

An Experience with Continent Urinary Diversion

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ABSTRACT

Objective To find out frequency of urinary continence and surgical complications of using cecum and right colon as reservoir with appendix as a continent catheterizable conduit in various urological conditions in adults.

Study design Retrospective study.

Place & Duration of study Department of Surgery, Hayatabad Medical Complex and Khyber Teaching Hospital, from January 2005 and December 2015.

Methodology This is a review of records of patients who underwent continent urinary diversion. Reservoir was constructed from cecum and right colon using Le Bag technique. Appendix was used as a catheterizable port applying Mitrofanoff principle. Patients were followed up for six months at two months interval.

Results A total of 85 patients underwent continent diversion and 78 patients completed the study protocol. Four patients were lost to follow up and three died. Out of 78 patients, 48 were males and 30 females, with age range from 05 year to 68 year. Thirty-eight (48.71%) patients presented with transitional cell carcinoma, and 12 (15.38 %) had exstrophy-epispadias complex. Reservoir formation using right colon with appendix for Mitrofanoff was performed in 53(67.94%) patients. Eleven (14.10%) patients underwent bladder augmentation procedure with Mitrofanoff and in 14 (17.94%) patients appendix alone was used for diversion. Thirty-two (41.02%) patients developed complications which included incisional hernia (n=7 - 8.97%), calculous formation (n=1 - 1.28%) and subacute intestinal obstruction (n=2 - 2.56%).

Conclusion Use of appendix as a catheterizable conduit is a good option in achieving continent urinary diversion.

Key words Urinary diversion, Mitrofanoff procedure, Appendix, Bladder augmentation.

INTRODUCTION:

Different approaches to replace an absent or ineffective bladder secondary to trauma, infection, neurogenic bladder, congenital anomalies or neoplastic diseases are reported in literature. Clean

intermittent self catheterization (CISC) provides effective urinary drainage in patients in various diseases.¹ This is not possible in conditions like urethral strictures as a result of trauma.²

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Various procedures for continent urinary diversion have been reported.³⁻⁷ Use of appendix as a channel for emptying a urinary reservoir by catheter was popularized Paul Mitrofanoff.⁸ According to this principle, appendix or an alternative conduit is buried in a submucosal tunnel via non refluxing flap valve technique.⁹ This appears to be an attractive procedure to achieve continence. Many surgical and non surgical complications are reported with this technique but

still it is considered a standard of care. This retrospective study was conducted to review case records of all the patients who underwent this procedure at our facility to find out indications, its effectiveness and procedure related complications.

METHODOLOGY:

This retrospective study was conducted at the Surgical Departments of Hayatabad Medical Complex and Khyber Teaching Hospital where records of all the patients managed between January 2005 and December 2015 were reviewed. High risk patients with significant comorbid such as chronic renal/hepatic failure, uncontrolled diabetes, hypertension etc and those who had learning disabilities and absent appendix were excluded.

Standard operative technique was used. Bladder augmentation was added as per indication. Regular follow up visits were scheduled to find out any complication and urinary continence. The first follow up visit was scheduled at 3 weeks after discharge. During this visit the reservoir drain was removed and patient was educated regarding self catheterization. Routine investigations were advised like blood biochemistry, urinalysis and urine cultures. Subsequent follow up visits were scheduled at 2 months interval for 6 months. During these visits ultrasonography was also added. At 6 month interval pouchogram was performed to monitor the capacity of reservoir and any reflux in the ureters. All pre-operative, peroperative and postoperative data was collected on structured proforma and analyzed on SPSS version 11.

RESULTS:

A total of 85 patients underwent continent diversion procedure. Of these 78 completed the study protocol. Four patients were lost to follow up and three died. Out of 78 patients, 48 were males and 30 females with the age range from 5 year to 68 year. Amongst

the 78 patients 38 (48.71%) had transitional cell carcinoma (table I). Reservoir formation using right colon with appendix for Mitrofanoff was performed in 53 (67.94%) patients (table II).

