# Augmentation Cystoplasty in Adult Patients with Renal Impairment

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## ABSTRACT

Bladder augmentation is beneficial in patients with neurogenic bladder due to spinal cord injury, multiple sclerosis, and tuberculous bladder. This retrospective study was done to determine the outcome of augmentation cystoplasty in adult patients with renal dysfunction. The study was done at the Sindh Institute of Urology and Transplantation (SIUT), Karachi from January 2010 till December 2019. A total of 153 patients underwent augmentation cystoplasty. Among these, 28 patients met the inclusion criteria of adult patients with age >18 years, and renal impairment at the time of the procedure. Exclusion criteria were patients with normal renal functions. Out of 28 patients, 17 (60%) showed improvement in renal functions post-augmentation cystoplasty, while 2 (7.14%) deteriorated and 9 (32.13%) patients showed static function in the same chronic kidney disease stages. Results from this study showed that augmentation cystoplasty is a safe operative procedure even in renal failure patients. It leads to improvement in renal functions in a significant number of patients.

**Key Words:** *Adults, Augmentation cystoplasty, Renal failure, Bladder compliance*.

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Bladder augmentation is described as beneficial in patients with neurological diseases like spinal cord trauma and multiple sclerosis or in severe bladder dysfunction conditions like small capacity, poor compliant bladder with high intravesical pressure which causes vesico-ureteric reflux (VUR) and subsequently renal impairment.[1-3] Cystoplasty was mainly indicated as a treatment option for small contracted tuberculous bladder.[1] Few studies have specifically examined the usefulness of augmentation cystoplasty in patients with various degrees of renal failure at the time of presentation. We aimed to determine the outcome of augmentation cystoplasty in adult patients with renal dysfunction. It was a retrospective study, done at Sindh Institute of Urology and Transplantation (SIUT), Karachi over 10 years from January 2010 till December 2019. A total of 153 patients underwent augmentation cystoplasty over the study period. Among these, 28 patients met the study criteria. Inclusion criteria were all adult patients (>18 years) with renal impairment and small bladder capacity or poor compliant bladder with increased or normal intravesical pressure confirmed by urodynamic studies. Exclusion criteria were patients with normal renal function or end-stage renal disease (ESRD) or augmentation done at any other hospital.

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The patient's demographics, diagnosis, preoperative renal functions, and postoperative outcomes were retrieved from medical records. Kidney function was determined by calculating eGFR initially and at different follow up periods using MDRD formula such as eGFR (ml/ min/ 1.73m$^2$) =186 x (Serum Cr)-1.154 x (age)-0.203 x 0.742 (if female). Patients were classified as having chronic kidney disease (CKD) on the basis of eGFR value. Statistical analysis was done by using SPSS version 22.0 software. Simple descriptive statistics were used to summarise the data. Continuous quantitative variables were summarised as mean ± standard deviation (SD), while categorical or qualitative variables were stated as numbers and percentages.

The mean age of the inducted patients was 28.32±11.79 years. Among all, 21 (75%) were males and 7 (25%) females. The mean BMI of patients was 16 ± 3.85 Kg/m$^2$. Pre-operative mean serum urea, mean serum creatinine, and mean eGFR were observed as 59.6 ± 28.14 mg/dl, 3.0 ± 1.11 mg/dl, and 29.18±12.29 ml/min/1.73 m$^2$, respectively.

Postoperative follow-up visits were at 2-3 weeks, 1 month, 3 months and 6 months. In the first postoperative follow-up visit, the mean serum urea, mean serum creatinine, and mean eGFR were 55.86±31.16 mg/dl, 2.94±1.7 mg/dl, and 34.64±18.72 ml/min/1.73 m$^2$, respectively. In the second follow-up visit (*i.e.* at 1 month), mean serum urea, mean serum creatinine, and mean eGFR were 57.64±38.8 mg/dl, 2.7±1.48 mg/dl, and 35.39±19 ml/min/1.73 m$^2$, respectively. In the third follow-up visit (*i.e.* at 3 months), the mean serum urea, mean serum creatinine, and mean eGFR were 55.64±43.19 mg/dl, 2.68±1.46 mg/dl, and 37.67±21.28 ml/min/1.73 m$^2$, respectively. Lastly, in the fourth follow-up visit (*i.e.* at 6 months), the mean serum urea, mean serum

