

## COMPARATIVE STUDY OF 'PERCUTANEOUS NEPHROLITHOTOMY PLACEMENT' VERSUS PERCUTANEOUS NEPHROLITHOTOMY WITHOUT NEPHROSTOMY PLACEMENT (TUBELESS PCNL)

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**ABSTRACT: OBJECTIVES:** To assess the efficacy, safety, and morbidity of tubeless percutaneous nephrolithotomy (PCNL) and compare it with standard PCNL. **METHODOLOGY:** Between August 2008 and December 2008 patients undergoing PCNL prospectively evaluated in two groups. One group patients undergone PCNL with nephrostomy placement (Standard PCNL) and second group of patients undergone PCNL without nephrostomy tube (TUBELESS PCNL). Case selection criteria were adequately matched and postoperative outcome was recorded in same way in both groups. Patients who needed more than two percutaneous tracts, intraoperative perforation of the pelvicalyceal system, excessive manipulation at the ureteropelvic junction, or a residual stone after the procedure and who had a solitary kidney or azotemia were excluded from the study. **RESULTS:** A total 43 patients (23 patients in group I, 22 patients in group II) were included in the study. Post-operative plain x-ray of kidneys, ureters and bladder showed a 100% stone clearance rate. There was no tract related problems i.e., tract infection and sinus formation. Mean hospital stay was 5.9 days in group I and 4.1 days in group II. Post-operative ultrasonography during hospitalization showed no perinephric collection. No readmissions to the hospital at mean follow up of 6 months (range 2 to 6 months). All patients were doing well. **CONCLUSIONS:** Avoiding the use of nephrostomy or D-J stent may not compromise the safety of PCNL and it decreases morbidity of the patient.

**KEYWORDS:** PCNL, RGC, FLOROSCOPY, NEPHROSTOMY, DJ STENT.

**INTRODUCTION:** Since the first description of percutaneous nephrolithotomy, it has become an integral part of renal stone management.<sup>1,2,3,4</sup> The placement of percutaneous tube after the completion of the procedure has been considered standard practice to aid in hemostasis, to ensure proper drainage of urine and to facilitate easy access in case repeat PCNL is required. Despite these apparent advantages, nephrostomy tube has been implicated in post-operative discomfort and morbidity. To reduce discomfort and tube related morbidity, modifications have been made like the use of smaller nephrostomy tube or avoiding it completely after an uncomplicated procedure with complete stone clearance with double-J stent as tubeless PCNL.<sup>5,6</sup> Because there is still apprehension without using a D. J stent, few have tried a totally tubeless PCNL.

**OBJECTIVES:** To assess the efficacy, safety, and morbidity of tubeless percutaneous nephrolithotomy (PCNL) and compare it with standard PCNL.

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**METHODOLOGY:** Between august 2008 and December 2008 patients undergoing PCNL prospectively evaluated in two groups. One group patients undergone PCNL with nephrostomy placement (standard PCNL) and second group of patients undergone PCNL without nephrostomy tube (TUBELESS PCNL). Case selection criteria were adequately matched and postoperative outcome was recorded in same way in both groups. Patients who needed more than two percutaneous tracts; intraoperative perforation of the pelvicalyceal system, excessive manipulation at the ureteropelvic junction, or a residual stone after the procedure; and who had a solitary kidney or azotemia were excluded from the study. A total 23 patients in group I underwent PCNL with nephrostomy drainage and in second group 20 patients underwent PCNL without nephrostomy drainage, in that 8 patients undergone PCNL even without D.J-stent (TOTAL TUBELESS PCNL).

Of 43 patient's 2 patients were presented with acute renal failure secondary to obstructive uropathy, an initial D. J stenting was done for improvement of renal function and PCNL was subsequently performed.

