



## Redo-Pyeloplasty: An Analysis

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### Abstract

**Objectives:** *The primary objective is to analyze the cases, which had redo pyeloplasty and to find out the mode of presentation, reasons for obstruction, indications for redo pyeloplasty and their final outcome.*

**Methodology:** *Cases re-operated for obstruction during the period 2000 to 2016 in a single center by the same surgeon, were analyzed. The criteria used to label as post pyeloplasty obstruction (stasis) were (i) Acute presentation with mass and pain immediately after removal of stent. (ii) Sub acute presentation, with mass and pain three weeks after removal of stent. (iii) Recurrence or Late presentation, where there was an initial period of good drainage, but later drainage deteriorated. The investigations redo operative details, per-operative findings and final outcome were analyzed.*

**Results:** *There were ten renal units in nine patients. The presentation was acute in three renal units and late in the other seven units. Reversed anastomosis, fibrous entrapment, pseudo-polyp, pseudo-diverticulum, adynamic segment, ureterocele were found to be the structural reasons for obstruction. Functional and morphological outcome after redo pyeloplasty were good in all but one renal unit.*

**Conclusions:** *Post pyeloplasty stasis can be due to structural or functional reasons. It is very important to properly identify the cases which need redo pyeloplasty. The main dilemma is in identifying late or recurrent cases. This is possible only if the patient is kept under systematic and long term follow up.*

**Keywords:** *Uretero-pelvic Junction Obstruction, Post Pyeloplasty obstruction, Redo pyeloplasty, Hydrocalyx.*

### Introduction

Pyeloplasty for Uretero-pelvic junction obstruction (UPJO) is a commonly done procedure. Stasis after pyeloplasty means absent or poor urinary drainage and not necessarily a persistence of dilated system alone. The success rate for open pyeloplasty is 94-97%<sup>[1,2]</sup>, whereas laparoscopic pyeloplasty reports a failure rate of 5-18%<sup>[3,4,5]</sup>. Though the incidence of failed

pyeloplasty is not alarming, it is always a matter of concern for the surgeon and patient.

The reasons for stasis, recurrence, diagnosing recurrence, indications for redo pyeloplasty and management principles are poorly depicted in literature. This study is done with the objective to identify (i) the mode of presentation of post pyeloplasty stasis, (ii) indications for redo pyeloplasty, (iii) the causes of stasis and (iv) the final functional and morphological outcome

## Materials and Methods

The patients who underwent redo pyeloplasty during the period 2000 to 2016 were retrospectively analyzed and tabulated. The initial surgical details, grade of hydronephrosis, differential renal function (dRF), operative technique, age at which operated were recorded.

The mode of presentation of post pyeloplasty stasis were divided into 3 groups (i) Acute – where the patient presented with flank mass, pain and vomiting, immediately after removal of stent. (ii) Sub acute- when they presented with flank mass, pain /vomiting, three weeks after removal of stent. (iii) Late or Recurrent– where after pyeloplasty there was an initial period of good drainage, but later deteriorated, as evident by ultrasonography and diuretic renogram ( $^{99m}\text{Tc}$  Diethylenetriamine penta acetic acid- $^{99m}\text{TcDTPA}$ ).

The initial emergency management adopted for acute and sub-acute cases, redo procedures done, was analyzed in terms of timing, technique, per operative findings and post-operative morphological and functional outcome. In late / recurrent cases, redo procedures done were analyzed in same terms (except that, there was no emergency intervention).

Ultrasonography,  $^{99m}\text{Tc}$  DTPA, Antegrade nephrostogram, Intravenous urography, Retrograde pyelography and Magnetic resonance urography were done as required. Ultrasonogram criteria used to assess morphological improvement are decreasing mid-pelvic AP diameter, collapsed pelvicalyceal system compared to tense pre-operative status and improvement in parenchymal thickness. Renogram criteria used to assess improvement was an improvement in drainage pattern with or without an improvement in dRF.

Those acute and sub-acute cases which resolved spontaneously after a period of temporary per-cutaneous drainage are excluded, as no redo pyeloplasty was done in those cases.

## Results

There were ten renal units in nine patients who required intervention for post pyeloplasty stasis.

Acute: in three renal units (cases 1, 2 &3). All of them underwent initial per-cutaneous nephrostomy. Antegrade nephrostogram after three weeks revealed obstructed UPJ and Renal function was found preserved at three months. All of them underwent open redo pyeloplasty three months after nephrostomy (Table.1).

All cases with Sub-acute presentation, resolved spontaneously after temporary per-cutaneous nephrostomy.

