

## URETEROCALICOSTOMY: A BAILOUT PACKAGE FOR KIDNEY PRESERVATION IN SECONDARY PELVIURETERIC JUNCTION OBSTRUCTION

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### ABSTRACT BACKGROUND

To study the successful outcome of Guillotine method of lower pole Ureterocalicostomy for the treatment of secondary ureteropelvic junction obstruction (PUJO). Methods: It is a descriptive study, conducted in Department of Urology at Institute of Kidney Diseases Hayatabad Peshawar Pakistan from June 2012 till March 2020. Total numbers of 22 patients with secondary PUJO were included in the study. We excluded the adult patients with renal function less than 20% and pediatric patients with renal function less than 10% on DTPA renal scan. After thorough radiological and nuclear imaging, the patients were subjected to lower pole Ureterocalicostomy. All the Preoperative, intra-operative and postoperative data was recorded on structured proforma and was analyzed on SPSS. Results: The Mean age of the patient was 28.5 years  $\pm$  9.7 years. The mean Pre operative Glomerular filtration rate (GFR) was 27.3  $\pm$  5.9 ml/minute The mean cortical thickness on Ultrasound was 8.18 $\pm$ 1.5. The mean pre operative split renal function on renal scan was 29.95% $\pm$ 5.525. Although Marginal improvement can be observed in postoperative renal scan at 6 month duration by 31 % but not significant (p= 0.140). Lower pole Ureterocalicostomy was found successful in relieving the obstruction and saving the kidney in 20 (90.9%) patients. The multivariate analysis showed poor cortical thickness less than 7mm and spit renal function below 20 % (p 0.001) as independent factors of failure in 2 patients. Conclusion: Ureterocalicostomy proves to be a bail-out package for the preservation of kidney in cases of complicated secondary Ureteropelvic Junction Obstruction

**KEYWORDS:** Pelviureteric Junction obstruction, Pyeloplasty, Pyelolithotomy, Ureterocalicostomy, Hydronephrosis.

### BACKGROUND

Ureteropelvic junction obstruction (PUJO) is defined as the obstruction to the flow of urine from the renal pelvis to the proximal ureter. Secondary PUJO can be caused by prior surgical intervention or a failed repair of the primary PUJO. Male to female ratio is 3:1.

Ureterocalicostomy is a procedure used to anastomose non-dilated healthy ureter to the lower calyceal system in order to bypass severe peripelvic fibrosis with a ureteropelvic junction obstruction or a long proximal ureteral stricture if the renal pelvis is scarred or intrarenal in location.<sup>[1]</sup> Ureterocalicostomy should be considered in selected patients with previous unsuccessful pyeloplasty, ureteropelvic junction obstruction associated with anomalies of renal fusion, rotation or ascent, an intra-renal pelvis or a short ureter. Although endopyelotomy or ureteropelvic junction dilatation should be considered in patients with a failed

pyeloplasty, Ureterocalicostomy continues to be a reliable salvage procedure in such patients as it bypasses extensive peri pelvic scarring provides for dependent drainage and compensates for lack of adequate ureteral length.<sup>[2]</sup> Less than 0.5% patient with proximal ureteral stricture and pelvic fibrosis require salvage Ureterocalicostomy after multiple previously failed pyeloplasties.<sup>[3,4,5]</sup>

Ureterocalicostomy has been employed as a protean procedure in treating recurrent ureteropelvic junction obstruction after previous pyeloplasty.<sup>[6]</sup> In addition, Ureterocalicostomy was used by Ben et al. as a successful last resort for treating severe iatrogenic stenosis of the ureteropelvic junction.<sup>[7]</sup> Moreover, Rosset al. performed Ureterocalicostomy for secondary ureteropelvic junction obstruction that provided long term successful reconstruction of an intricate ureteropelvic junction Obstruction.<sup>[8]</sup> Furthermore, Selli et al. showed that Ureterocalicostomy proves to be a successful procedure

for the treatment of secondary ureteropelvic junction obstruction after failed pyeloplasty. The overall success of ureterocalycostomy ranges from 70-95 %.<sup>[7,8,9,10]</sup>

The most common procedure for Ureterocalycostomy. is through amputation of lower pole nephrectomy (Guillotine method). The rationale of our study is based upon the research question that why there is so much disparity in the data regarding the successful outcome of Ureterocalycostomy in relieving secondary ureteropelvic junction obstruction and preservation of renal functions.