Thirty-two (41.02%) patients developed complications. Incisional hernia in 07 (8.97%) patients was the most commonly reported complication that required intervention. Other complications are given in table III. In a patient with calculous in reservoir intracorporeal lithotripsy was used. Two patients with subacute intestinal obstruction were managed by conservative approach and improved. Two patients had intraperitoneal urinary leak one of whom settled conservatively and other required operation. Suprapubic urinary fistula was noticed in four patients of which two settled conservatively and others required surgical intervention. All patients with stomal stenosis were managed by intermittent dilation. A patient developed entero-reservoir fistula which needed surgical correction. This patient also had incisional hernia and suprapubic leak from reservoir and all were managed in single surgery. Transient urinary incontinence was observed in five patients which settled without surgery in six months.

DISCUSSION:

Reconstructive bladder surgery using continent urinary diversion/neobladder has been practiced for the last 40 years. Neobladder is the preferred procedure in the developed world due to the fact that it utilizes the patient's own urethra and sphincter rather than an artificially developed mechanism.¹⁰ However in some situation and diseases neobladder may not be an option. In our setup continent urinary diversion is more commonly performed.¹¹ It is also the procedure of choice in patients with absent or ineffective sphincter and neurologically disabled patients.¹²

Indications	n (%)
Transitional cell carcinoma of urinary bladder	38 (48.71%)
Urethral injuries	8 (10.25%)
Neurogenic bladder	8 (10.25%)
Vesico-vaginal fistula	2 (2.56%)
Exstrophy- epispadias complex	12 (15.38%)
Posterior urethral valves	6 (7.69%)
Post pelvic irradiation	3 (3.84%)
Contracted bladder (Tuberculosis)	1 (1.28%)

Procedure	Male (n=48)	Female (n=30)	Total (n=78)
Using appendix for Mitrofanoff procedure alone	10	04	14 (17.94%)
Bladder Augmentation procedure with Mitrofanoff	05	06	11 (14.10%)
Reservoir formation with Mitrofanoff	33	20	53 (67.94%)

Complications	Frequency n (%)	Managed Conservatively	Required Surgical Intervention
Wound infection	03 (3.84%)	03 (3.84%)	Nil
Suprapubic urinary fistula	04 (5.12%)	02 (2.56%)	02 (2.56%)
Intraperitoneal leak	02 (2.56%)	01 (1.28%)	01 (1.28%)
Subacute Intestinal obstruction	02 (2.56%)	02 (2.56%)	Nil
Urinary bladder stone formation	01 (1.28%)	0	01 (1.28%)
Incisional hernia	07 (8.97%)	0	07 (8.97%)
Stomal stenosis	07 (8.97%)	07 (8.97%)	Nil
Entero-reservoir fistula	01 (1.28%)	0	01 (1.28%)
Transient Urinary Incontinence	5 (6.41%)	5 (6.41 %)	Nil
Total	32 (41.02%)	20 (25.64 %)	12 (15.38%)

In this study appendix was used as catheterizable conduit. In case of a short appendix, a rectangular patch of cecum may be taken along the appendix. This cecum is tabularized in such a manner that it supplements the appendix and provides an adequate length of conduit as described.¹³ In our study we encountered seven cases of short appendix which were dealt with the same technique.

In current series 48% of patients who underwent Mitrofanoff procedure had transitional cell carcinoma followed by exstrophy- epispidias complex. This is in contrast to international studies where neurogenic bladder is the leading indication for such a procedure.¹⁴ The reason for this contrast is the late presentation of patients in our setup; mostly with advance stage of tumor, necessitating radical cystectomy. Similarly exstrophy-epispidias complex patients are managed early in infancy in developed countries.

We achieved a continent reservoir in all the patients which is in accordance with national and international studies. In a study conducted by Barqawi et al continence rate was 97%.¹⁵ This study was performed on 109 pediatric patients where the indication was neurogenic bladder. Another study performed by

Sahadevan et al conducted on adults had a continence rate of 89%.¹¹ This study was based on a small sample size, but since it was designed in a developing country like ours, their primary indication for continent diversion was bladder tumor.

The most common complication encountered in our series was incisional hernia. This high rate can be attributed to the fact that all these patients were treated for exstrophy-epispidias. The abdominal defect closure in such cases is always challenging. The potential weakness due to widely separated pubic symphysis predisposes to incisional hernia. This is in contrast to other studies in which the common complications include stomal stenosis and bladder stone formation. In Sahadevan et al study 57% of the patients developed stomal stenosis and 14% developed bladder stones.¹¹ Same complications occurred with less frequency in current series. By using VQZ technique for stoma formation the frequency of stenosis is decreased.