Late presenting cases: seven renal units (Table.2) Cases. 5 &6 – Both cases operated during infancy for grade-4 hydronephrosis with a dRF of less than 30%. Morphological and drainage improvement was there till 7-8 years of age, there after pelvic AP diameter progressively increased,  $^{99m}\text{Tc}$  DTPA renogram revealed deteriorating drainage curves with stable dRF. At 9 years of age, case 5 -developed acute obstruction precipitated by urinary tract infection. He underwent redo pyeloplasty after control of infection. At 10 years of age for case.6 – Intravenous urography revealed retention of dye in collecting system even after 6 hours. Retrograde pyelography revealed patent UPJ, but retained dye in pelvis even after voiding. This case also underwent redo pyeloplasty. (Fig.1a, 1b, 1c, 1d)

Case. 7 –had bilateral UPJO, he had right pyeloplasty at 12 months and left at 20 months. Both sides developed acute obstruction on removal of stent, however both spontaneously resolved after temporary per-cutaneous nephrostomy drainage. Followed up for next 3 yrs, revealed persisting hydronephrosis, but not intervened as dRF was stable. He lost follow up for 5 years. At 10 years of age, he reported with bilateral palpable kidneys, right kidney non-functional by DTPA. Serum creatinine was normal. He underwent left redo pyeloplasty and after four months redo pyeloplasty was done on right side also.

Case. 9 – underwent pyeloplasty at three months of age. Post operatively morphological and functional results were very good. By 1 year of age ultrasonography revealed dilated lower pole calyx, which progressed gradually to 38mm in the next 6 yrs, however the pelvic AP dimension remained around 15mm. Radiologist suspected duplex and so an intravenous urography and

magnetic resonance urography done both failed to confirm duplex. Later seen by author and came to the conclusion of acquired hydrocalycosis, due to stenosis of infundibulum of lower pole calyx, which was accidentally included in the pyeloplasty due to aggressive pelvic reduction (Fig.2). This was confirmed during exploration and corrected by a lateral uretero-calycostomy.

**Table.1-** Operative findings and procedure done for acute cases

Case. No.	Age	Pathology	Procedure& Route	Morphological & Functional results after 1year	Morphological & Functional results after 2years
1.	2 yrs.	Reversed anastomosis	Y-V plasty. (Dorsal Lumbotomy)	Good	Good
2.	9 yrs.	Fibrous entrapment	A-H Pyeloplasty (Transperitoneal)	Good	Good
3.	9 months	Pseudo-polyp	A-H Pyeloplasty (Extraperitoneal)	Good	Good

**Table.2:** Operative findings and procedures done for late cases

Case.No.	Age (Pyeloplasty)	Age (Recurrence&redo procedure)	Pathology	Procedure & Route	Morphology& functional after 1 year	Morphology & functional after 2 years
4.	7 yrs.	7 ½ yrs.	Ureterocele	C'scopy& Incision	Good	Good
5.	8 months	9 yrs.	Patent UPJ ?adynamic (functional)	A-H Pyeloplasty (Extraperitoneal)	Good	Good
6.	6 months	10 yrs.	Patent UPJ ?adynamic (functional)	A-H pyeloplasty (Extraperitoneal)	Good	Good
7.(right)	1 yr.	10yrs dRF- 0%	Total stricture	A-H Pyeloplasty (extraperitoneal)	Good dRF- 22%	Poor dRF- 0%
7. ( left)	20 months	10 yrs.	Patent UPJ ?adynamic (functional)	A-H Pyeloplasty (Extraperitoneal)	Good	Good
8.	3 yrs.	4yrs.	Pseudo-diverticulum	A-H Pyeloplasty (Transperitoneal)	Good	Good
9.	3 months	7yrs	Acquired hydrocalyx at lower pole	Lateral ureterocalycostomy (Transperitoneal)	Good	----

