



Original Article

Standard Versus Tubeless Percutaneous Nephrolithotomy in Tertiary Care Centre: A Randomized Control Trial

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ABSTRACT

Nephrolithiasis is a common health problem usually presenting as acute complication.

Objective: This study was aimed to know the comparative outcomes of the standard tube PCNL and tubeless PCNL in our population. **Methods:** It was a prospective randomized controlled study conducted in Lady Reading Hospital Peshawar; Urology Department consisting of 100 patients randomly selected who underwent percutaneous nephrolithotomy dividing into two groups; group 1 underwent through standard PCNL and group 2 underwent through tubeless PCNL. All the data were analyzed through SPSS version 20. Means and standard deviations of the quantitative variables and frequencies and percentages of the qualitative variables were determined. **Results:** There was no significant difference in the demographics of both the groups. The mean operation time, hospital stay in group 1 (standard PCNL) were 86.06 ± 7.20 and 6.46 ± 0.97 respectively while the mean of operation time, hospital stay in group 2 (tubeless PCNL) were 83.68 ± 3.81 and 3.42 ± 0.81 , respectively. The mean of visual analogue scale scores for pain in group 1 and group 2 were 6.24 ± 0.71 and 3.70 ± 0.81 , respectively. There as significant difference in the VAS score of both groups. Post operative complications were less seen in the tubeless PCNL. **Conclusions:** The tubeless PCNL is a safe technique having short operation time and statistically significant short hospital stay and low Visual Analogue Scale score for pain post operatively. Tubeless PCNL is associated with less post operative complications as compared to the standard PCNL.

INTRODUCTION

Nephrolithiasis is a common health problem usually presenting as acute emergency [1]. About 5% to 12% of the population faces renal colic in their lifetime [2]. The peak incidence of nephrolithiasis is in 4th to 6th decades [3]. About 80% of the renal stones are the calcium stones and 80% of all the calcium stones are the calcium oxalate stones [4]. The treatment of nephrolithiasis depends upon the cause of the stone formation. Symptomatic nephrolithiasis with evidence of obstruction should be surgically decompressed. There are many surgical

procedures used for the treatment of nephrolithiasis. Extracorporeal shock wave lithotripsy [5], Ureteroscopy [6], percutaneous ante grade ureteroscopy [7], Percutaneous Nephrolithotomy (PCNL) and open or laparoscopic surgical removal are the options used for the removal of the renal stone. Percutaneous nephrolithotomy is a minimally invasive procedure used for the large renal and proximal ureteric stones [8, 9]. This procedure was described by Fernstrom and Johansson in 1976 or renal calculi [10]. This procedure is also used after the failed

ESWL and ureterocopy. The two important approaches used in this procedure are the standard PCNL approach and the tubeless PCNL approach [11]. The nephrostomy tube is placed post operatively for drainage in the standard PCNL while in the Tubeless PCNL the nephrostomy tube is not placed for the drainage. The fibrin glue injections are used in the tubeless PCNL for sealing of the nephrostomy tract [12]. According to the meta analysis by Wang et al, it was shown that the tubeless PCNL have less post operative complication, less Hospital stay and less need of post-operative analgesia [13]. Going through the literature search it was observed that both procedures are commonly practiced all over the world. This study was aimed to know the comparative outcomes of the standard tube PCNL and Tubeless PCNL in our population.

METHODS

This was a prospective randomized controlled study conducted at Lady Reading hospital Peshawar, Pakistan, Urology Department from March 2019 to May 2020. Total 100 patients were included and divided into two groups randomly. Group 1 underwent standard PCNL technique while the group 2 underwent tubeless PCNL. Patients with age 18-60 years old with stone size less than 3 cm, with no residual stones post operatively confirmed on fluoroscopy, with single puncture tract, were included in the study while patients with deranged coagulation profile, single kidney, deranged renal functions test, unfit for anesthesia, and bilateral renal calculi were excluded. Permission from hospital ethical committee and informed written consent was taken from all the included patients. All the patients included in the study had a detailed history, clinical examination and routine investigations used pre operatively. Computed tomography scan was used to determine the location and size of the stones. Pre-anesthetic assessment was done by anesthesiologist. Patient meeting the inclusion criteria were randomly selected and group 1 underwent standard PCNL and group 2 underwent tubeless PCNL. All the procedures were done by a single Urologist having experience of 10 years. All the demographical data age, gender, side of the stone (Right or Left), size of the stone, operation time, pain scores (Visual Analog Scale) hospital stay and complications post operatively were recorded in the pre-designed questionnaire. All the data was analyzed in the SPSS version 20. Mean and standard deviation for quantitative variables were calculated. Frequency and percentage were calculated for qualitative variables. Chi square test and t test were applied for categorical and continuous variables respectively keeping the p value ≤ 0.05 as a significant.

