

Comparison of Efficacy and Outcome of Tubeless with Standard Percutaneous Nephrolithotomy in Patient with Renal Stones

UBAID-UR-RAHMAN¹, NADIR HUSSAIN², BIBHUSHIT MAHAT³, SULOCHANA DAHAL⁴, MUHAMMAD NAZIR⁵

^{1,3,5}Department of Urology, Lahore General Hospital, Lahore, Pakistan

²Department of Urology, Sheikh Zayed Hospital, Lahore, Pakistan

⁴Department of Pediatric Surgery, Children's Hospital & University of Child Health Sciences, Lahore, Pakistan

Correspondence to: Dr. Ubaid-ur-Rahman, Cell: +92-3339705515. E-mail: dr.ubaidunari@yahoo.com

ABSTRACT

Objective: To compare the outcome and complications of standard PCNL with tubeless PCNL in terms of analgesia requirement, incidence of infection, post-operative perinephric urinary collection and post-operative hospital stay.

Study Design: Randomized control trial

Place and Duration of Study: Department of Urology, Lahore General Hospital Lahore from 1st March 2018 to 30th April 2019.

Methodology: Ninety six patients fulfilling the inclusion criteria were randomly categorized into 2 groups; Group A where patients will undergo standard PCNL and Group B where patients will undergo tubeless PCNL. Post-operatively, patients were assessed for the requirement for analgesia, rate of infection, post-operative urinary leakage and hospital stay.

Results: The mean duration of surgery had no significant difference between the two treatment groups; tubeless group was on average 51 minutes while the standard PCNL group was 55 minutes. No significant difference was observed in reduction of hematocrit values between the groups (4.9% vs 4.2%). Transfusions were not required in either group. The average post-operative duration of hospital stay was 2 days in group 1 and group 2 was 3 days with P<0.001.

Conclusion: Tubeless PCNL is effective in patients with kidney stones and requires fewer analgesic drugs and shorter hospital stay, post-operative complications are almost the same in both groups with no significant difference.

Key words: PCNL, Standard, Tubeless, Complications

INTRODUCTION

Being one of the most prevalent and troublesome diseases, renal stone occurs with a prevalence of approximately 2–3% and characterized by a high rate of recurrence about 50%.¹ With reduced indications for open surgery, PCNL was introduced in 1985 revolutionizing the management of renal calculi, bearing numerous advantages including reduced scar, decreased post-operative pain, faster recovery, relatively shorter hospital stays and reduced rate of wound infections as well as stone clearance.^{2,3} One of the major concerns of patients after a standard PCNL is pain along nephrostomy tube. Thence, tubeless PCNL technique was employed which was associated with minimal complications as well.⁴ Tubeless PCNL has proven to be a safe as well as an effective improvisation of the conventional technique, which renders the patient at ease after surgery and also reduces the total stay at hospital. It expedites the course of recovery and the patient can continue their daily routine earlier.^{3,5}

MATERIALS AND METHODS

This is a randomized control trial conducted in the Urology Department, Lahore General Hospital, Lahore where 96 patients were equally divided into two groups; first underwent standard PCNL while the second underwent tubeless PCNL. Patients above 18 years with stone >2.5cm, recurrent stones and stones not responding to ESWL were included while those with PUJ obstruction, polycystic kidneys, uncontrolled bleeding, those with multiple tracts and pregnant women were excluded from the study. Stone was diagnosed with non-contrast CT. After an informed consent, all patients were operated under general anesthesia in prone position. The two groups were compared in terms of stone clearance, analgesia requirement, infection, perinephric urinary collection and post-operative hospital stay. Pain was analysed by VAS. The Data was recorded and analyzed in SPSS 23.0.

