Case Series

Mitrofanoff Urinary Diversion: A Report of Three Cases

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Summary

The quality of life in patients with urinary incontinence or irreparable urethral stricturing can be improved by diversion with construction of catheterizable urinary stomas. We report our experience with three patients who required urinary diversion and underwent the Mitrafanoff procedure. The cases involved an eight year old with myelomeningocele, paraplegia and urinary incontinence, a 32 year old male with irreparable traumatic urethral stricture and an eighteen year old paraplegic man who developed urethral stricture secondary to prolonged catheterization for urine retention. Three years after their surgeries, they are continent with normal renal function.

Key Words: Urine diversion, catheterizable channel, continence

Introduction

Continent catheterizable channel is a conduit that connects a reservoir, which may be the urinary bladder, to the exterior, without leak of urine when the reservoir is full, but allows emptying by self catheterization. The aim is to improve the quality of life of the patients by achieving continence. The reservoir is emptied on a regular basis initially every 2 hours, then subsequently 3 hourly and 4 hourly as the patients builds confidence (1) .The upper urinary tracts are protected from damage from hydronephrosis and ascending infection(2).

Continence is achieved by employing the Mitrofanoff principle by sub-mucosal tunneling of the tubular structure which can be appendix, ureter or a spiral ileal segment into the reservoir wall creating a flap valve effect (3-5). The channel is then used for clean intermittent self catheterization. The patients will not need to carry urine collecting appliances since they are continent.

Case 1

Eight year old female with myelomeningocele, paraplegia, and both stool and urine incontinence. She had developed chronic sacral ulcers due to urine and stool soiling. A sigmoid divided colostomy was fashioned on the left lower abdomen to divert stool to allow granulation of the sacral ulcer, after which a gluteus maximus flap was raised to cover the ulcer. A micturating cystourethrogram revealed a good bladder capacity, therefore urine diversion was recommended to improve her quality of life. At laparatomy, a bladder neck sling was made from rectus fascia, applied, and tested to ensure leakage does not occur. A 2 cm segment of the ileum on its blood supply was resected and a spiral Monti channel made from it over a 14FG feeding tube as a stent. Mitrofanoff procedure was performed and the channel brought out at the umbilicus. The appendix was used to create a Malone Antegrade Caecal Enema (MACE) ‘stoma’ and brought out to the right lower quadrant. The colostomy was closed at the same sitting. The stent was in situ for 14 days after which assisted catheterization was commenced. She has remained dry for more than three years, her sacral ulcers have healed. This allows her to sit on a wheel chair and go to school. There is some urine leak when emptying delays.

Insert Table 1 here

Insert Figure 1 here

Case 2

This case involved a 32 year old male who suffered compression pelvic fracture, bladder rupture and membranous urethral injury after a fall from a height. Laparatomy was performed to repair the bladder rupture. A supra-pubic catheter left in-situ to drain the bladder.

A urethrogram conducted six weeks later revealed a urethra stricture and bone healing with severe pelvic contraction. Examination under anesthesia revealed a long gap between the two

ends of the stricture. The associated pelvic deformity made it technically difficult to perform urethroplasty and consent sought for do urine diversion. At laparatomy, appendicectomy was done, maintaining its blood supply. The tip of the appendix was transected and catheter introduced to ensure patency. A Mitrafanoff procedure was performed and the appendix brought out through the right lower abdominal wall. A, FG10 catheter was introduced and left in situ for fourteen days, after which it was removed and self catheterization commenced. The patient is compliant with self catheterization and remains continent more than three years after the surgery. He has a normal renal function with no upper tract dilatation on ultrasonography. The only complication is urine leak when emptying is delayed.

Insert Table 2 here

Insert Figure 2 here

Case 3

This was an eighteen year old male with history of a fall from a tree at the age of 10 years and sustained spinal injury with paraplegia. Due to prolonged urethral catheterization for the neurogenic ; he developed multiple penile urethral strictures for which a suprapubic cystostomy was performed. We reviewed his care and state of urethra and advised a continent catheterizable stoma rather than staged urethroplasty which would require clean intermittent self catheterization (CISC). This would be technically difficult because at the time of surgery he had stiffness of both hip joints in extension. At laparatomy, appendicectomy was performed preserving its blood supply. The tip of the appendix was transected, and appendico-vescicostomy done using Mitrafanoff of principle. A small cystostomy was made in the mucosa and 4-0 polyglactin used to make an appendico-vesical anastomosis and a FG 10 catheter left within the lumen for14 days. CISC was commenced on removal of the catheter. He has a no urine leak and a normal renal function. He latter underwent osteotomy of the hip joints to enable him sit on a wheel chair.