### Objective

To study the successful outcome of Guillotine method of lower pole Ureterocalycostomy for the treatment of secondary ureteropelvic junction obstruction.

### Operational Definition

By successful outcome we mean the relieve of obstruction on post-op renal scan at 6 months time and preservation of split renal function on DTPA.

### METHODS

**Study Design:** Descriptive Study.

**Setting:** Department of Urology Institute of Kidney Diseases, Hayatabad, Peshawar.

**Duration of Study:** June 2012 till March 2020

**Inclusion Criteria:** We have included all the patients with secondary ureteropelvic junction irrespective of the etiology.

**Exclusion Criteria:** We excluded the adult patients with renal function less than 20% and pediatric patients with renal function less than 10% on DTPA Renal Scan.

**Sample Size:** 22 patients.

**Sampling Technique:** Non-probability convenient sampling.

**Data Collection Procedure:** After the approval of ethical committee, all the patients who had given consent and fulfilled the above mentioned criteria were included in the study. Complete history, examination and relevant investigations like CT Urogram, Renal Scan were performed in all of patients. Cystoscopy and on table Retrograde studies were performed in all cases to evaluate the length of ureteric stricture.

### Operative Procedure

All the patients were explored through supra 12 rib flank Incision. The ureters were dissected with intact adventitial tissue. Lateral Spatulation of the ureters were performed. Kidney were then mobilized and cooled down with Normal saline slush and cubes for 15 minutes. Vascular clamp were applied to the main pedicle. We Performed the Guillotine amputation of lower pole parenchyma.

Meticulous mucosa to mucosa anastomosis were performed with Vicryl 4/0. We wrapped the anastomosis with an omentum or perivesical fats. Antegrade ureteral stenting were performed in all the cases. All the pre, per and post-operative data was recorded on structured proforma and was analyzed on SPSS version 20. The Final look of Ureterocalycostomy is shown in Figure 1.

### RESULTS

The Mean age of the patient was 28.5 years  $\pm$  9.7 years. 15 patients were male and 7 were Female. Left kidney was involved in 18 (81.8 %) while Right kidney was involved in 4 patients.

The Etiology of Secondary PUJ obstruction is shown in Table 1.

The mean numbers of previous surgeries were 2.5 $\pm$  1.3 in Failed Pyeloplasty, Pyelolithotomy and rigid URS respectively.

The mean Pre operative Glomerular filtration rate (GFR) was 27.3  $\pm$  5.9 ml/minute with range of 12-34 ml/min. 18 (81.8 %) patients were labeled as gross hydronephrosis while 4 patients had moderate hydronephrosis. The mean cortical thickness on Ultrasound was 8.18 $\pm$ 1.5 mm with range of 5-11mm. All the patients were having working Percutaneous Nephrostomy in affected kidneys.

Renal scan (DTPA) with Frusemide was performed in all the cases and it was repeated at 6 month interval after Ureterocalycostomy. The Mean split function on pre operative renal scan and post operative renal scan is shown in Table 2.

Although Marginal improvement can be observed in postoperative renal scan at 6 month duration but paired sample T test revealed no significant difference between pre operative and post operative renal scan (p= 0.140).

The Ureterocalycostomy was found successful in relieving the obstruction of kidneys, resulting in salvage of the kidneys. The detail is shown in Figure 2.

The above mentioned figure showed that we were able to save 20 kidneys with ureterocalycostomy.

The 2 patients with failed procedure confirmed that their Pre operative cortical thickness on ultrasound was 5 mm and 4.9 mm, the mean preoperatively GFR was 14ml/min and Mean Pre operative split function less than 25 %. The postoperative split renal function on DTPA 9 % on 6 month interval. Both patients had history of failed Pyeloplasty. The multivariate analysis showed poor cortical thickness less than 7mm and split renal function below 20 % (p 0.001) as independent factors of failure.