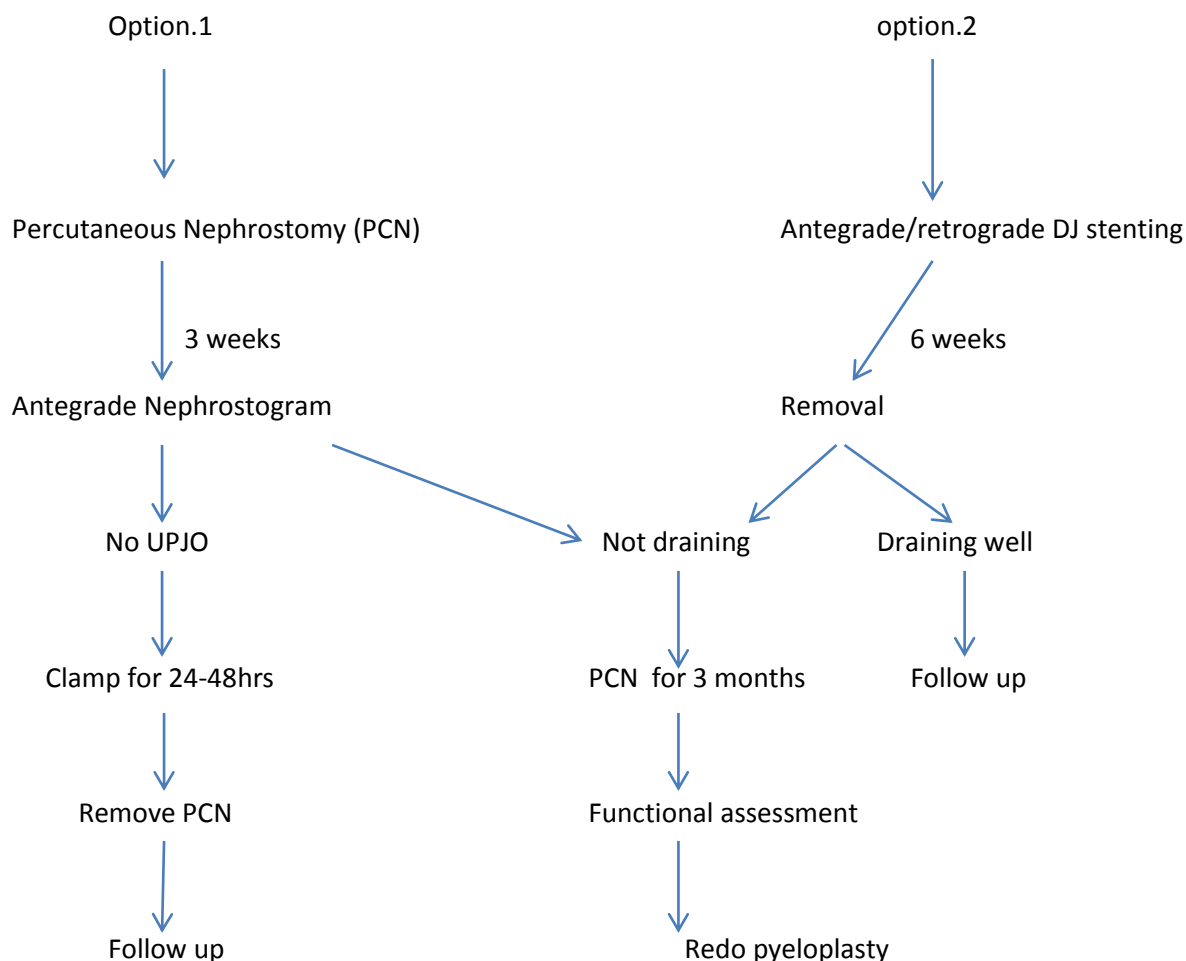


Chart.1 : Management of acute cases.

