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### RESEARCH ARTICLE

#### TUBELESS PERCUTANEOUS NEPHROLITHOTOMY-A CRITICAL ANALYSIS FOR SAFETY AND EFFICACY.

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#### Abstract

**Aims And Objectives:** To assess the safety profile and simultaneously observe the associated morbidity of Tubeless Percutaneous Nephrolithotomy.

**Materials And Methods:** A total of 54 patients were enrolled in this study and studied prospectively for a period of one and a half year. Out of 54 patients 10 were having upper calyceal stones, 14 pelvic stones, 12 middle calyceal, 10 patients lower calyceal and 8 patients proximal ureteric stones. All the punctures were made in prone position and under the guidance of fluoroscopy.

**Results:** The overall complication rate in our study was 22.22%. Four patients(7.40%) presented with residual disease and another three patients(5.56%) with persistent soakage. The other complications include hydrothorax in two patients(3.7%), two patient(3.70%) developed post-operative fever/sepsis and another one had prolonged hematuria(1.85%).

**Conclusion:** From our study, we concluded that tubeless percutaneous nephrolithotomy is both safe as well as effective version of PCNL as far as outcome and morbidity is concerned.

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#### Introduction:-

The breakthrough in the management of renal stone disease was not until in 1955 Goodwin and et al<sup>[1]</sup> did first nephrostomy. Subsequently, in 1976 Fernstrom and Johansson<sup>[2]</sup> first time published work on percutaneous nephrolithotomy(PCNL). Percutaneous nephrolithotomy have revolutionized the management of renal stone disease, both for of results as well as in terms of associated complications and the morbidities. The advantages of percutaneous nephrolithotomy are evident as far as open renal stone disease procedures are concerned; include lower morbidity and mortality, improved cost effectiveness and faster recovery and early possibilities of instituting auxiliary procedures.<sup>[3]</sup>

The placement of the nephrostomy at the end of the PCNL is highly advocated for post operative drainage of the kidney, for the creation of temponade in the access tract so as to control any bleeding from the tract site and in case of residual disease same tract is used for second-look procedure.<sup>[4]</sup> However, based on the concept that the purpose of the tube is only to maintain adequate drainage of the kidney, a 'tubeless' approach has been developed by placing a ureteral stent or catheter to provide drainage after PCNL in lieu of a nephrostomy tube. Since last two decades, the

use of nephrostomy has been strongly challenged and trend towards 'nephrostomy-free' i.e, Tubeless PCNL has been adopted. There is considerable decrease in various parameters as far as conventional procedures are concerned, eg. analgesic requirement, hospital stay and morbidity.<sup>[5-7]</sup> But, early recognition and management of any complication is a must to avoid undue morbidities.

### **Materials And Methods:-**

Between 2016 and 2018, we prospectively observed 54 patients who underwent Tubeless Percutaneous Nephrolithotomy in our hospital.

The study was approved by the institutional/college ethical committee and all the patients enrolled in our study were allowed to participate actively and a written informed consent was taken from them.

The indications for Tubeless PCNL include upper calyceal stones, pelvis stones, complex inferior calyceal stones and proximal ureteric stones.

Patients with active urinary tract infection, uncorrected coagulopathy, pregnant females, contraindication to general/spinal anesthesia and age less than 18 years were excluded from our study.

The pre-operative evaluation include radiographic evaluation(IVP/CT) of stone size(stone bulk), stone location, renal anatomy and function, bacteriological evaluation of urine. Prophylactic antibiotics were administered to all patients.

After induction of general or spinal anesthesia, the patient was put in dorsal lithotomy position, cystoscopy was done followed by retrograde ureteric catheterization for retrograde pyelography. It was followed by indwelling bladder catheterization and both indwelling catheter and ureteric catheter secured to anterolateral aspect of the thigh. Now the patient was positioned prone (swimmers' position) and the retrograde pyelography was done to delineate the pelvicalyceal system under fluoroscopy. The appropriate calyx was selected for puncture and the puncture made under the guidance of fluoroscopy by 18Gauge Cooks Puncture Needle. The position of puncture needle was confirmed either by its movements with each respiration or by free flow of urine/saline when infused retrogradely. The Turemo guidewire(0.035") was introduced into the pelvicalyceal system and manipulated into ureter/bladder. Then the tract was dilated either using single step method or sequential/co-axial dilators (Alken dilators) until the desired Amplatz sheath was placed in. The nephroscope was introduced and the stone visualized and required procedure done (PCNL). At the end of the procedure the check fluoroscopy was done to look for any residual stone fragments and to place the DJ stent. We routinely used universal DJ Stent of 5F. The fluoroscopy of chest was done to look for any evidence of pneumothorax or hydrothorax/hemothorax at the end of the procedure.

