Urinary diversion: A seven year experience in Maiduguri North Eastern Nigeria

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Urinary diversion offers reasonably good quality of life following radical cystectomy for bladder cancer, and in severe cases of benign bladder pathologies. The study reviewed our experience in urinary diversion. All patients that had urinary diversion in University of Maiduguri Teaching Hospital (UMTH) and Specialist Hospital Damaturu (SHD) North Eastern Nigeria between January 2007 and December 2013. A total of 89 patients were analyzed, between the age ranged from 24 – 87 years with the mean of 48.87 years, and a male to female ratio of 2.18: 1. The peak age group was 40 – 49 years accounting for 29.21%. The indications for the diversions were muscle invasive bladder cancer in 84.27%, gunshot injury in 5.62%, and severe vesico-vaginal fistula in 2.25%.

Procedures done were continent diversions in 65.17%, and non-continent diversion in 34.83%. The mean age for patients that had ureterosigmoidostomy was 64.59 years, ileal conduit was 48.73 years, and continent cutaneous catheterizable was 46.82 years. The early postoperative complications were metabolic acidosis in 32.58%, and UTI in 19.10%. The mortality was 12.36%, 7.87% from cancer progression and 4.49% from diversion related complications. Urinary diversion is rewarding procedures for improving the quality of life in post cystectomy patients in both benign and malignant conditions. Diligence in patients selection is paramount to minimize post-operative complications.

Key words: Urinary diversion, indications, management outcome, developing country.

INTRODUCTION

The aim of reconstructive urology is to produce a functionally normal lower urinary tract in terms of storage, voiding, continence and preservation of renal function. An ideal method of bladder reconstruction would be non-refluxing, have low pressure, maintain continence and be non-absorptive (Konety et al., 2006) in addition patients actively seek maintenance of normal micturition and an undisturbed body image. When urinary diversion is indicated, patient information concerning the advantages and disadvantages of different types of urinary diversions and their choices is of utmost importance for the functional outcome and patient satisfaction. There is a variety of choices for incontinent diversion (ureterocutaneousostomy, ileal conduit, colonic conduit) and continent diversion (ureterosigmoidostomy-continent anal urinary diversion, continent cutaneous catheterizable urinary diversion, and urethral bladder substitution-orthotopic neobladder). Choices may be limited by patient criteria/medical criteria. Important patient criteria are preference, age and co-morbidity, body mass index, motivation, underlying disease and indication for cystectomy. Medical criteria limiting choices of type of diversion are kidney function/upper tract status, and limitations concerning the gastrointestinal tract, concerning urethra/sphincter as well as the ability and motivation to perform intermittent self-catheterization (Thuroff et al., 2012). The time tested ileal conduit is deliberately constructed to be incontinent and to minimize the dwell time of urine in bowel (Bucher et al., 1962). These were the reasons Bricker developed it as an alternative to the ureterosigmoidostomy. The new alternatives to the conduit, the orthotopic neobladder or

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the less commonly performed cutaneous continent diversion; revert to increasing urine dwell time but not always with the anticipated continence (O’Connor et al., 2002). Urinary diversions are associated with complications which include stenosis of ureterointestinal anastomosis, metabolic acidosis, vitamin B$_{12}$ deficiency, cholegenic diarrhea, urinary tract infections, and voiding disorder of the reservoir, which require monitoring for life (Hautmann et al., 2007; Stenzl et al., 1995). Indications for cystectomy and urinary diversion include muscle invasive bladder cancer, neurogenic bladder, and traumatic loss of bladder, spinal cord injury, and exstrophy of bladder (Riedmiller et al., 1989; Bejany et al., 1993; Rajendra et al., 2013). The study aimed at reviewing indications, types of diversion procedures and management outcome over a seven-year period.

### MATERIALS AND METHODS

The study reviewed all patients that had urinary diversion in the UMTH and SHD between January 2007 and December 2013. Permission for the study was given by the Hospital Ethical and Research Committee. All patients gave written informed consent. Information was extracted laboratory and clinical notes and data analyzed using SPSS statistical data version 16. Patients that presented as emergency were resuscitated with intravenous fluids, antibiotics, and blood where necessary. Investigations done were biopsy for histological diagnosis in malignant conditions; other investigations were urinalysis, full blood count blood chemistry (all patients glomerular filtration rate were above 60mls/min), chest x-ray, abdominopelvic ultrasound scan, computerized tomography and intravenous urography. Patients had routine sessions on management of diversions. Bowel preparation was done where applicable, there was no neoadjuvant chemotherapy given. All patients had surgery under general anesthesia with prophylactic antibiotics at induction (ceftriaxone and metronidazole). A 20 cm ileum was used in conduit. Pouches were constructed from small bowel segments isolated with a length of 60cm detubelerised, and configured (Kock’s pouch, Mansoura pouch). Uretero intestinal anastomosis were non re-refluxing, seromuscular tunneling. Continent mechanisms for catheterizable pouches were constructed from ileocecval valve in caecal bladder while ileal segments were used in constructing continent efferent limbs via seromuscular tunneling (Mansoura techniques). All pouches and continent ports were catheterized and allowed to mature in 2 - 3 weeks before weaning off tubes and drains. All patients were followed up. Pelvic lymphadenectomy involved clearance of lymphnodes from 3cm from common iliac bifurcation and distally to the true pelvis.