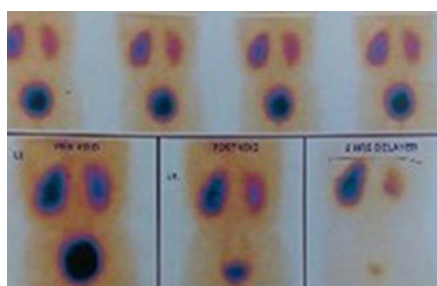


Fig.1a

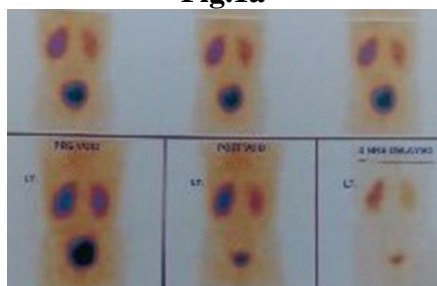


fig.1b

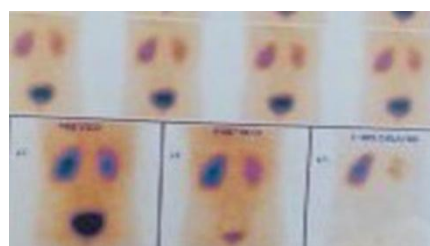


Fig.1c

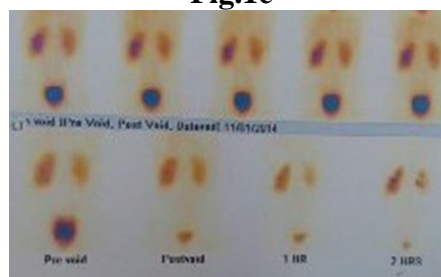
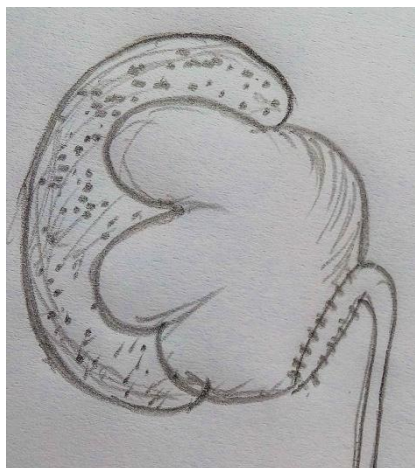


Fig.1d

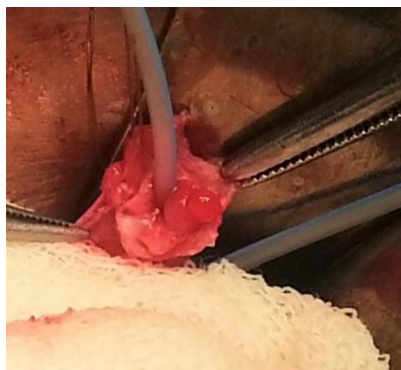
Fig. 1 a) before left pyeloplasty, b) good drainage after pyeloplasty, c) deterioration of drainage left side, d) good drainage left side after redo-pyeloplasty in case.6



**Fig.2** Acquired hydrocalyx in case.9



**Fig.3** Reversed anastomosis in case.1



**Fig.4** Pseudopolyp in case.2

## Discussion

Anderson and Hynes described open dismembered pyeloplasty in 1949<sup>[6]</sup>, and is still the Gold Standard. Rao KLN et al<sup>[7]</sup> scientifically explained the principles behind the level of excision of juxta pelvic ureter. Though this is one of the most rewarding surgeries, the data on principles of management of post-operative complications, especially post pyeloplasty stasis is limited.

The criteria used to define success is variable. Tan et al defined success as good drainage on diuretic

renogram and direct visualization of UPJ in ureterorenoscopy<sup>[4]</sup>. Others consider it as a success if there is symptomatic relief, improvement in hydronephrosis and dRF, even though renogram curve is abnormal<sup>[4]</sup>

The objective of surgery is to promote good urinary drainage across UPJ, so as to preserve renal function. Post pyeloplasty stasis or obstruction means, poor or absent urinary drainage and not necessarily a dilated system alone. Improvement in dRF can be taken as a bonus, but deterioration is not.

*Acute and sub-acute* case presents with pain, vomiting and flank mass, with or without evidence of infection. Presence of renal mass post-operatively is definitely suggestive of obstruction. This presentation is usually due to structural reasons like,

(i) Improper anastomotic technique especially at the 'V' angle of ureter, which is the final outflow tract.

(ii) Longitudinal twist of ureter, usually unrecognized. This may also happen when ureter is spatulated on wrong side.

(iii) Non-dependent anastomosis, caused by faulty trimming of pelvis.

(iv) Redundant pelvis resulting in a kink at UPJ<sup>[8]</sup>

(v) Reversed anastomosis causing reversed 'J' hooking of ureter with pelvis. (Fig.3)

(vi) Left behind adynamic segment.

(vii) Compromised anastomosis especially when there is a long narrow segment.

(viii) Missed aberrant vessels. Which occur in 18-50% of cases<sup>[9]</sup>

(ix) Pseudopolyp – could be suture induced granuloma, or due to infection. (Fig.4)

(x) Subclinical urinary leak, producing urinoma or abscess which produces mass effect on UPJ.

(xi) Fibrous entrapment due to infection or subclinical urinary leak.<sup>[4]</sup>

(xii) Ipsilateral vesico-ureteral junction obstruction or obstructing ureterocele, which will manifest only after pyeloplasty as urinary drainage improves across UPJ.

(xiii) Acute infection and edema at UPJ anastomosis.

Majority of these settle down in course of time. Emergency intervention is needed if the mass, pain or pyonephrosis is persisting. In one series 40% needed intervention<sup>[10]</sup>.