RESULTS

The demographic, clinical and the outcomes of surgery have been mentioned in Tables 1-2. 94(94%) patients had complete stone clearance, of which 95.8% (46) of group A patients and 93.7% (45) of group B patients had complete stone clearance. Drop in HB level was 0.82gm/L in Tubeless PCNL and 0.87gm/L in group B with p<0.001. Apart from requiring PCNL, 3 (3%) patients required left URSL, 5(5%) patients right URSL, ESWL was needed in 4 (4%) while a percutaneous nephrostomy was required in 1(1%)

patient. Likewise, in group A, left URSL was done in 1(2%) patient while right URSL in 2(4%) patients; 2(4%) patients required ESWL whereas PCN was done in 1(2%) patient. Similarly, in group B, left and right URSL was performed in 2(4%) and 3(6%) patients respectively, while ESWL was done in 2(4%) patients and no patient required PCN. The need for analgesia after surgery was higher in standard PCNL group than the tubeless group. In tubeless PCNL 30mg of analgesia was being used while in standard 90mg, which was statistically significant bearing a p-value of <0.001.

Table 1: The demographic and clinical data of patients and their associated complexities (n=96)

Variable	Tubeless PCNL	Standard PCNL
Age (in years)	15.5±11.29	14±12.61
Male female ratio	32:16	37:11
Serum creatinine		
<2	43	41
>2	5	7
Associated complexities		
Staghorn Calculi	37	41
Solitary Kidney	3	2
Malrotated kidney	3	3
Horse-shoe kidney	5	3

Table 2: The outcomes during and after surgery

Variable	Tubeless PCNL	Standard PCNL	p-value
Operative duration (minutes)	51	55	
Reduction in Hb (gm/L)	0.82 (0.98)	0.87 (1.50)	
Postoperative Pain			
Operative day	4.1	7.1	<0.001
Day 1	2.0	5.0	<0.001
Outcomes			
Analgesic Requirement	13	20	<0.001
Duration of foley catheter (hours)	30	45	<0.001
Hospital stay (days)	2 days	3days	<0.001
Stone clearance	46 (95.8%)	45 (93.7%)	0.844
Need for Ancillary Procedure	04	06	
ESWL, Ureteroscopy, PCNL	0	03	

DISCUSSION

The mean duration of surgery didn't have significant difference between the two treatment groups; the tubeless group with an

average of 51 minutes while standard PCNL group with 55 minutes. Due to minimal tissue trauma and requirement of analgesia post-operatively, shorter hospital stay and least requirement of blood transfusion, PCNL has become the recommended procedure for renal stones. In our study, clearance was said to occur when the residual fragments were <4mm; the success rate was higher in group 1 as compared to group 2 (96 vs 91%). No significant difference was observed in the reduction of hematocrit levels in either group (4.9% vs 4.2%). Transfusions were not required in either group as well. The average duration of stay at hospital post-operatively was 2 days in tubeless group while it was 3 days in the standard PCNL ($p < 0.001$). Upon examination in the morning the next day, the wounds were normal to mildly inflamed.^{7,8} In 1984, a few authors published their report of skipping the use of a nephrostomy tube after performing PCNL in eligible patients.^{2,9,10}

Despite being a cumbersome procedure in the initial days, the technique of PCNL has significantly improved leading to shorter operative time, reduced hospital stay and earlier return to routine daily life.⁶ A randomized controlled trial reported that PCNL is the safest and effective choice in patients with complex stone type.⁷

Tubeless was intervened in 48 patients age 7 to 43 years and performed even in patients having deranged renal parameters, staghorn calculi as well as in co-morbidities like diabetes Mellitus and hypertension. We compared the results of post-operative complications, analgesia and hospital stay in the two groups and found that PCNL were performed successfully in both groups without significant complications. 90% stone clearance was achieved in both groups with residual fragments <3mm in the remaining patients.

This tubeless technique of PCNL can reduce the rate of transfusion as well as other morbidities while at the same time reducing the rate of complications. In our study, the incision site was closed in the end using deep seated sutures which also helped tamponade any bleeding from the track. No cases of urinary leakage or bleeding were observed from the wound site. Similarly, the reduction in hematocrit levels was not statistically significant between the two groups. The analysis of our results has led us to believe that blood loss in the perioperative period is not related or dependent on the placement of a nephrostomy tube.