A standard technique of percutaneous nephrolithotomy was used<sup>7,8,9</sup>. All procedures were performed with the patient under general anesthesia in prone position. After retrograde ureteral catheterization, initial percutaneous access was obtained after injecting contrast retrogradely. The tract was dilated under fluoroscopic control using polytetrafluoroethylene dilators, and an amplatz sheath of 28 to 30 Fr was placed depending on degree of dilation of selected calyx and the bulk of stone to be retrieved. Stone disintegration was done using a pneumatic lithotripter (swisslithoclast).

After completion of the procedure D.J stent was placed over the guide wire across the ureteropelvic junction. Once it was ensured that tract bleeding was not alarming, in group I patients a 14 or 16 no. foleys catheter was placed in pelvicalyceal system through the amplatz sheath under fluoroscopic guidance as nephrostomy drainage and amplatz sheath is removed. In group II patients after completion of the procedure amplatz sheath is removed, a spongostan (absorbable gelatine) was conformed to tubular shape and plugged into the nephrostomy tract. Skin incision was closed with 2-0 silk mattress suture.

Two groups were compared in regard to total stone burden, operative time, estimated blood loss (decrease in haemoglobin measured from preoperative and postoperative haemoglobin), hospital stay, post-operative pain, analgesic requirement, duration of post-operative haematuria and complications like urinary leak, perinephricurinoma formation. Patients had an ultrasonography assessment for perinephric collection before discharge home. The D.J stent was removed as an outpatient procedure after 3 wks from surgery.

**RESULTS:** A total 43 patients (23 patients in group I, 22 patients in group II) were included in the study. Postoperative plain x-ray of kidneys, ureters and bladder showed a 100% stone clearance rate. There was no tract related problems i.e., tract infection and sinus formation. Mean hospital stay was 5.9 days in group I and 4.1 days in group II and Post-operative ultrasonography during hospitalization showed no perinephric collection. No readmissions to the hospital at mean follow up of 6 months (range 2 to 6 months). All patients were doing well.

Subset analysis of group II patients with or without D. J stent was done. Analgesic requirement in subset of patient's with D J stent is 90 mg, and in patients with-out D. J stent is 50 mg. Duration of hospital stay in subset of patients with D.J stent is 4.1 days and in patients without D. J stent is 3.0 days.

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Change in haematocrit is almost equal in both groups. Mean operative time is 42.8 mins in Group I and 35 mins in group II. Post-operative haematuria and complications like urinary leak are similar in two groups. Statistical analysis of our study compared with study at AIIMS, New Delhi,<sup>10</sup> (2000-2007) (Journal of urology, 2008), Study by T. J. Crook-published paper 2008 (Journal of urology, 2008)<sup>11</sup>, Study at SGPGL, lucknow<sup>12</sup>, (2004-2008)(Journal of urology, 2008).

	Study at Gandhi hospital(2008-2009)		Study at AIIMS, Newdelhi <sup>10</sup> (2000-2007)		Study by T. J. Crook-published paper 2008 (Journal of urology) <sup>11</sup>	
	Group I	Group II	Group I	Group II	Group I	Group II
No. Patients	23	22	185	135	25	25
Mean pt age	39.5 yrs	33.9 yrs	32.6	34-4	33.5 yrs	30.2 yrs
No. Stone side:						
Right	11	13				
Left	11	09				
bilateral	1					
No. Male/Female	11/12	15/7	100/85	85/50		
Average stone size	3.1 cm	2.8	3.6	3.2 cms	2.16 cms	1.75 cms
No. Stone site:						
Caliceal	6	3				
Pelvic	13	17				
Pelvic+caliceal	3					
Upper ureter		2				

Table1: Statistical analysis between group I and group II patients and with other studies-patient and stone related charecteristics

