Lower Pole Sparing Ureterocalicostomy: A Case Series

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Abstract

Introduction: Ureterocalicostomy is a uncommonly performed procedure with few indications. In 1947 Neuwirt reported the first ureterocalicostomy. The thinned lower pole hydronephrotic parenchyma was removed and the inferior renal calyx was connected to the ureter for efficient urinary drainage. However resection of the lower pole parenchyma leads to nephron loss as well as increases risk of hemorrhage. We present our cases series of ureterocalicostomy in which the anastomosis was carried out without resection of the lower pole and thus reducing the morbidity. **Methods:** This is a retrospective study conducted at a tertiary care centre in Eastern India. It included patients who underwent UC at the institute between January 2022 and January 2025. Review of the baseline demography, clinical features, radiological images, indications and type of surgery, complications and clinical outcomes was done from the department register. Preoperative workup included ultrasonography and diuretic scan with DTPA. All patient underwent open retroperitoneal UC. In all cases longitudinal 2-3cm nephrotomy was made in the medial aspect of the dependent lower pole, ureter was divided and spatulated and calyceal mucosa anastomosed with the spatulated ureter adjacent to the lower pole. **Results:** Eleven patients underwent open ureterocalicostomy. The age ranged from 7-60 years. Three patients had prior Anderson hynes pyeloplasty. APD declined significantly (p=0.008) and CT improved significantly (p=0.03) after surgery. The SRF and drainage however did not improve significantly. At a mean follow-up of 14.36 months all except one patient had complete symptoms relief and had an anatomically successful ureterocalicostomy. The overall success rate in our study was 90.90%. **Conclusion**: Lower pole sparing ureterocalicostomy offers good outcome, in patients with both primary and secondary ureteropelvic junction obstruction. It can be performed by open as well as minimally invasive route. UC is particularly helpful in improving drainage in kidneys with nondependent UPJ and small, intrarenal pelvis

Keywords: Lower pole sparing, Ureterocalicostomy, APD, Cortical thickness, SRF

Introduction: Ureterocalicostomy is a procedure with few indications but with important application in situations where the more desirable methods of constructing an unobstructed ureteropelvic drainage cannot be used. As early as 1947 Neuwirt reported the first ureterocalicostomy.[1] This surgical procedure involves removing the thinned lower pole hydronephrotic parenchyma and connecting the free ureter directly to the inferior renal calyx for efficient urinary drainage. The limited reports of this operation reflect the infrequency of its indication and also perhaps the difficulties and frustrations often associated with the complicated conditions in which ureterocalicostomy becomes necessary. Indications for this procedure includes failed pyeloplasty or an intrarenal pelvis and other congenital anomalies of the kidney. It can also be done when the lower pole of the affected kidney is too dependent so that it reaches almost upto iliac crest and the drainage of the kidney through UPJ is inadequate (Non-dependent UPJ) [2],[3]. Resecting the lower pole parenchyma leads to nephron loss as well as increases risk of hemorrhage. We present our cases series of ureterocalicostomy in which the anastomosis was carried out without resection of the lower pole and thus reducing the morbidity.

Materials and Methods: This is a retrospective study conducted at a tertiary care centre in Eastern India. It included all patients who underwent UC at the institute between January 2022 and January 2025. Department registers were used for data collection. Ethics committee approval was received for this study from institutional ethics committee (NRSMC/IEC/148/2025). Patients whose contralateral kidney had cyst/stone/altered echotexture on ultrasonography, were excluded. In depth review of the baseline demography, clinical features, radiological images, indications and type of surgery, complications and clinical outcomes was done. Preoperative workup included ultrasonography (with emphasis on anteroposterior diameter (APD) of renal pelvis andcortical thickness (CT)) and diuretic scan with DTPA for the type of drainage and split renal function (SRF). Cross-sectional imaging in the form of computed tomography or magnetic resonance imaging was done routinely for anatomical tails as depicted in figure 1.

All patient underwent open retroperitoneal UC. In all cases, after dissecting out the hydronephrotic lower pole (Fig. 2A), instead of doing a lower pole nephrectomy longitudinal 2-3cm nephrotomy was made in the medial aspect of the dependent lower pole, and calyceal mucosa identified and calyceal everting sutures were taken (Fig. 2B). It is essential to carefully mobilise the ureter preserving the adventitia around it so as to bring it closer to the lower pole. The ureter is then divided and spatulated at least 1 cm and anastomosed with the lower pole calyx to ensuring wide anastomosis (Fig. 2C,D).