creatinine, and mean eGFR were 52.85±43.15 mg/dl, 2.54±1.3 mg/dl, 40.71±23.79 ml/min/1.73 $m^2$, respectively. The significant increase was observed in eGFR at pre and postoperative follow-up visits 1 - 4 ($p < 0.001$) as shown in Figure 1. Out of 28 patients 60% (n=17) patients improved renal function post-augmentation cystoplasty, while 7.14 % (n=2) patients were deteriorated and 32.13% (n=9) patients remained static in same CKD grade. Out of 17 patients who improved in their renal function, 35.71% (n=10) patients improved from CKD grade 4 to CKD grade 3. While 17.85% (n=5) patients improved from CKD grade 3 to CKD grade 2. One patient improved from CKD grade 4 to CKD grade 2 and another patient improved from CKD grade 3 to CKD grade 1 respectively. While in 7.04% (n=2) patients renal functions deteriorated. One from CKD grade 3 to CKD 4 and another patient from CKD grade 4 to CKD grade 5. While 32.13% (n=9) patients out of 28 patients remained static in their same CKD grade i.e. 21.42% (n=6) patients remained in CKD grade 4 and 10.71% (n=3) patients remained static in CKD grade 3. Significant deterioration was found in 2 (7.14%) and 9 patients (32.13%) remained static in their CKD stage due to repeated UTIs postoperatively and persistent VUR, as shown in Table I.

**Table I: Frequency of postoperative complications.**

| Complications | n (%) |
|---|---|
| Urinary tract infections (UTIs) | 4 (14.28%) |
| Vesicoureteric reflux | 3 (10.71%) |
| Mitrofanoffstenosis | 2 (7.14%) |
| Wound infections | 2 (7.14%) |
| Bladder neck contracture | 1 (3.57%) |
| Enterocutaneous fistula | 1 (3.57%) |

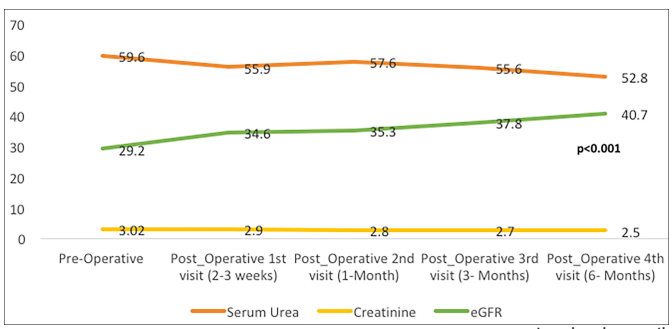


**Figure 1: Post-augmentation cystoplasty eGFR values at 1st, 2nd, 3rd and 4th visits.**

Athawale *et al*. reported that 5 (16.66%) patients out of 30 were in renal failure at the time of augmentation cystoplasty. Out of 5 patients with elevated serum creatinine >2.5mg/dl, 40% (n=2) improved renal functions post-augmentation cystoplasty, while 60% (n=3) patients required hemodialysis.[4] Singh *et al.* showed that patients with serum creatinine >1.54 mg/dl during surgery was associated with poor outcome in term of renal function post-augmentation cystoplasty in pediatric patients.[5] Reid *et al.* showed improved renal function of serum creatinine from 61.74 mmol/L to 69.18 mmol/L post-augmentation cystoplasty.[6]

The current series is limited by the retrospective nature of data collection which has limited some of the details we have, its single centre origin and short-term follow-up (6 months follow-up post-augmentation cystoplasty).

In conclusion, augmentation cystoplasty is a safe operative procedure even in patients with prior renal dysfunction. Further deterioration of renal function can occur due to recurrent UTIs or persistent VURs, which are the main culprit of renal deterioration.

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**COMPETING INTEREST:**

The authors declared no competing interest.

**AUTHORS' CONTRIBUTION:**

MAJ: Conception and study design, interpretation of data, discussion.

ML: Interpretation of data, discussion, organisation.

SKP: Data collection, analyst of data interpretation of data.

AAR: Collection of data.

MH: Organisation of data.

AHR: Director of the institute.

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