RESULTS

The mean age of group 1 patients who underwent standard

PCNL was 39.12 ± 11.70 while the mean age of group 2 patients who underwent Tubeless PCNL was 36.68 ± 12 . The frequencies and percentages of the age group 31-50 years was more in both the groups. Group 1 had 64% patients from the age group 31-50 years and group 2 had 72% patients from the age group 31-50 years. Patients who underwent standard PCNL were 52% females and 48% were males. While in Tubeless PCNL 60% were females and 40% were males. Sixty percent of the stones were on right side of the body in group 1 and 50% were on right side in group 2. The mean of the size of the stones in group 1 was 2.1300 ± 0.38 and group 2 was 2.25 ± 0.33 which were not statistically significant. The mean operation time of group 1 was 86.06 ± 7.20 and group 2 was 83.68 ± 3.81 . Although the operation time of tubeless PCNL was short as compared to the standard PCNL but it was not statistically significant. Visual Analogue Scale (VAS) for pain assessment was used on second post operative day. The mean of VAS of group 1 was 6.24 ± 0.71 and group 2 was 3.70 ± 0.81 . The VAS difference in groups was statistically significant (Table 1).

Visual Pain Analogue Score	Mean \pm SD	Sig
Group 1	6.24 ± 0.71	0.001
Group 2	3.70 ± 0.81	

Table 1: Visual Analogue scale for pain assessment

The mean of hospital stay in group 1 patients was 6.46 ± 0.97 days and in group 2 were 3.42 ± 0.81 days. The hospital stays in the patients underwent standard PCNL was significantly more as compared to the tubeless PCNL (Table 2).

Hospital Stay	Group 1	Group 2	Sig
	Mean \pm SD	Mean \pm SD	
	6.46 ± 0.97	3.42 ± 0.81	0.001

Table 2: Post-operative hospital stay

Post-operative complications were more in the standard PCNL. 22 out of 50 patients had no complications in the standard PCNL while in the tubeless PCNL 36 out of 50 patients had no complications post operatively. Fever was the most common complication developed in both the patients. 9 patients developed fever in patient with standard PCNL and 4 patients developed fever post operatively in tubeless PCNL. Urinary leak was seen in 8 patients in the standard PCNL while 2 patients had urinary leak in tubeless PCNL. PCNL site infection was seen more in the standard PCNL. 7 patients had PCNL site infection the standard technique while in the tubeless PCNL it was seen only in 4 patients. Hematoma was seen in 2 patients with tubeless PCNL while in standard PCNL only 1 patient developed hematoma (Table 3).

Post-operative complications	Group 1 (Standard PCNL) (n)	Group 2 (Tubeless PCNL) (n)
No complications	22	36
Fever	9	4

Hematoma	1	2
PCNL site infection	7	4
UTI	3	2
Urinary Leak	8	2
Total	50	50

Table 3: Post-operative complications

DISCUSSION

PCNL is a modern advance technique used for the removal of the renal or proximal ureter stones of size more than 2 cm. Different techniques of PCNL are introduced with time and experience. Every technique has some advantages and disadvantages. One technique is the standard technique and other is the tubeless technique where nephrostomy tube is not placed post operatively so the chances of infections decrease [14, 15]. Wickham introduced the tubeless PCNL in 1984 [16] which is practiced nowadays due to few post operative complications and short hospital stay for the patients. In our study we evaluated the demographics of the patients like age, gender, side of the stone and size of the stones in both the groups. Group 1 underwent through the standard PCNL and group 2 underwent tubeless PCNL. The demographics of both the groups were not statistically significant. According to other authors the demographics of the patients were not statistically significant in both the standard and tubeless PCNL [17 – 20]. The operation time for a surgery is very important and it has some advantages if the procedure is done in short time and significant difference is there in both procedures. In our study the operation time for the standard PCNL was 86.06 ± 7.20 and tubeless PCNL was 83.68 ± 3.81 (Table 6). There was no significant difference in both the groups. Many of the authors found no significant differences between these two techniques but Singh et al found the significant difference between the two procedure [21]. The duration of surgery in the tubeless PCNL was shorter as compared to the standard in our study and most of the studies have shown the same result [22, 23]. Visual Analogue Scale (VAS) scoring was used in our study for pain assessment. The mean of VAS was 6.24 ± 0.71 in the standard and was 3.70 ± 0.81 tubeless PCNL and significant difference was found in both groups of the patients. The tubeless PCNL is less painful according to our results. Many authors have shown the same results [24, 25]. The post-operative stay in hospital was shorter in the tubeless PCNL in our study (Table 3) and was statistically significant. According to other authors the hospital stay in the tubeless PCNL was shorter as compared to the standard PCNL [26, 27]. The post-operative complications are associated with both standard and tubeless PCNL. But standard PCNL had more complications developed as compared to the tubeless PCNL. Fever was the most common complication in both the techniques but it was more associated with the

standard PCNL. Similarly, urinary leakage was seen more in the standard PCNL (Table 3). In a Meta-Analysis by Borges et al the fever was not statistically significant in a trial of six studies [28].

CONCLUSIONS

On the basis of results of our study it is concluded that the tubeless PCNL is a safe technique having short operation time and statistically significant short hospital stay and low Visual Analogue Scale score for pain post operatively. Tubeless PCNL is associated with less post operative complications as compared to the standard PCNL.

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