Reduction of the renal pelvis was done in 1 case. Double J (DJ) stent and a perinephric drain was placed in all the cases. Per urethral catheter (PUC) were allowed to drain for 72 hours, then removed. This was followed by removal of the drain after 24 hours if drain

output did not increase further. DJ stent was removed 6 weeks after surgery. The patients were followed up with ultrasonography and diuretic scan at 6 months. If obstruction was not suspected, they were followed annually with ultrasonography. Drainage pattern on diuretic scan alone was not considered for suspecting obstruction because it is known to be imprecise in large hydronephrotic kidneys [4]. Instead, we used a combination of clinical findings (resolution of abdominal lump, flank pain and fullness or distension), sonographic findings (decrease in,degree of hydronephrosis as indicated by the AP diameter and/or any change in cortical thickness) and nuclear imaging findings (stable or improvement in SRF while improvement in drainage may or may not be there) to define success. In cases reporting decrease in hydronephrosis (HDN) and resolution of symptoms, the fall in SRF or equivocal drainage (plateau curve) or even retention of tracer was not considered as failure. Such findings could be on account of preoperative scan overestimating the renal function due to severe HDN or drainage that could not be commented in cases of poor functioning kidney[4]. The outcome or success in our study was absence of obstruction needing a reoperation. The preoperative parameters were compared with those at 6 months after surgery. Statistical analysis was done using SPSS 20.0 software (SPSS Inc., Chicago, IL). Paired observations (i.e. before and after surgery) were tested using Wilcoxon Signed-Rank Test. All tests were 2-sided and the statistical significance was considered at $P < 0.05$.

Results: A total of eleven patients underwent open ureterocalicostomy. Table 1 displays preoperative parameters. The age range was from seven to sixty years old, and three patients were male. Three of eleven patients had prior Anderson hynes pyeloplasty. Median preoperative APD, CT, SRF were 39mm, 8mm and 23% respectively.
Table 2 displays the indications of ureterocalicostomy.
Mean operative time was 154 minutes from skin incision to skin closure. Intraoperatively, two patient had high insertion of ureter, four had non dependent UPJ, and two had intrarenal pelvis. Only one patient required blood transfusion. Mean hospital stay was 3.5 days. One patients had early postoperative complication in the form of surgical site infection which recovered on iv antibiotics and wound dressing.
Table 3 displays postoperative parameters. Postoperative renal ultrasound at 6 months revealed improvement in hydronephrosis in 10patients, and deterioration in one patient. The median APD pelvis had declined significantly from 39mm preoperatively to 30mm (p=0.008) after UC. Median cortical thickness had also improved significantly from preoperative value of 8mm to 9mm (p=0.03) postoperatively. Split renal function increased in 9 patients was stable in one and decreased in one patient which however was not statistically significant.(p=0.06)
The overall success rate in our study was 90.90%. At a mean follow-up of 14.36months (median 10months), all except one patient had complete symptoms relief and had an

anatomically successful ureterocalicostomy. That patient required simple nephrectomy over fourteen months after ureterocalicostomy, despite a patent anastomosis, due to poor drainage from a capacious renal pelvis.

Discussion: UC is an infrequently performed surgery.In our study, 8 patients underwent primary or upfront UC, out of which, one had high insertion of ureter,three had intrarenal pelvis and four had non dependent PUJ. 3 patients underwent ureterocalicostomy after failure of previous pyeloplasty. Similar indications have been reported in literature.[2,6,7]

APD pelvis is one of the key parameters that are used to monitor HDN[5]. APD pelvis is particularly important in gross hydronephrosis since the diuretic renogram invariably shows an obstructive drainage owing to the large volume of the pelvicalyceal system [4]. Sarhan et al., in their series of 41 patients who underwent pyeloplasty for huge renal pelvis (mean APD Z 5.6 cm), found that except for 3, all the remaining had an improvement in APD after surgery [4]. Radford et al. also found that 11 out of 13 children undergoing UC had a reduction in APD after surgery[6]. In their series, one child who had an increase in APD after surgery had anastomotic obstruction. In our study we found all except one patient had reduction in APD from a median APD of 39mm preoperatively to 30mm postoperatively (p=0.008).