The frequency of intraperitoneal urinary leak in our study is lower than others. It was 5.6% in a series by Rowland et al.¹⁶ This can be attributed to certain modifications that we have made in surgical procedures. The ureteric tubes and drains leave the

reservoir at a single point instead of separate outlets. A purse string suture was applied to narrow down the opening and further this was attached to peritoneum where it exits the anterior abdominal wall, hence, reducing the probability of any leak.

CONCLUSIONS:

Successful urinary continence was achieved in all the patients operated in this series. Use of appendix in Mitrofanoff procedure is an ideal for creating continent diversion.

REFERENCES:

1. Lapidés J, Diokno AC, Gould FR, Lowe BS. Further observation on self catheterization. *J Urol.* 1976;116:169-71.
2. Khan M, Inam A, Afridi N, Ahmed S, Farrukh, Manzoor S. Efficacy of use of appendix as Mitrofanoff conduit in urinary diversion. *Khyber Med Univ J.* 2015;7:3-7.
3. Kock NG, Nilson AE, Norlen LS, Norlén LJ, Philipson BM. Urinary diversion via a continent ileal reservoir: clinical results in 12 patients. *J Urol.* 1982;128:469-75.
4. Rowland RG, Mitchell ME, Bihle R, Kahnoski RJ, Piser JE. Indiana continent urinary reservoir. *J Urol.* 1987;137:1136-9.
5. Thuroff JW, Alken P, Riedmiller H, Engelmann U, Jacobi GH, Hohenfellner R. The Mainz pouch (mixed augmentation ileum and cecum) for bladder augmentation and continent diversion. *J Urol.* 1986;136:17-26.
6. Skinner DG, Lieskovsky G, Boyd SD. Technique of creation of a continent internal ileal reservoir (Kock pouch) for urinary diversion. *Urol Clin North Am.* 1984;11:741-9.
7. Light JK, Scardino PT. Radical cystectomy with preservation of sexual and urinary function: use of the ileocolonic pouch ("Le Bag"). *Urol Clin North Am.* 1986;13:261-9.
8. Mitrofanoff P. Cystotomiecontinent-tetransappendiculaires dans le traitement des vessies neurologiques. *Chir Pediatr.* 1980; 21:297-305.
9. Suzer O, Vates TS, Freedman AL, Smith CA, Gonzalez R. Results of the Mitrofanoff procedure in urinary tract reconstruction in

- children. *Br J Urol.* 1997;79:279-82.
10. Gakis G, Stenzl A. Ileal Neobladder and its variants. *Eur Urol.* 2010;9S:745-53.
11. Bachor, R. and Hautmann, R. Options in urinary diversion: a review and critical assessment. *Urology.* 1993;11:235-50.
12. Sahadevan K, Pickard RS, Neal DE, Hasan TS. Is continent diversion using the Mitrofanoff principle a viable long-term option for adults requiring bladder replacement? *BJU Int.* 2008;102:236-40.
13. Bruce RG, McRoberts JW. Cecoappendicovesicostomy: conduit lengthening technique for use in continent urinary reconstruction. *Urology.* 1998;52:702-4.
14. Merenda LA, Duffy T, Betz RR, Mulcahey MJ, Dean G, Pontari M. Outcomes of urinary diversion in children with spinal cord injuries Lisa A. *J Spinal Cord Med.* 2007;30:41-7.
15. Barqawi A, de Valdenebro M, Furness PD 3rd, Koyle MA. Lessons learned from stomal complications in children with cutaneous catheterizable continent stomas. *BJU Int.* 2004; 94:1344-7.
16. Rowland RG. Complications of continent cutaneous reservoirs and neobladders: series using contemporary techniques. *AUA Update Series.* 1995;14:202-7.

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Mazhar Khan: Data collection and manuscript writing.
 Saadia Muhammad: Manuscript writing.
 Farrukh Ozair Shah: Statistical analysis and data collection.
 Aisha Inam: Data collection.
 Ainul Hadi: Critical review of the manuscript.
 Muhammad Kalim: Data collection.

Conflict of Interest:

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