### RESULTS

A total of 102 patients were reviewed, 89 analyzed, and 13 excluded due to incomplete data. Age ranged from 24 – 87 years with the mean of 48.87 years, with a male to female ratio of 2.18: 1. The peak age group was 40 – 49 years accounting for 26(29.21%) (Table 1). The indications for the diversions were muscle invasive bladder cancer in 75(84.27%), gunshot injury in 5(5.62%), paraplegia in 4(4.49%), neurogenic bladder in 3(3.37%), and severe vesico- vaginal fistula in 2(2.25%). Associated co morbidity were hypertension in 13(14.61%), diabetes in 7(7.87%), and Parkinsonism in 3(3.37%). Procedures done were continent diversions in 58(65.17%) comprising of ureterosigmoidostomy in 39(43.82%), continent cutaneous catheterizable in 18(20.22%), and othortopic neobladder in 1(1.12%). Non continent diversion was in 31(34.83%), comprising of ileal

<table>
<thead>
<tr>
<th>Age (years)</th>
<th>No</th>
<th>%</th>
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<tbody>
<tr>
<td>20-29</td>
<td>03</td>
<td>03.37</td>
</tr>
<tr>
<td>30-39</td>
<td>06</td>
<td>06.74</td>
</tr>
<tr>
<td>40-49</td>
<td>26</td>
<td>29.21</td>
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<tr>
<td>50-59</td>
<td>14</td>
<td>15.73</td>
</tr>
<tr>
<td>60-69</td>
<td>24</td>
<td>26.97</td>
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<tr>
<td>70-79</td>
<td>12</td>
<td>13.48</td>
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<tr>
<td>80+</td>
<td>04</td>
<td>04.49</td>
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<tr>
<td>Total</td>
<td>'89</td>
<td>100.00</td>
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conduit in 29(32.58%), and ureterostomy in 2(2.25%). The mean age for patients that had ureterosigmoidostomy was 64.59 years, ileal conduit was 48.73 years, and continent Cutaneous catheterizable was 46.82 years. The early postoperative complications were severe metabolic acidosis in 14(15.73%) (Table 2). The follow up period ranged from 3 – 36 months. There were 11(12.36%) mortalities, 7(7.87%) from cancer progression and 4(4.49%) from diversion related complications. Pouches were created from ileal segment (Figure 1, 2, and 3).

**DISCUSSION**

The current study found relatively younger patients undergoing cystectomy and urinary diversion, with the mean age of 48.87 years. The reason being bladder cancer, the major indication for cystectomy is a disease of young age. In Senegal the mean age of diagnosis of bladder cancer is 45.50 years (Diao et al., 2008). These young patients tend to be fit, haemodynamically stable, and minimal co-morbidities which are prerequisites for urinary diversion. The mean ages for patients that had continent cutaneous catheterizable, ileal conduit and ureterosigmoidostomy were 46.82, 48.73, and 64.59 years respectively. This is imperative but continent catheterizable is commoner in the younger age with minimal co-morbidity therefore fit. Increased co-morbidity will mean that patients are less capable of coping with any electrolytes or acid-base derangements, drug metabolism alterations or urinary tract infections that they may suffer. Decreased cognitive and physical function would impair effective emptying, catheterization and irrigation of the diversion, which would increase expected complications and place an ever-increasing burden on care givers (Michael et al., 2008). The study found gunshot injury with loss of bladder, and vesico-vaginal fistula (VVF) following prolonged obstructed labor, (common in developing countries) as rising indications for cystectomy and urinary diversion. The gunshot injuries can be explained by the insurgency during the study period. (Mikah et al., 2011) had 5% of their VVF repair series undergoing cystectomy and urinary diversion with good quality of life. In most centres with experience in urinary diversion orthotopic urinary reservoir is the diversion of choice (Clark, 2002). In the present study, ureterosigmoidostomy was the commonest procedure 48.32% and orthotopic the least 1.12%, as opposed to Hautman et al. (2007) who had orthotopic neobladder in 47% and ureterosigmoidostomy in 10%. In patients with ureterosigmoidostomy continence and body image were excellent with no problems associated with stoma diversion; however there were severe metabolic acidosis in 17.95%, recurrent ascending urinary tract infection in 15.38% among others. These complications were comparable to similar studies (D’Elia et al., 2004; Tollefson et al., 2010; Pahernik et al., 2006). Ureterosigmoidostomy is known to be associated with increased risk of developing Adenocarcinoma at the site of anastomosis for this reasons all patients that had this procedure were subjected to annual colonoscopy (Kalbel et al., 2011). Ileal conduit is the most common type of urinary diversion (33-63%) (Lowrance et al., 2009). In this study ileal conduit was the second most common (32.58%). An ileal conduit is technically easier and takes shorter time than continent diversion, and takes shorter bowel segment. The complications in this study were urinary tract infections 10.34%, and stoma related complications in 13.79% (dermatitis and stenosis). Complications reported in the long term by similar studies were deteriorating renal function up to 80% after 15 years, problems with stoma (prolapsed, hernia, stomatitis) in 24%, urinary tract infection in 23%, and uretero intestinal anastomotic stenosis in 14% (Madersbacher et al., 2003). The study found ileal conduit to be a formidable diversion in elderly and frail patients, in patients being planned for radiotherapy, and also as a conversion ground when other conversion failed. It is also found to be rewarding in patients with

