

**Original Article**

**Outcome of percutaneous nephrolithotomy in patients with history of open renal surgery - a comparative study with PCNL in primary patients**

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**Abstract**

Percutaneous nephrolithotomy (PCNL) in patients operated previously for renal stone are thought to pose some difficulties. This study was carried out to compare the outcome of PCNL in patients who had undergone open surgery for renal stone with the outcome in primary patients. This descriptive cross sectional study was conducted in the Department of Urology, Bangabandhu Sheikh Mujib Medical University, Dhaka during the period of Nov 2012 to Oct 2013. Sixty patients with renal stone admitted in urology department were selected of which 30 cases were with recurrent stone having previous open renal stone surgery (group I - study group) and another 30 were primary patients without previous surgery for renal stone disease (group II - control). After PCNL all the patients were followed at one week, one month and three months after procedure. Mean ages of Group I and Group II were  $40.90 \pm 6.08$  years and  $44.10 \pm 9.91$  years respectively. Mean stone size of the respondents in Group I was  $2.98 \pm 0.65$  cm and in Group II was  $3.03 \pm 0.67$  cm. Mean operation time of the respondents in Group I and Group II were  $1.50 \pm 0.46$  and  $1.52 \pm 0.33$  hours respectively.

Mean post-operative hospital stay of the respondents in Group I was  $3.87 \pm 1.13$  days and Group II was  $3.67 \pm 0.60$  days. Stone was cleared from 29 (96.7%) patients in Group I and 28 (93.3%) patients in Group II. Mean drop of Haemoglobin level were  $0.85 \pm 0.55$  mg/dl and  $0.94 \pm 0.52$  gm/dl in group I and group II respectively. It was evident from the study that previous open stone surgery does not alter the outcome of subsequent PCNL.

**Keywords:** Renal stone, PCNL, open renal surgery

**Introduction**

The management of renal calculi with percutaneous modalities entered the medical practice in the late 1970s.<sup>1</sup> Today percutaneous nephrolithotomy (PCNL) is the management of choice for stones larger than 1.5 cm or for staghorn calculi. Nephrolithiasis is a common disease affecting the population with a peak incidence around third to fourth decade of life.<sup>2</sup> History of previous stone disease increases the probability of a second stone within five to seven years to approximately 50%.<sup>3</sup> In advanced countries PCNL has almost completely replaced open surgical procedures for removal of large or complex renal calculi. In Bangladesh, many surgeons are practicing open stone surgery in different centers where facilities and expertise for PCNL are not available; therefore the recurrent stone following open surgery are not uncommon. In general, when performing surgery in a previously operated anatomical region, the surgeon may face technical difficulties that may lead to a longer operating time, higher complications rate and possibly a lower success rate. This may be true for PCNL also.

Access to the collecting system and removal of the stone are the main parts of the PCNL. Previous open stone surgery may pose challenges for subsequent PCNL, such as prolong operative time, higher complication rate and lower success rate because of retroperitoneal scar and the distorted anatomy of the pelvicaliceal system. This study was carried out to have experience of PCNL in patients who were treated previously with open stone surgery and to compare the outcome of PCNL in primary stone. Surgeons are facing such kind of problem increasingly & there is no such study in Bangladesh.

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## Methods

This descriptive cross sectional study was conducted in the Department of Urology, BSMMU, Dhaka during the period of Nov 2012 to Oct 2013 for a period of one year. Sixty patients with renal stone (age between 18-65, any sex, stone larger than 1.5cm, staghorn/multiple calculi) admitted in Urology Department, BSMMU were selected of which 30 cases were with recurrent stone having previous open renal stone surgery (study group - group I) and another 30 were primary patients without previous surgery for renal stone disease (group II - control).

Stone size, shape, position, anatomy of the collecting system and renal function were evaluated by using ultrasonogram, IVU and CT scan before PCNL and recorded. Single tract access was used with an additional tract when needed to facilitate complete stone clearance. The percutaneous access was created with the patient in the prone position under fluoroscopic guidance.

Stones were fragmented by pneumatic lithotripter & were removed by forceps and small fragments by flushing with normal saline. At the end of the procedure, the collecting system was examined by direct nephroscopy and fluoroscopy for any retained stone fragments and any procedural complication. Post operative stone clearance was documented by X-Ray KUB at the time of discharge. Patients were discharged on the 3<sup>rd</sup> postoperative day if there was no complication. Follow up was done 1 week after the procedure, then after 1 month and 3 months. In each follow up, clinical examination, urine RME and C/S and plain X- ray of KUB were performed. Failure defined as a retained stone >4 mm.

