IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)
e-ISSN: 2279-0853, p-ISSN: 2279-0861.Volume 14, Issue 5 Ver. III (May. 2015), PP 41-45
www.iosrjournals.org

Use Of Intestinal Segments In Urinary Diversion: Experience With Eight Cases At The Jos University Teaching Hospital, Jos.

Authors: Ofoha C.G., Shu'aibu S.I., Akpayak I.C., Dakum N.K., Ramyil V.M.
Dr. Chimaobi Ofoha. Division Of Urology, Department Of Surgery, Jos University Teaching Hospital, P.M.B 2076, Jos, Nigeria.

Abstract:
Background: *Reconstructive urologic surgery frequently requires use of bowel for ureteral substitutes, bladder augmentation, or bladder replacement. In rare cases, gastrointestinal segments may also function as urethral or vaginal substitutes. This study gives an insight into the indications and uses of various intestinal segments in urinary diversion in our centre.*
Patients and methods: *A nine year review of patients who had urinary diversion using intestinal segment from 2005 to 2014 was done. All patients underwent preoperative evaluation in the form of careful history taking, medical examination and laboratory investigations which included complete urine analysis, serum creatinine, sodium, potassium and chloride. Radiological investigations to visualize the urinary tract included ultrasonography, intravenous urography or CT urography and cystoscopy and biopsy. Patients' age, sex, indication for urinary diversion, intestinal segment used, type of urinary diversion and complications related to use bowel segment were analyzed.*
Results: *Total of eight patients had urinary diversion using intestinal segments. The mean age of the patients was 47.4years (range 14 - 66years). Six of the patients were males (75%) while two were females (25%). Indications for use of intestinal segment in this study were complete ureteral stenosis from schistosomiasis, bladder exstrophy and carcinoma of the bladder. The types of urinary diversion were ileal ureteral replacement, rectosigmoid pouch and ileal neobladder.*
Conclusion: *Intestinal segments have become a veritable tool in reconstructive urology and they may be used to reconstruct a functionally normal urinary tract in terms of transport, storage, voiding, continence and preservation of renal function.*
Key words*: Intestinal segment, urinary diversion, ileal ureteral replacement, Mainz II pouch, ileal neobladder.*

I. Introduction

Reconstructive urologic surgery frequently requires use of bowel for ureteral substitutes, bladder augmentation, or bladder replacement. In rare cases, gastrointestinal segments may also function as urethral or vaginal substitutes [1]. Published reports on urinary diversion rely heavily on expert opinion and single-institution retrospective case series [2].

The choice of the type of urinary diversion requires careful clinical and quality of life (QOL) assessments with the patient [3]. Total cystectomy for bladder cancer necessitates urinary diversion. Other indications are as follows: when cystectomy is needed because of severe and persistent bladder hemorrhage after radiation therapy and when uncontrollable irradiation cystitis follows x-ray therapy to the uterine cervix, for carcinoma of the female urethra prior to irradiation or surgical extirpation, as a palliative for malignant rectovesicovaginal fistula, and for ureteric obstruction due to pelvic malignancy and Congenital Anomalies e.g. Ectopia vesicae [4]. Bowel segments have also been used in situations in which a ureteral defect cannot be bridged by tissue lined with urothelium [5]. This study gives an insight into the indications and uses of various intestinal segments in urinary diversion in our centre.

II. Patients And Methods

A nine year review of patients who had urinary diversion using intestinal segment from 2005 to 2014 was done. All patients underwent preoperative evaluation in the form of careful history taking, medical examination and laboratory investigations which included complete urine analysis, serum creatinine, sodium, potassium and chloride. Radiological investigations to visualize the urinary tract included ultrasonography, intravenous urography or CT urography and cystoscopy and biopsy. Elevated serum creatinine > 1.8 mg/dL, irradiated bowel or a non functioning renal unit were considered as exclusion criteria. Patients' age, sex, indication for urinary diversion, intestinal segment used, type of urinary diversion and complications related to use bowel segment were analyzed.

III. Results

Total of eight patients had urinary diversion using intestinal segments. The mean age of the patients was 47.4years (range 14 - 66years). Six of the patients were males (75%) while two were females (25%).
Indications for urinary diversion were complete ureteral stenosis from schistosomiasis, bladder exstrophy and carcinoma of the bladder.