Cortical thickness is another parameter that is useful to assess recovery, which is found to increase in most studies after relief of obstruction [7,8,9]. We also found improvement in CT after surgery. We observed a significant median increase of 1mm at 6months (p=0.03). This is however lower compared to that reported by Baek et al. (4 mm at 5 years) and by Nerli et al. (2.88 mm at 12 months) [8,9]. Over a long follow up period, CT may certainly be useful as a predictor of recovery.

In present study, 9 patients showed improved SRF after UC. SRF deteriorated in one patient while it remained same in one patient. The median preoperative and postoperative SRF was 23% and 30% respectively. The drainage on diuretic scan is unreliable in gross hydronephrosis. In our study, improved drainage following UC was found only in two while one showed deterioration, and no change was observed in eight patients. Given the lack of reliability of diuretic scan in postoperative period, some authors do not even perform it after UC if the ultrasonography shows clear evidence of reduction in dilatation [6]. Sarhan et al. too reported that 50% of the UPJO and grossly dilated renal pelvis don't have improvement in drainage after procedure [4]. In their study, improvement in drainage was seen in only 37.5%, clearly demonstrating lack of reliability of diuretic scans. Despite the evidence that diuretic scan may not be as reliable in higher grades of HDN, it is still important because even ultrasonography in isolation cannot predict failure in all cases. It has been suggested that a combination of decrease in APD on ultrasonography and stability of renal function on diuretic scan may best judge

the relief of obstruction in grossly hydronephrotic kidneys [4]. The overall success rate in our study was 90.90%. Only one patient required reoperation in the form of simple nephrectomy.

Guillotine lower pole nephrectomy is generally recommended in order to reduce anastomotic stricture rates.[10] We have had fair success with only a lower pole nephrotomy. Performing a guillotine amputation of the lower pole leads to unnecessary loss of nephrons in patients who are already having a compromised kidney. Further significant bleeding can be encountered during the cortical dissection, especially if a guillotine amputation is planned, necessitating hilar control. Since only a nephrotomy is made in all of our cases, maximally sparing the lower pole parenchyma, we did not required clamping of the hilum in any of our cases.

Pyeloplasty has been done traditionally however UC as an alternative provides reliable drainage. Our study has a few limitations. Firstly, it is a retrospective study. Secondly, we could not do a head-to-head comparison of UC with pyeloplasty. Through this study, we want to suggest that lower pole sparing ureterocalicostomy is an effective alternative treatment for pelviureteric junction obstruction with high success rate.

Conclusion: Lower pole sparing ureterocalicostomy offers good outcome, is associated with high success rate, is technically feasible and provides adequate drainage in patients with both primary and secondary ureteropelvic junction obstruction. It can be performed by open as well as minimally invasive route. Single ultrasonographic or diuretic renogram parameters may not be sufficient to predict failure and a combination of them should be used for follow up after UC. UC is particularly helpful in improving drainage in kidneys with nondependent UPJ and small, intrarenal pelvis.

Declaration of Interest Statement: Nothing to disclose

References

1. Neuwirt K (1948) Implantation of the ureter into the lower calyx of the renal pelvis. Urol Cutaneous Rev 52(6):351
2. Mesrobian HG, Kelalis PP. Ureterocalicostomy: indications and results in 21 patients. J Urol 1989; 142(5):1285e7.
3. Mollard P, Braun P. Primary ureterocalycostomy for severe hydronephrosis in children. J Pediatr Surg 1980;15(1):87e91.
4. Sarhan O, Helmy T, Abou-el ghar M, et al. Long-term functional and morphological outcome after pyeloplasty for huge renal pelvis. BJU Int 2011;107(5):829e33.
5. Tapia J, Gonzalez R. Pyeloplasty improves renal function andbsomatic growth in children with ureteropelvic junction obstruction. J Urol 1995;154(1):218e22.

