knoblauch D, Heidenreich A. Operative Korrekturmöglichkeiten der Anastomosenstriktur nach radikaler Prostatektomie. *Urol.* 2011; 50: 392–396.
7. Spahn M, Kocot A, Loeser A, Kneitz B, Riedmiller H. Last resort in devastated bladder outlet: bladder neck closure and continent vesicostomy – long-term results and comparison of different techniques. *Urol.* 2010; 75: 1185–1192.

8. Gurung PMS, Attar KH, Abdul-Rahman A, Morris T, Hamid R, Shah PJR. Longterm outcomes of augmentation ileocystoplasty in patients with spinal cord injury: a minimum of 10 years of follow-up. *BJU Int.* 2011; 109: 1236–1242.
9. Ardelt PU, Woodhouse CRJ, Riedmiller H, Gerharz EW. The efferent segment in continent cutaneous urinary diversion: a comprehensive review of the literature. *BJU Int.* 2011; 109: 288–297.
10. Leslie B, Lorenzo AJ, Moore K, Farhat WA, Bägli DJ, Pippi Salle JL. Long-term followup and time to event outcome analysis of continent catheterizable channels. *J Urol.* 2011; 185: 2298–2302.
11. Kaelble T, Roth S: Serosa lined and tapered ileum as primary and secondary continence mechanism for various catheterizable pouches. *J Urol.* 2008; 180: 2053–2057.
12. Kaelble T, Anheuser P, Steffens J. Serosa lined and tapered ileum as continence mechanism for catheterizable pouches. *BJU Int Surgical Atlas.* 2012; 110: 756.
13. Elshal AM, Abol-Enein H, Mosbah A, Kamal MM, Abdel-latif M, Ghoneim MA. Serous-lined unidirectional valve for construction of continent cutaneous urinary reservoir: the test of time. *J Urol.* 2012; 80: 452–459.
14. Lai HH and Boone TB: Complex artificial urinary sphincter revision and reimplantation cases – how do they compared to virgin cases? *J Urol.* 2012; 187: 951–955.
15. Wiesner C, Stein R, Pahernik S, Hahn K, Melchior SW, Thueroff JW. Long-term followup of the intussuscepted ileal nipple and the in situ, submucosally embedded appendix as continence mechanisms of continent urinary diversion with the cutaneous ileocecal pouch (Mainz pouch I). *J Urol.* 2006; 176: 155–160.
16. Thomas JC, Dietrich MS, Trusler L. Continent catheterizable channels and the timing of their complications. *J Urol.* 2006; 176: 1816–1819.
17. Welk BK, Afshar K, Rapoport D. Complications of the catheterizable channel following continent urinary diversion: their nature and timing. *J Urol.* 2008; 180: 1856–1860.
18. Farrugia MK, Malone PS. Educational article: the Mitrofanoff procedure. *J Pediatr Urol.* 2010; 6: 330–334.
19. Abol-Enein H, Salem M, Mesbah A, Abdel-Latif M, Kamal A, Shabaan A. Continent cutaneous ileal pouch using the serous lined extramural valves. The Mansoura experience in more than 100 patients. *J Urol.* 2004; 172: 588–563.
20. D'Elia G, Gilfrich CP, Leissner J, Abol-Enein H, Fichtner J, Hohenfellner R. Operative Strategie der Harnableitung in komplizierten Situationen (Fallbericht): Bildung eines kontinenten efferenten Segmentes bei einem inkontinentem Indiana-Pouch. *Akt Urol.* 1998; 29: 1–6. ■