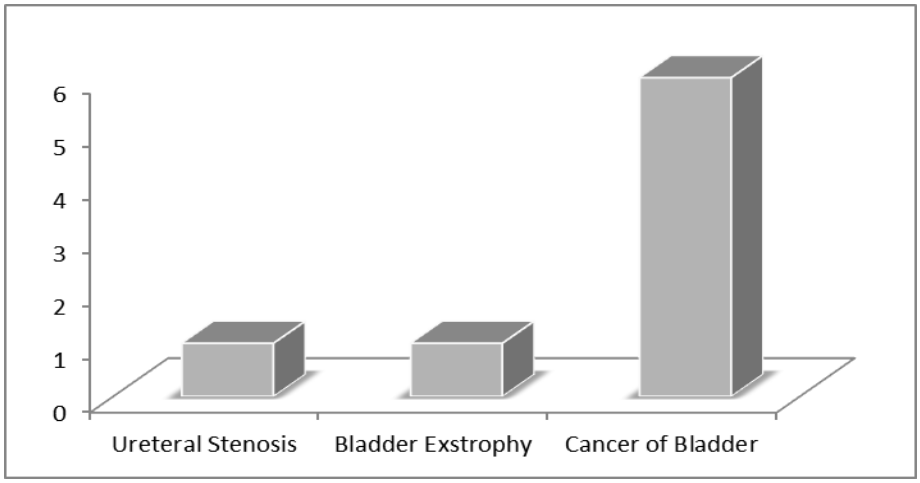

Figure 1: Showing indications for urinary diversion using intestinal segment.

The types of urinary diversion were ileal ureteral replacement for complete ureteral stenosis, rectosigmoid pouch for bladder exstrophy and ileal neobladder for carcinoma of the bladder. Four patients had orthotopic bladder reconstruction while two patients had continent catheterizable units.

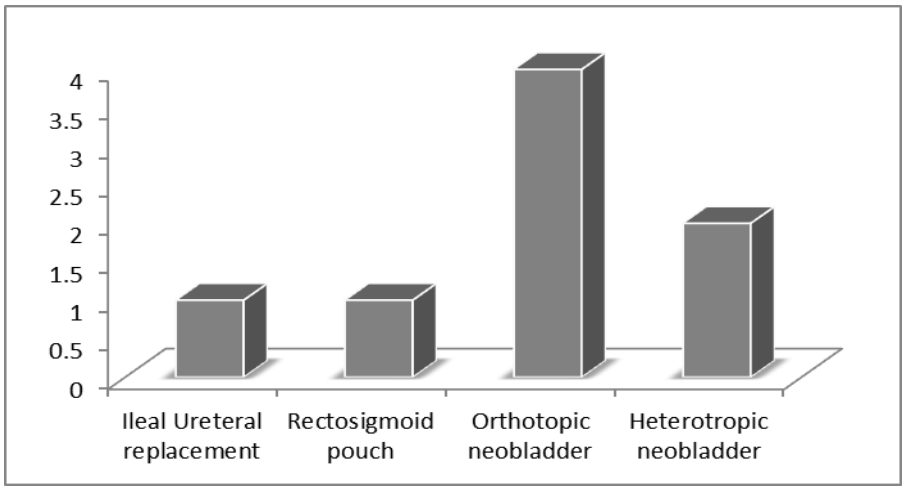

Figure 2: Showing types of urinary diversion.

Complications encountered include mucus plug in three patients, two patients had wound infection, one patient had burst abdomen while one patient had urinary incontinence.

IV. Discussions

The ileum and colon are commonly used in urinary diversion and reconstruction. Selection of appropriate form of urinary diversion involves a discussion with the patient outlining the various forms of urinary diversion, the potential risks and complication of the various forms. Incontinent diversion (conduit), continent diversions (catheterizable pouch via stomas and orthotopic neobladder) options should be presented to the patient. It should also be made clear that intra operative findings may affect the final choice of urinary diversion. Where a catheterizable pouch is the form of urinary diversion chosen, the stoma therapist should be involved in counseling and choosing the site for the stoma.

Ileal and intestinal ureteral replacement remains a useful procedure for complex ureteral reconstruction [6]. Long ureteric defects may occur as a result of iatrogenic ureteral injuries, recurrent pelvi-ureteric junction obstruction, chronic inflammatory diseases such as bilhariziasis, retroperitoneal fibrosis and ureteral carcinoma.

Several techniques were described to compensate this defect by intrinsic urinary tissue such as direct anastomosis, psoas hitch, Boari flap, transuretero-ureterostomy and renal autotransplantation [7].

In this review, a 14year old girl with long segment ureteric defect from schistosomiasis had complete ureteral replacement using ileal segment. Prior to surgery she had nephrostomy because of impaired renal function. Definitive surgery was carried out subsequently after stabilization of renal function. At surgery the proximal end-to- end anastomosis was done between tapered bowel end and renal pelvis while the distal bowel was implanted into the posterior superior aspect of the bladder dome. The substitution was performed with an isoperistaltic ileal segment in refluxing fashion. The double J stent and urethral catheter were removed two weeks after surgery.

Figure 3: Showing nephrostomy tube.

Figure 4: Showing stenosed and calcified ureter.

The first case of ileal ureteral replacement was carried out by Shoemaker et al [8].

Motoi et al [9] presented his clinical experience with eight patients who underwent ureteral reconstruction with the use of bowel segments over forty years. His conclusions were; ureteral replacement with a bowel segment is a challenging but useful procedure, even for patients with malignancy. Chung et al [10] examined the long-term safety and efficacy of ileal ureteral replacement, especially in regard to maintaining preoperative renal function and the avoidance of major complications and concluded that, ileal and intestinal ureteral substitution remains a safe and efficacious procedure in patients with complex and difficult ureteral issues not amenable to more conservative measures.