6. Radford AR, Thomas DF, Subramaniam R. Ureterocalicostomy in children: 12 years experience in a single centre. BJU Int 2011;108(3):434e8.
7. Kaura KS, Kumar M, Sokhal AK, et al. Giant hydronephrosis: still a reality! Turk J Urol 2017;43(3):337e44.
8. Nerli RB, Reddy MN, Hiremath MB, et al. Surgical outcomes of laparoscopic dismembered pyeloplasty in children with giant hydronephrosis secondary to ureteropelvic junction obstruction. J Pediatr Urol 2012;8(4):401e4.
8. Baek M, Park K, Choi H. Long-term outcomes of dismembered pyeloplasty for midline-crossing giant hydronephrosis caused by ureteropelvic junction obstruction in children. Urology 2010;76(6):1463e7.
9. Raj A, Kudchadker S, Mittal V, Nunia S, Mandhani A. Importance of lower pole nephrectomy during ureterocalicostomy. Urol Ann. 2017;9(4):407–9.

Table 1 Preoperative parameters

Parameter	Value	IQR
Median age (years)	**23**	**25**
Male : Female	**3:8**	
Median Preoperative APD (mm)	**39**	**8**
Median Preoperative cortical thickness (mm)	**8**	**4**
Median Preoperative split renal function of affected side (%)	**23**	**10**

Table 2 Indications of procedure

Indication of procedure	Number of cases (n)
High insertion of ureter	2
Previous failed pyeloplasty	3
Non dependent UPJ	4
Intrarenal pelvis	2

Table 3 Postoperative parameters

Parameter	Value	IQR
Median Postoperative APD (mm)	**30**	**12**
Median Postoperative cortical thickness (mm)	**9**	**4.3**
Median Postoperative split renal function of affected side (%)	**30**	**13**