While removing the Amplatz sheath, the tract was always view under nephroscopic view to look for any bleeding with the guidewire still into the system. If satisfied, guidewire removed and incision closed by single vertical mattress suture.

In post-operative period, the patients were monitored and observed critically. The X-ray Chest was done in immediate post-operative period, in all patients, to look for any pneumothorax, hemothorax and/or hydrothorax. The post-op X-ray KUB was also done to confirm the position of DJ stent and to look for any residual disease. Patient was said to have residual disease when the fragments were >3mm.

### **Statistical analysis:-**

Statistical analyses were performed using the Statistical Package of Social Sciences version 19 (SPSS Inc.; Chicago, IL, USA).

### **Results:-**

Out of 54 patients, the mean age was  $48.2 \pm 10.4$  years; 34(62.96%) were males and 20(37.04%) were females. The procedure was done on right side in 40 patients (74.07%) and in 14 patients (25.93%) on left side. Out of 54 patients, 10 patients (18.5%) were having upper calyceal stones, 12 patients (22.3%) were having middle calyceal stones, 10 patients (18.5%) were having lower calyceal stones, 14 patients (25.9%) were having pelvic stones and rest 8 patients (14.8%) were having upper ureteric stones. Total of 36 patients (66.67%) were symptomatic of their

disease and the rest 18 patients (33.33%) were asymptomatic. The mean stone size was  $2.8 \pm 1.2$  cm. The mean operative time was  $74.4 \pm 20.8$  minutes. (Table1)

**Table 1:-**The demographic and clinical data, and the outcomes during and after surgery, of 54 patients undergoing tubeless PCNL.

Characteristic	Values
No. of Renal Units	54
Mean age(years)	$48.2 \pm 10.4$
Male:Female	34:20
Right:Left	40:14
Symptomatic:Asymptomatic	36:18
Mean stone size(cm)	$2.8 \pm 1.2$
Operative Duration(mins)	$74.8 \pm 20.8$
Average drop in Hb(g/dL)	1.6
Analgesic,mg Diclofenac	$100 \pm 20$
Hospital stay(days)	$4.2 \pm 2.8$
Stone-free rate(%)	92.6
Complication rate(%)	22.2%

None of our patients needed more than one tracts. The overall success rate/stone free rate of our study was 92.60% and the complication rate was 22.22% (12 patients). The residual disease, i.e, the significant residual fragments were found in 4 patients (7.40%). The persistent soakage was present in 3 patients (5.56%), 2 patients (3.70%) developed hydrothorax, prolonged hematuria in 1 patient (1.85%) and another 2 patients developed sepsis/persistent fever (3.70%). (Table2)

**Table 2:-**Nature, frequency and Clavien-Dindo Grade of complications

Complication	Frequency (%)	Clavien-Dindo type
Residual Disease	4(7.4%)	Three Grade-3a Another Grade-3b
Soakage	3(5.56%)	All Grade-1
Hydrothorax	2(3.70%)	One Grade-1 Another Grade-2
Fever/Sepsis	2(3.70%)	All Grade-1
Hematuria	1(1.85%)	Grade-1

The cases of residual stone fragments were subjected to auxiliary procedures. Three patients were put to ESWL and complete stone clearance was achieved in all the cases after single sitting of ESWL. In 4th patient the stone had migrated into the lower ureter and was lodged at the crossing of iliac vessels and was managed and rendered stone free at 4weeks by retrograde ureteroscopy, under regional anesthesia. Soakage, fever and hematuria were managed conservatively. The pleural effusion was drained in one patient by wide bore needle under local anesthesia and the other one settled conservatively.

All the residual stone diseases were found in patients with stone size  $> 2.5$  cms. The pleural effusion developed in patients with superior calyceal stones. Soakage was seen in lower calyx tract in 2 patients and through middle calyx in another one. Both fever and hematuria was seen in patients with proximal ureteric stone disease.

The average analgesic consumption was  $100 \pm 20$  mgs.

The mean duration of hospital stay was  $4.2 \pm 2.8$  days.