The main advantage of reconstructing the ureter with ileum is the long-term avoidance of nephrostomy tubes, ureteral stents and nephrectomy. Furthermore, the ileal ureter requires no external devices, preserves renal function and has the advantage of using an uncompromised blood supply in irradiated cases [11].

The Sigma-Rectal pouch or Mainz II pouch [12] which is a type of continent urinary diversion may be utilized in reconstruction for bladder exstrophy. Bladder exstrophy is a rare congenital malformation which presents a defect of the anterior lower abdominal wall, with deficient anterior bladder wall, epispadias and widening of the pubic symphysis [13]. Management includes modern staged exstrophy repair or single stage repair and urinary diversion procedures. The aim of treatment is preservation of renal function, maintenance of continence to urine, cosmetically acceptable external genitalia and satisfactory sexual function. These patients are usually seen in the postnatal period. Presentation in adulthood presents a major surgical challenge. Such patients require cystectomy and urinary diversion [14].

Mainz II pouch was the form of urinary diversion in a 34year old man who presented with bladder exstrophy. The bladder was fibrotic with squamous cell metaplasia. The patient is indigent hence the late presentation.

Figure 5: Showing bladder exstrophy in an adult.

Figure 6: showing Mainz II pouch under reconstruction

Belachew et al [13] managed a total of forty six cases of classic bladder exstrophy. Thirty two percent were managed by diversion of urine to Mainz II pouch. 93.3% achieved continence to urine which was satisfactory in terms of quality of life. His conclusion was that, Sigma rectal pouch is a good alternative for selected neglected cases in improving the quality of life in the developing world. Mingin et al [15] reviewed the results of the Mainz II pouch as a primary and secondary urinary diversion in five patients with bladder exstrophy. All patients were continent and the upper urinary tract stable during follow up. He concluded that Mainz II pouch is appropriate for patient with a small fibrotic bladder, and as a salvage procedure for those who have endured multiple reconstructive procedures and remained incontinent. Furthermore, this procedure deserves serious consideration in children residing in developing countries.

As reported by Fisch et al [16], the results of these low-pressure rectal reservoirs are excellent with day and night continence better than 90% and complications related to the surgical procedure range from 0- 10% with the sigma-rectum pouch.

Continent urinary diversion following radical cystectomy represents an established treatment option. Many different techniques of continent urinary diversion, have been developed and improved over the last 50 years [17]. In this study six patients had continent urinary diversion following radical cystectomy for carcinoma of the bladder. Four had orthotopic neobladder while two had catheterizable pouches. In all cases ileal segment were used for the construction of the neobladder.

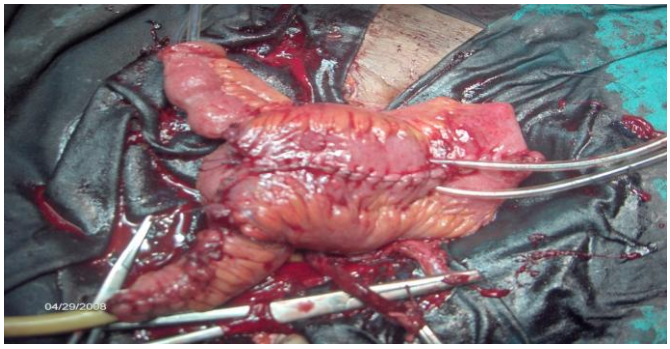

Figure 7: Reconstructed ileal neobladder.

Catheterizable pouches involve creating a urinary reservoir within the abdomen using an ileal segment, colon or combination of small and large bowel [18]. The stoma is usually located at the umbilicus or lower abdomen. Cognitive function to perform intermittent self catheterization as well as hand eye co-ordination is paramount in this form of urinary diversion [19]. While Orthotopic diversion involves the creation of a large capacity, low pressure reservoir from colon or ileum that is connected to the native urethra. Voiding is achieved

through relaxation of the external sphincter and an increase in intra-abdominal pressure (Valsalva maneuver). These patients may also need to perform intermittent catheterization (ISC) to relieve urinary retention or for irrigation of excess mucous [17], [19]. Continent urinary diversion, especially orthotopic bladder substitutions, has become increasingly popular following radical cystectomy for bladder cancer. The ultimate goal of orthotopic bladder substitution is to offer patients the best quality of life, similar to that of patients with native bladders [20]. Studies have demonstrated that patients with continent urinary diversions had better outcomes in terms of different domains of QoL, including sexual functioning, psychological status, and global satisfaction rate [21], [22].

The commonest complication encountered in this study was mucus plug, however wound infection, burst abdomen and urinary incontinence were also recorded. Urinary diversion is not without complications as recorded by different investigators [3],[23],[24],[25],[26]. Hence, there is need for adequate patient selection and counseling.

V. Conclusion

Intestinal segments have become a veritable tool in reconstructive urology and may be used to reconstruct a functionally normal urinary tract in terms of transport, storage, voiding, continence and preservation of renal function.

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