	Study at Gandhi Hospital (2008-2009)		Study at AIIMS, New Delhi (2000-2007) <sup>10</sup>		Study by T.J.Crook-published paper 2008 (Journal of urology) <sup>11</sup>	
	Group I	Group II	Group I	Group II	Group I	Group II
Mean operative time	42.8 min	35 mins	No. statistical difference		No.Statistical difference	
Mean days hospital stay	5.9 days	4.1 days	2.9 days	1.8 days	3.4 days	2.3 days
Mean analgesic requirement (diclofenac in mg)	150 mg	85 mg	210 mg	68 mg	150 mg	58 mg
Decrease in haemoglobin	0.6	0.5	0.4	0.5	2.03	1.18

Table2: Statistical analysis between group I and group II patients and with other studies-operative and post-operative out come

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	Study at Gandhi Hospital (2008-2009)		Study at SGPGI, lucknow <sup>12</sup> (2004-2008)	
	Tube less PCNL	Total tubeless PCNL	Tube less PCNL	Total tubeless PCNL
No. Patients	14	8	25	27
Mean pt age	31.9	39.2	32.6	38.82
No. Stone side:				
Right	8	5	13	13
Left	6	3	9	12
bilateral			3	2
No. Male/Female			22/3	22/4
Average stone size	2.7cm	2.5	3.0	2.8 cms
No. Stone site:				
Caliceal			12	13
Pelvic	5	3	12	12
Pelvic+caliceal	9	5	2	1
Upper ureter			1	3
Mean operative time	35 min	31 mins	47.68	46.65
Mean days hospital stay	4.1days	3.0 days	2.52	2.35
Mean analgesic requirement (diclofenac in mg)	90mg	50 mg	170 mg	163.24 mg
Decrease in haemoglobin	0.5	0.425	1.1	0.9

**Table 3: Comparing two subsets of patients in group II  
(Tubeless PCNL and total tubeless PCNL (even without D-J stent))**

**DISCUSSION:** Traditionally a wide bore nephrostomy tube is placed in pelvicalyceal system at end of PCNL, it not only provides an effective tamponade to nephrostomy tract, despite these obvious advantages, the nephrostomy tube is associated with significant post-operative discomfort and pain as it lies in vicinity of rib cage. Many studies have reported the use of small bore nephrostomy decreases morbidity but it does not completely eliminates discomfort and morbidity of nephrostomy placement this led to modifications of complete elimination nephrostomy tube as tubeless PCNL.<sup>5,6</sup>

D-J stent placement across pelviureteric junction may allow free drainage of urine but it causes severe post-operative dysuria. So complete elimination of tubes i.e., both nephrostomy tube and D-J stent decreases post-operative analgesic requirement and morbidity. These factors decreases the total hospital stay of patients undergone tubeless PCNL.

Spongostan is absorbable gelatine sponge prepared natural reacting purified gelatine foam of uniform density. It consist of 100% porcine gelatine and is water insoluble, it acts as local haemostatic agent in venous bleeding or oozing where traditional haemostasis is difficult. It adheres to bleeding site and absorbs approximately 45 times its own weight due to its uniform porosity

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platelets are caught and the coagulation cascade is activated, transforming soluble fibrinogen into a net of insoluble fibrin which stops bleeding. When implanted in the tissues it is absorbed within 3-5 weeks, due to this expansion spongostan seals off the nephrostomy tract and possibly helps in further hemostasis.

**CONCLUSIONS:** This trial demonstrates that percutaneous nephrolithotomy without nephrostomy or stent is a safe and well tolerated procedure in selected patients. Length of stay was reduced with no major complications in either group. We believe that totally tubeless percutaneous nephrolithotomy may be considered an accepted standard of care for selected cases and it is possible to reserve placement of a nephrostomy tube or internal ureteral stent for specific indications. The present prospective study comparing PCNL with or without nephrostomy tube decreases patient hospital stay and analgesic requirement thereby increasing the chance of labeling PCNL as day care surgery. In future, a large cohort of patients studied in randomized fashion would prove the advantage making PCNL, a tubeless procedure and real meaning of tubeless would be worth appreciating.

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