## Discussion:-

Percutaneous renal surgery is a popular endo-urolological procedure for the treatment of upper urinary tract stone disease. Conventionally, the placement of nephrostomy after completion of procedure was highly considered. In 1997, Bellman et al,<sup>[5]</sup> reported the first tubeless PCNL. Patients who undergo tubeless PCNL have significantly less pain postoperatively and require less analgesia dosage. Tubeless PCNL minimizes the hospital stay and offers the advantage of passive dilation of the ureter, caused by the indwelling DJ stent to facilitate the spontaneous passage of

any unrecognized small stone fragments with rapid healing and minimal urine leakage. The general consensus is that the tubeless approach is feasible only in a selected population that generally excludes cases requiring two or more accesses, significant intra-operative bleeding or situations with a likelihood of residual stone fragments. The important limitations to tubeless PCNL are that it precludes any hope of 'second-look' procedure through the same tract, need of cystoscopy to remove the DJ stent, 'Stent symptoms' which can be troublesome in some patients. A randomized comparison of tubeless and standard PCNL in 220 cases in 2008 by Agrawal et al<sup>[8]</sup> demonstrated that tubeless PCNL reduced postoperative urinary leakage and local pain and minimized hospital stay without increasing morbidity. In 2005, Shah et al<sup>[9]</sup> advocated that tubeless PCNL was safe and effective even in patients with a solitary kidney, or with multiple renal access tracts.

Renal hemorrhage is a life-threatening complication of PCNL, especially when the access tract has not been secured with a nephrostomy. Peri-operatively, the proper selection of patient is a must while planning for a tubeless PCNL. Post-operative hemoglobin drop is the standard in the literature; we utilized the immediate post-operative drop to identify those who may have had more significant intraoperative bleeding, and as such may have been at greater risk of post-operative bleeding. Our results and observations were consistent with most of the previous surgeries. Our experiences of 54 cases of tubeless Percutaneous Nephrolithotomy, the tubeless PCNL is a safe procedure for the treatment of urinary tract stone disease with an acceptable morbidity.

### Conclusion:-

Tubeless PCNL can be used with a favourable outcome in selected patients with small stone burden, no significant residual stones, no significant calyceal system perforation, minimal bleeding and no requirement for a secondary procedure; with the potential advantages of decreased postoperative pain, analgesia requirement and hospital stay.

Ethics Committee Approval: Ethics committee approval was received for this study from the ethics committee of the college and the associated hospital of Government Medical College Srinagar.

Informed Consent: Written informed consent was obtained from patients who participated in this study.

Conflict of Interest: No conflict of interest.

### Bibliography:-

1. Goodwin WE, Casey WC, Woolf W. Percutaneous trocar (needle) nephrostomy in hydronephrosis. J Am Med Assoc. 1955;157:891-4.
2. Fernström I, Johansson B. Percutaneous pyelolithotomy. A new extraction technique. Scand J Urol Nephrol. 1976;10:257-9.
3. P. Alken, G. Hutschenreiter, R. Guenther: Percutaneous kidney stone removal. Eur Urol, 8 (1982), pp. 304-311.
4. Winfield HN, Weyman P, Clayman RV. Percutaneous nephrostolithotomy: Complications of premature nephrostomy tube removal. J Urol. 1986;136:77-9.
5. G.C. Bellman, R. Davidoff, J. Candela, J. Gerspach, S. Kurtz, L. Stout Tubeless percutaneous renal surgery: J Urol, 157 (1997), pp. 1578-1582.
6. Y.C. Jou, M.C. Cheng, C.T. Lin, P.C. Chen, J.H. Shen. Nephrostomy tube-free percutaneous nephrolithotomy for patients with large stones and staghorn stones: Urology, 67 (2006), pp. 30-34.
7. T. Akman, M. Binbay, E. Yuruk, E. Sari, M. Seyrek, M. Kaba *et al.* Tubeless procedure is most important factor in reducing length of hospitalization after percutaneous nephrolithotomy: results of univariable and multivariable models: Urology, 77 (2011), pp. 299-304 .
8. M.S. Agrawal, M. Agrawal, A. Gupta, S. Bansal, A. Yadav, J. Goyal A randomized comparison of tubeless and standard percutaneous nephrolithotomy: J Endourol, 22 (2008), pp. 439-442.
9. H.N. Shah, V.B. Kausik, S.S. Hegde, J.N. Shah, M.B. Bansal: Tubeless percutaneous nephrolithotomy: a prospective feasibility study and review of previous reports: BJU Int, 96 (2005), pp. 879-883