## DISCUSSION

Secondary Ureteropelvic Junction Obstruction is quite challenging for Urologists to deal with and needs reconstruction. Lower Pole Ureterocalicostomy, although, is rarely performed, serves as a bailout package to preserve the kidneys.

The strength of the study is that, this study is carried out on reasonable sample size of relatively uncommon surgical procedure. The follow up of the patients are also satisfactory.

The secondary PUJ usually effect the younger population as the mean age of the 28.5 years  $\pm$  9.7 years. These findings are comparable to the mean age taken by Shah *et al.*<sup>[10]</sup>, Ross *et. Al.*<sup>[8]</sup> Similarly, mean age in the research conducted by Srivastava *et al.*<sup>[12]</sup> is 28.9. Mean age in the study performed by Osman *et al.*<sup>[13]</sup> was 36.27 years. The mean age taken by Radford *et al.*<sup>[6]</sup> and Mesrobian *et al.*<sup>[2]</sup> is 9.3 and 9 years respectively which is not comparable to the study conducted in this paper due to the fact pediatric patients are catered by Pediatric Urologists. Previous history of open stone surgeries, failed attempts of pyeloplasty are the main etiological factors described in the literature.<sup>[12,13]</sup> The same is also true for present study where failed Pyeloplasty and history of Pyelolithotomy was found the main factor in secondary PUJ obstruction requiring Ureterocalicostomy. The over all successful out come in relieving obstruction has always been debatable ranging from 70 -95 percent. In present study after performing all prerequisite of radiological and nuclear imaging, the success rate was 90.9 %.

Selli *et al.*<sup>[9]</sup> and Hawthorne *et al.*<sup>[11]</sup> have quoted 70 -75 % success of Ureterocalicostomy by Guillotine Method. The lower success rate in their study is related to the fact of very low sample size of 3 patients.

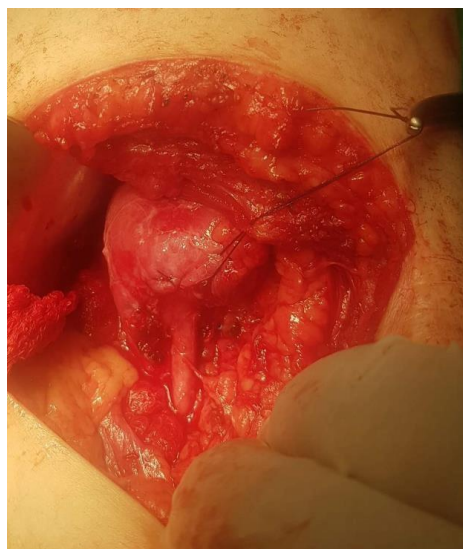
Mesrobian *et al.*<sup>[2]</sup> reported a success rate of 90% with decrease or total elimination of hydronephrosis. Abraham GP while performing Ureterocalicostomy with laparoscopy reported high success rate as 93 %.<sup>[12]</sup> Which is in accordance with present study.

We found in the present study that showed poor cortical thickness less than 7mm and spit renal function below 20 % (p 0.001) as independent factors of failure of Ureterocalicostomy. A conducted by Osman *et al.*<sup>[13]</sup> correlated the successful outcome of Ureterocalicostomy with the values of pre-operative renal scan. The failure rate was attributed to the inability to assess the pre-operative renal scan values. It is imperative to point out that prolonged duration of follow up leads to increase in failure rate. Mollard *et al.*<sup>[14,15]</sup> compared the effectiveness of Ureterocalicostomy in the treatment of secondary Ureteropelvic Junction Obstruction with other methods in children with horse-shoe kidneys and concluded that Ureterocalicostomy is superior to other methods in providing dependent drainage and avoiding

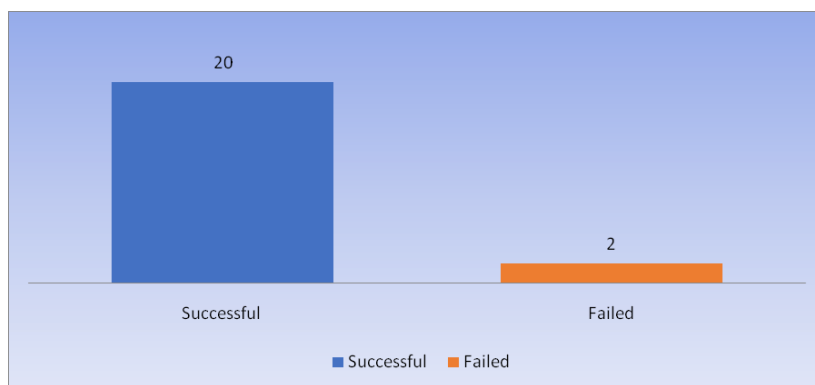
the need for Ureteric passage over the Isthmus.