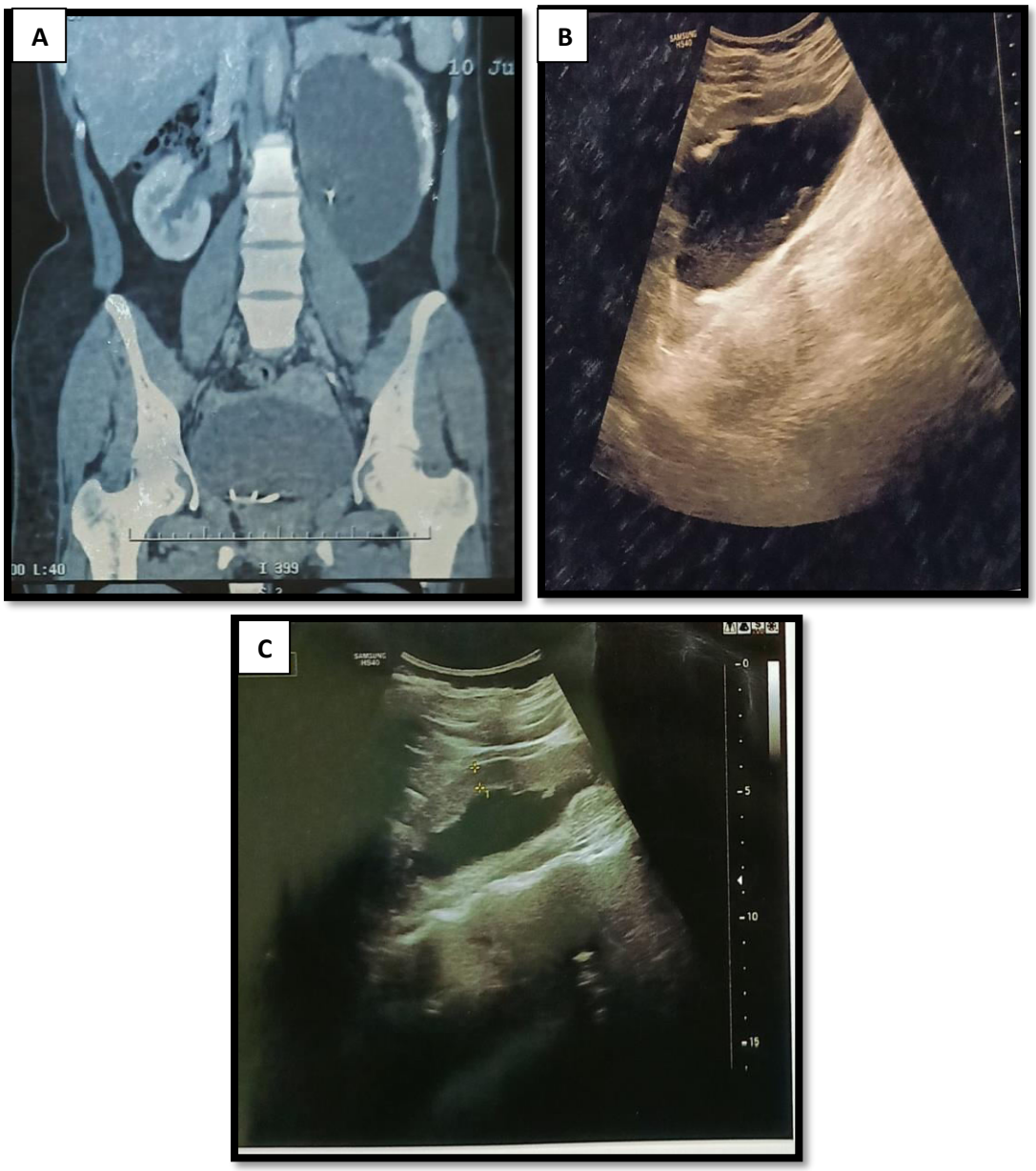

Figure 1: [A] Contrast enhanced CT showing gross hydronephrosis of left kidney with non dependent UPJ, [B] Preoperative ultrasound showing hugely dilated renal pelvis and reduced cortical thickness, [C] Postoperative ultrasound showing improvement in APD pelvis and CT