### Table 2. Post-operative complications.

<table>
<thead>
<tr>
<th>Complications</th>
<th>U.S(N39)</th>
<th>I.C.(N29)</th>
<th>C.C.C(N18)</th>
<th>U(N2)</th>
<th>O.N(N1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Severe acidosis</td>
<td>7 17.95%</td>
<td>4 13.79%</td>
<td>2 11.11%</td>
<td>1 100.00%</td>
<td></td>
</tr>
<tr>
<td>U.I.A Stenosis</td>
<td>3 7.69%</td>
<td>2 6.90%</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>U.T.I</td>
<td>6 15.38%</td>
<td>3 10.34%</td>
<td>2 11.11%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chologenic D.</td>
<td>2 5.13%</td>
<td>3 10.34%</td>
<td>4 22.22%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>S.S.I</td>
<td>4 10.26%</td>
<td>1 3.45%</td>
<td>2 11.11%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>S. Stenosis</td>
<td>4 13.79%</td>
<td>1 5.56%</td>
<td>1 50.00%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>S.dermatitis</td>
<td>4 13.79%</td>
<td>1 5.56%</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Renal failure</td>
<td>3 7.69%</td>
<td>2 11.11%</td>
<td></td>
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<tr>
<td>S. Retraction</td>
<td>2 11.11%</td>
<td></td>
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<tr>
<td>Incontinence</td>
<td>3 16.67%</td>
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Figure 1. Isolated ileal segment.
Figure 2. Ileal Plate with afferent and efferent limbs.

Figure 3. Configured pouch.
severe renal insufficiency. The continent catheterizable diversion pouches were mainly Koch’s pouch, caecal bladder with imbricated ileocecal valve. The complications in this study were severe metabolic acidosis, Urinary tract infection, renal failure, and surgical site infection. Others were colonic diarrhea in 22.2%. Continent mechanism failure that necessitated revision in 2 patients and conversion to ileal conduit in 1 patient. Previous studies found complications in the form of calculi in the pouch in 10%, stoma problems in 7-11%, ureteral anastomotic stenosis in 7-8%, failure in continent mechanism in 5% others were metabolic acidosis, vitamin B<sub>12</sub> deficiency and cholelithic diarrhea (Somani et al., 2009; Gosalbez et al., 1993; McDugal, 1992, Stein et al., 2012). Out of the 2 patients that had ureterostomy in this study 1 developed stoma stenosis that required revision and catheterization. Only one patient had orthotopic neo bladder. In this patient mucus plug was the major problem initially which improved on diuretics, irrigation, and intermittent self-catheterization. The patient was continent in the day time but occasionally incontinent at night which was managed by use of condom at night. These findings were similar to previous series with 90% continence in the day, 10 - 15% nocturnal incontinence and mucus plug resulting in impaired emptying of reservoir (Simon et al., 2006; Finley et al., 2011; Gupta et al., 2007). The study had a short term follow up of 3 years, there is the need for long term follow up as deteriorating renal function, nutritional deficiencies, and malignant transformation are established long term complications.

Conclusions

The spectrum of indications for urinary diversions is increasing, and various techniques have evolved over the years to improved outcome, however patients’ selection for each technique, surgeon’s experience, and close long term patient monitoring are important factors in determining success.

REFERENCES