In post-operative period no collection of urine and urinoma was seen in either group on ultrasonography. The duration of hospitalization was longer in group B comparative to group A, 1.5 vs 3 days. Tubeless PCNL was done in patients with unilateral and bilateral kidney stones. In the tubeless PCNL group, 2-4% underwent right URS and 2-6% underwent left URS as ancillary procedures. Operative time was quite the same in either group. The residual stone was treated with ESWL and the rate was comparable in both the groups. Post-operative complications were lesser in tubeless PCNL when compared with standard PCNL. Complications were managed conservatively. Post-operative fever was observed in 16% of patients in the tubeless group and 29% in standard PCNL group.

Bearing in mind the reduction of pain and scar, duration of hospital stays and total cost postoperatively, total tubeless PCNL procedure (PCNL without DJ or a nephrostomy) has started to gain popularity in recent times. At the same time, only appropriate candidates should be considered for the total tubeless technique.^{8,11,12} We think that this technique should only be opted when patient safety is not sacrificed.

CONCLUSION

Tubeless PCNL is a relatively safe procedure, even for patients with co-morbidities like DM and HTN. Tubeless PCNL is effective in patients with bilateral kidney stones and requires fewer analgesic drugs and a shorter hospital stay; post-operative complications are almost the same in both groups with no significant difference. However, in select patients, the decision to use tubeless surgery must be made during surgery, on the operating table.

REFERENCES

1. Simon I, Roumeguère T, Devuyst F, Cotton F, Tang BN, Cappello M, et al. Recurrent episodes of brushite nephrolithiasis revealing primary hyperparathyroidism. *Rev Med Brux* 2015; 36(3):172-6.
2. Sheikh AH, Nabi N, El Khalid S. Safety and efficacy of tubeless percutaneous nephrolithotomy. *JPMA* 2007; 57(12).
3. Shah H, Khandkar A, Sodha H, Kharodawala S, Hegde S, Bansal M. Tubeless percutaneous nephrolithotomy: 3 years of experience with 454 patients. *BJU Int* 2009;104(8):40-46.
4. Agrawal MS, Sharma M, Agarwal K. Tubeless percutaneous nephrolithotomy using antegrade tether: a randomized study. *J Endourol* 2014; 28(6): 644-8.
5. Xun Y, Wang Q, Hu H, Lu Y, Zhang J, Qin B, Gengand Y, Wang S. Tubeless versus standard percutaneous nephrolithotomy: an update meta-analysis. *BioMed Central Urol* 2017 17:102.
6. Gupta R, Gupta A, Singh G, Suri A, Mohan SK, Gupta CL. PCNL - a comparative study in nonoperated and in previously operated (open nephrolithotomy/pyelolithotomy) patients a single surgeon experience. *Int Braz J Urol* 2011; 37:739-44.
7. Bhat S, Lal J, Paul F. A randomized controlled study comparing the standard, tubeless, and totally tubeless percutaneous nephrolithotomy procedures for renal stones from a tertiary care hospital. *Indian J Urol* 2017; 33(4): 310-14.
8. D'souza N, Verma A, Rai A. Laparoscopic-assisted mini percutaneous nephrolithotomy in the ectopic pelvic kidney: Outcomes with the laser dusting technique. *Urol Ann* 2016;8(1):87-90.
9. Dogan HS, Kilicarslan H, Kordan Y, Celen S, Oktay B. Percutaneous nephrolithotomy in children: does age matter?" *World J Urol* 2011; 29(6): 725-9.
10. Honeck P, Wendt-Nordahl G, Krombach P, Bach T, Häcker A, Alken P, et al. Does open stone surgery still play a role in the treatment of urolithiasis? Data of a primary urolithiasis center. *J Endourol* 2009;23(7):1209-12.
11. Nalbant I, Ozturk U, Sener NC, Dede O, Bayraktar AM, Imamoglu MA. The comparison of standard and tubeless percutaneous nephrolithotomy procedures. *Int Braz J Urol* 2012; 38, 795-801.
12. Samad L, Zaidi Z. Tubed vs tubeless PCNL in children. *J Pak Med Assoc* 2012; 62(9): 892-6.