Insert Table 3 here

Insert Figure 3 here

Discussion

The successful introduction and popularization of clean intermittent self catheterization by Lapedes in 1872 led to development of a wide range of urologic operations using bowel (6). Clean Intermittent self catheterization ensures complete emptying of the reservoir. Though normally performed through the native urethra, in some patients the urethra is unsuitable, or it may have been surgically removed as part of the surgical procedures the patient has to undergo. Patients with an intact bladder that requires only catheterizable channel are good candidates for Mitrofanoff channel (7). In using such surgical procedures, continent vesicostomy can be successfully performed (8). A large compliant reservoir helps protect the kidneys and achieve

continence. The appendix can be used for creating the catheterizable channel, but when not available, the ureter, fallopian tube, tailored ileum or a skin tube may be used instead (4).

However, the Young-Monti technique using the bowel is a preferred substitute for the appendix (5, 9). Our third patient had unsuitable urethra for self catheterization, in which case the Mitrofanoff principle of appendico-vesicostomy was used. This creates a flap valve effect at the appendico-vesical junction so that pressure within the reservoir keeps the tube collapsed and hence continent during filling. Either a standard catheter or a Nelaton catheter is used for emptying.

In case-1 it was necessary to construct a Mitrofanoff channel using Young-Monti technique because the appendix was used to create a continent caecostomy for ante grade enemas (Malone Ante grade Caecostomy Enemas-MACE).

Our indication for performing catheterizable continent conduits included neurogenic bladder due to spina bifida and spinal injury (10) and irreparable urethral strictures, similar indications to those of Maranya et al (7).

Siting of the stoma for wheel chair bound patients is a special challenge but the umbilical location is the most favorable for cosmetic reasons and ease of catheterization (11). Case 2 in our series had a long gap between the stricture ends and a pelvic deformity. Both factors made the performance of urethroplasty technically difficult. . Case 3 had multiple urethral strictures which would require staged repairs involving several sessions of planned surgeries. He also had stiffness of both hip joints in extension. Carrying out CISC in this position when he cannot see his external genitalia would be impossible. He however benefitted from hip osteotomy to enable him sit in a wheel chair which made it even easier to empty the stoma.

Continent catheterizable stomas have attendant high rates of complications which include stomal stenosis requiring revision or conversion to an alternative catheterizable channel, and false passage (8, 12, 13). Up to 23% may require conversion to an alternative stoma or ileal conduit which is still the standard diversion, but it requires a stomal appliance which is a major cost to resource deprived families. The stomas of all our three patients are working well with no stricture. However, case 1 and 2 occasionally have urine leak when emptying is delayed. Mainz II procedure has been popularized in our region because of the poor acceptance of external appliances by our patients, and the high cost of the stoma appliances. It is however not suitable to patients whose external anal sphincter is not intact.

Conclusion

Continent catheterizable stomas are useful approaches to the management of urinary incontinence and irreparable urethral strictures. Our experience will help us expand the options for urinary diversion in our region.

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Table 1: Urea and electrolytes results for case 1

Electrolytes	**Results**	**Normal Range**
Creatinine	20.4 µm/L	(35-53 µm/L)
Cl^-	98 mmol/L	(98-101 mmol/L)
K^+	4.4 mmol/L	(3.5-5.1 mmol/L)
Na^+	130mmol/L	(136-145 mmol/L)
Urea	3.2mmol/L	(0.-8.3 mmol/L)

Table 2: Urea and electrolytes results for case 2

Electrolytes	**Results**	**Normal Range**
Creatinine	79.9 µm/L	(53-97 µm/L)
Cl^-	99.9 mmol/L	(96-107 mmol/L)
K^+	4.4 mmol/L	(3.5-5.1 mmol/L)
Na^+	136.1mmol/L	(136-148 mmolL)
Urea	2.29 mmol/L	(0-8.3 mmol/L)

Table 3: Urea and electrolytes results for case

Electrolytes	**Results**	**Normal Range**

Creatinine	47.6µm/L	(62-106 µm/L)
Cl^-	107mmol/L	(98-107 mmol/L)
K^+	4.7mmol/L	(3.5-5.1 mmol/L)
Na^+	138mmol/L	(136-145 mmol/L)
Urea	3.1mmol/L	(0.0-8.5 mmol/L)

Fig 1.Umbilical site of catheterizable stoma in Case 1.

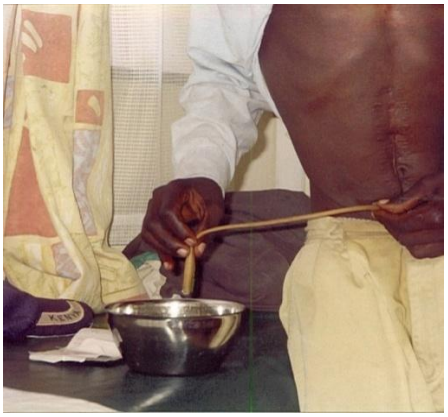

Fig 2. Pelvic X-ray of a molded pelvice, and patient emptying his bladder from right iliac site stoma (Case 2)

Fig 3. Stoma sited in the right lower abdomen, Case 3.