Another important contributing factor ascribed to the success of Ureterocalicostomy lies in the adequate freeing of anastomosis from the surrounding tissue of the lower pole cortex as reported by Couvelaire *et al.* and Levitt.<sup>[16,17]</sup> This is in accordance of present study as we had meticulous dissection, cooling of kidney before applying the vascular clamps to prolonf the ischemia time.

The indications for Ureterocalicostomy cited in this study are similar to those that have been pointed out by Salby *et al.*<sup>[18]</sup> which are in accordance of Present study. Srivastava D in their study identified decrease cortical thickness, reduced split renal function as predictors for the failure which is in accordance of present study. The results of our study show that the Guillotine Method is relatively better than the other. The inference from the study can be drawn by Urologists, Nephrologists, Reconstructive Urologists and Pediatric Urologists. The limitation of the study is its low sample size and operator dependent technique. We found in the present We have found that patients with split function of more than 25 % showed improved results in preservation of kidneys and vice versa. The reasons for this can include overestimation of their renal functions by the renal scan, prolonged cold ischemia during surgery, and nephron loss due to manipulation. Therefore, further research is desired to see whether 25 % renal function should be considered a cut-off value for performing Nephrectomy. Thus we conclude that, Ureterocalicostomy proves to be a bail-out package for the preservation of kidney in cases of complicated secondary Ureteropelvic Junction Obstruction. Based on this research, Guillotine Method yields successful and satisfactory results in renal preservation.



**Figure Legend 1: The Final step of Lower pole Ureterocalicostomy.**



**Figure 2: Overall Outcome of Ureterocalicostomy.**

**Table 1: Table showing the Etiology of secondary PUJ obstruction.**

	Frequency	Percent	Valid Percent	Cumulative Percent
Failed Pyeloplasty	15	68.2	68.2	68.2
Previous Pyelolithotomy	4	18.2	18.2	86.4
Post Multiple Rigid Ureterorenoscopy (URS)	2	9.1	9.1	95.5
Post PCNL	1	4.5	4.5	100.0
Total	22	100.0	100.0	

**Table 2: Preoperative & Post operative Split renal function on Renal scan.**

Split Renal function(%) on Renal scan	N	Minimum	Maximum	Mean	Std. Deviation
Pre operative Renal Scan	22	22	40	29.95	5.525
Post operative Renal Scan A	22	8	39	31.27	7.642
Valid N	22				

#### Declaration for BMC Urology

#### Ethics approval and consent to participate

The ethical approval for the study duly signed by the chairman has been submitted in supplementary file in manuscript submission

#### Consent to publish

The letter of consent to publish duly signed by the Director of institute has already been submitted in supplementary file in manuscript submission

#### Availability of data and materials

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

#### Competing interests

There is no conflict of competing interest in the study

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#### Authors' Contributions

1. Dr. Liaqat Ali Principal Author  
Contributed in Concept, data collection, analysis, interpretation and manuscript writing.

2. Mishal Nazim Co- Author

Contributed in Concept, data collection, interpretation and acquisition and analysis.

3. Muhammad Shahzad

Contributed in Concept, data collection, interpretation and acquisition.

4. Faiza Hayat

Contributed in Concept, data collection, interpretation and acquisition.

5. Nasir Orakzai

Contributed in Concept, data collection interpretation and acquisition.

6. Qudratullah Wazir

Contributed in Concept, data collection, interpretation and acquisition.

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Not Applicable

#### Abbreviations

**PUJO:** Pelviureteric junction obstruction

**DTPA:** Diethylenetriaminepentacetate

**SPSS:** Statistical package for Social Sciences.

**GFR:** Glomerular filtration rate.



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