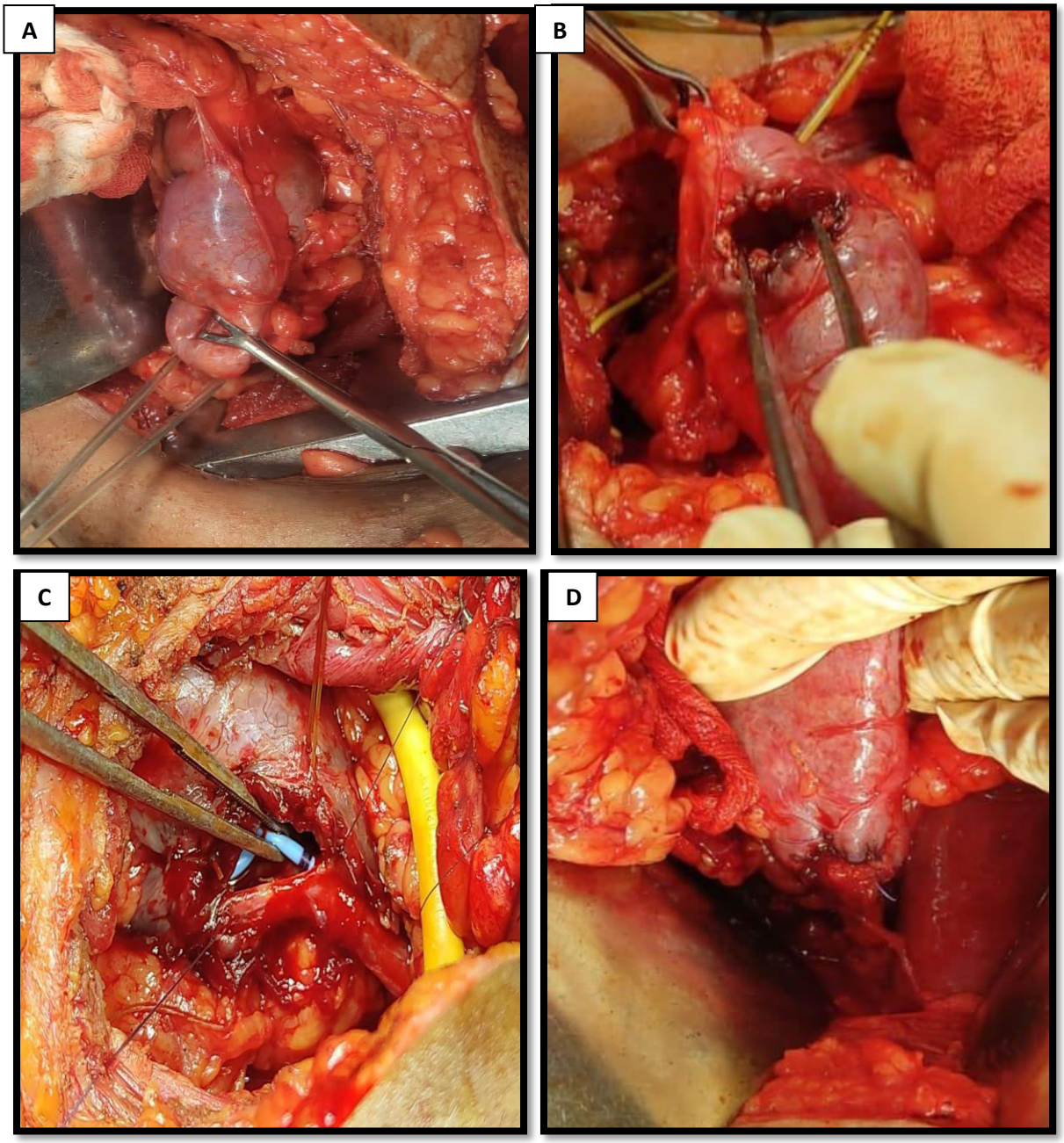

Figure 2: Operative steps of ureterocalicostomy, [A] Identification of dilated lower pole, [B] Nephrotomy done on the medial border of the dilated lower pole and everting sutures taken in the dilated lower pole calyx, [C] Suturing the lower pole calyx to the spatulated ureter done over a DJ stent, [D] Completed ureterocalicostomy

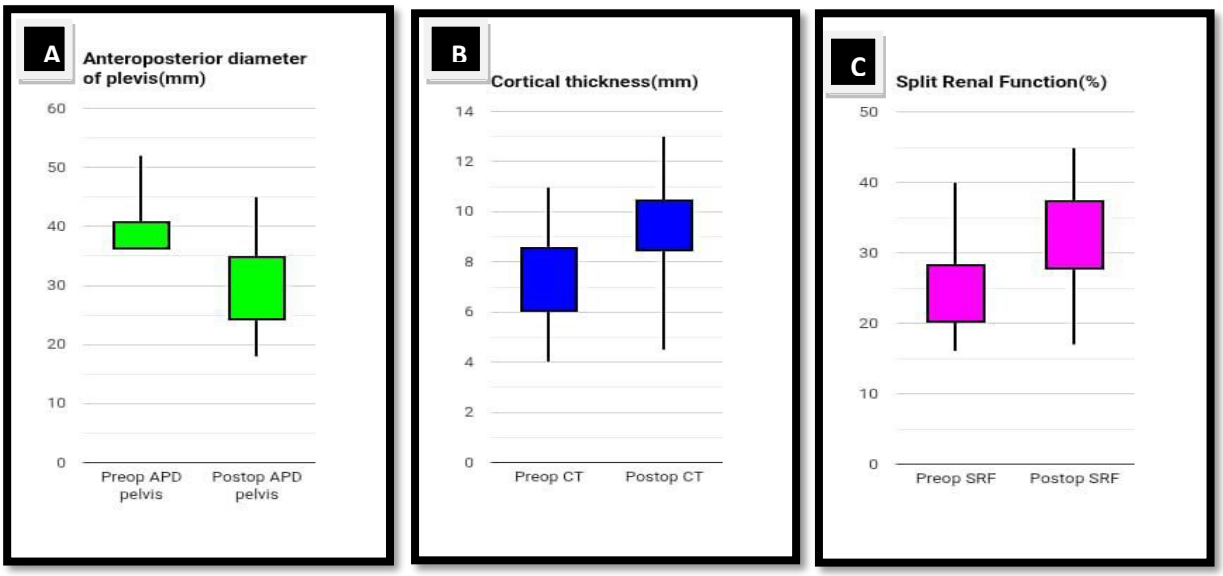

Figure 3: Box and Whiskers plot showing changes in [A] Anteroposterior diameter of pelvis(mm), [B] Cortical thickness(mm), [C] Split renal function after ureterocalicostomy

Abbreviations

UC- Ureterocalicostomy
APD- anteroposterior diameter
CT- cortical thickness
SRF- split renal function
CT- computed tomography
HDN- hydronephrosis
GH- gross hydronephrosis
Preop- preoperative
Postop- postoperative
UPJ- Ureteropelvic junction
UPJO- ureteropelvic junction obstruction
DJ- Double J