The treatment adopted depends on availability of expertise and facilities for endourological intervention. Option-1 was adopted in this study. (chart.1)

Before contemplating redo procedure, functional and morphological assessment should be done by, ultrasonography, intravenous urography/ Scintigraphy to document dRF and to decide upon redo pyeloplasty or nephrectomy. Redo procedure are done with the aim of correcting the identified cause. Sometimes a non-dismembered technique like Y-V plasty may be feasible. Dense fibrous entrapment needs patient dissection and a prior retrograde stenting of ureter will help in relatively easy identification of ureter. A healing period of minimum 3 months is given before redo procedure. Gupta DK recommended similar timing for intervention<sup>[11]</sup>.

*Late or recurrent* cases can be those presenting late in spite of poor drainage, after primary pyeloplasty as they are asymptomatic, ignored or lost follow up. These should be differentiated from cases of true recurrence of UPJO, where there is a period of good drainage, for varying period, but deteriorated later in terms of morphology, drainage and function. It may be difficult to differentiate these two unless; they are on a long term and systematic follow up. Late obstruction has been identified even beyond 3 to 8 years after pyeloplasty<sup>[1, 12, 13, 15]</sup>.

This group of patients also may develop palpable mass (usually painless), infection or pyonephrosis. Recurrent UPJO can be due to structural or predictable functional reasons.

Structural causes noted are:

- (i) Chronic fibrous entrapment due to subclinical infection/urinary leak
- (ii) Post ischemic adynamic segment/stricture at UPJ<sup>[4,9]</sup>

(iii) Secondary calculus at UPJ

(iv) Left behind adynamic segment.

(v) Missed aberrant vessels

(vi) Ipsilateral vesico-ureteric junction obstruction / ureterocele. (case.4)

(vii) Pseudo-diverticulum – Subclinical chronic urinary leak leads to formation of small urinoma near UPJ, which acquires a pseudo-capsule and as the communication with pelvis persist, remains as a diverticulum, which can produce extrinsic compression on UPJ. (case.8)

(viii) Risk of recurrence was found to be more after dorsal lumbotomy route of pyeloplasty<sup>[16]</sup>.

Functional Reasons:

(i) Initial dRF <30%. Similar observations reported in other studies<sup>[17]</sup>.

(ii) As age advances urine output increases and the outflow tract cannot handle this (cases.5,6). Lim HJ et, reported that infants who undergo pyeloplasty may be more prone for persistent obstruction<sup>[1]</sup>.

(iii) Deterioration of tubular function (due to dysplasia or infection), can lead to ipsilateral polyuria. This increased urine output is not handled properly by the new anastomosis. Such cases may also present as Deitl's crisis. This can be labeled as "unilateral Diabetes Insipidus".

(iv) Diabetes mellitus –and polyuria can lead to similar pathophysiology<sup>[4,9]</sup>

Recurrent UPJO is always a dilemma, since it is difficult to prove poor drainage and stasis, especially when the dRF is poor, that the renogram drainage pattern is not reliable. Retention of dye in the pelvis even after 6 hours in Intravenous urography while on continuous bladder drainage can be taken as a sign of stasis. Again this is useful only if the tubular function is good. If <sup>99mTc</sup> DTPA shows poor dRF which is based on glomerular filtration, then intravenous pyelography can also be done, which depends on tubular function, (as <sup>99m</sup>MAG3 is not freely available). Retrograde pyelography is useful when the function is poor, however a patent UPJ doesn't rule out an adynamic segment. Morphological changes in ultrasonography like

progressive increase in pelvic AP diameter, and parenchymal thinning are suggestive of recurrence.

Endourological procedures available like, Antegrade or retrograde endopyelotomy using cold knife, laser, accusize device or balloon dilatation have lower success rates compared to open redo pyeloplasty<sup>[2,13]</sup>. However this can be employed as first mode of intervention in hands of experts. A study on laparoscopic redo pyeloplasty versus open redo pyeloplasty shows a success rate of 92% versus 100%<sup>[18]</sup>.

Redo pyeloplasty should be performed before severe deterioration of dRF or decrease in parenchyma thickness<sup>[19]</sup>. Delay will lead to irreversible loss of function.

### Conclusion

Recurrence of UPJO can be due to structural or functional reasons. Missed aberrant vessel or calculi are unusual causes for post pyeloplasty stasis in this series. Poor initial renal function especially <30% and surgery done during infancy are predictors of recurrence of UPJO, by pre-pubertal or pubertal age. The protocol adopted for acute cases here, can be followed as the final outcome is good. Good morphological and functional outcome can be achieved after open redo pyeloplasty. Long term systematic follow up till pubertal age group is essential to identify recurrent uretero-pelvic junction obstruction.

**Conflict of Interest:** Nil

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