Complications like abdominal distention, haematuria, urinary leakage were evaluated by plain x-ray of abdomen, urine RME and ultrasonogram. For evaluating suspected pulmonary complications, especially in case of supracostal puncture, postoperative chest X-ray was done; complications were managed by conservatively or by surgical approach where appropriate.

## Result

In our study, study group was mentioned as group I and control group was mentioned as group II. In both the groups, male were predominant than female; 80.0% vs. 20.0% & 73.3% 26.7% respectively. The difference between these two groups was not statistically significant. Mean( $\pm$ SD) age of Group I was 40.90  $\pm$  6.08 years and mean( $\pm$ SD) age of Group II was 44.10  $\pm$  9.91 years. There was no statistically significant difference between the groups. (Table-I)

**Table-I:** Distribution of the patients by gender in groups

	Group		P value
	Group I	Group II	
Gender			
Male	24 (80.0)	22 (73.3)	0.542
Female	06 (20.0)	08 (26.7)	
Age (Mean $\pm$ SD)	40.90 $\pm$ 6.08	44.10 $\pm$ 9.91	0.137

Among the respondents in Group I, location of stone in Pelvis + Upper calyx + Middle calyx + Lower calyx, Pelvis+Upper calyx, Pelvis+Middle calyx and Pelvis+Lower calyx were 08 (26.7%), 07 (23.3%), 09 (30.0%) and 06 (20.0%) respectively. Among the respondents in Group II, location of stone in Pelvis + Upper calyx + Middle calyx + Lower calyx, Pelvis+Upper calyx, Pelvis+Middle calyx and Pelvis+Lower calyx were 06 (20.0%), 12 (40.0%), 07 (23.3%) and 05 (16.7%) respectively. In group I, single stone was in 8 (26.7%) patients and multiple stones were in 22 (73.3%) patients. In group II, single stone was in 9 (30.0%) patients and multiple stones were in 21 (70.0%) patients. Mean stone size of the respondents in Group I and Group II were 2.98 $\pm$ 0.65 cm and 3.03 $\pm$ 0.67 cm respectively. There were no statistically significant differences in location of stone, number of stone and stone size between the groups. (Table-II).

**Table-II:** Comparison of location, number and size of stone in groups

Location of stone	Groups		P value
	Group I	Group II	
Pelvis + Upper calyx + Middle calyx + Lower calyx	08 (26.7)	06 (20.0)	
Pelvis + Upper calyx	07 (23.3)	12 (40.0)	
Pelvis + Middle calyx	09 (30.0)		
Pelvis + Lower calyx	06 (20.0)		
Number of stone			
Single	08 (26.7)	09 (30.0)	07 (23.3)
Multiple	22 (73.3)	21 (70.0)	05 (16.7)
Stone size (cm) (measured by X-ray)	2.98 $\pm$ 0.65	3.03 $\pm$ 0.67	

Blood transfusion required for 12 (40.0%) and 9 (30.0%) patients in group I and group II respectively. Mean operation time needed in Group I and Group II patients were 1.50  $\pm$  0.46 hours and 1.52  $\pm$  0.33 hours respectively. Mean post operative hospital stay was 3.87  $\pm$  1.13 days and 3.67  $\pm$  0.60 days in group I and group II respectively. Mean time of nephrostomy tube removal was 1.11  $\pm$  0.35 days and

1.09 ± 0.28 days in group I and group II respectively. Mean drop of Hb level were 0.85 ± 0.55 mg/dl and 0.94 ± 0.52 gm/dl in group I and group II respectively. There were no statistically significant differences in preoperative blood transfusion, operative time, postoperative hospital stay, time of nephrostomy tube removal and drop of Hb level between the groups. (Table-III)

**Table III:** Per operative and post-operative information of both groups

	Groups		P value
	Group I	Group II	
Per operative blood transfusion	12 (40.0)	9 (30.0)	0.417
Operation time (hour)	1.50 ± 0.46	1.52 ± 0.33	0.811
Post operative Hospital stay (day)	3.87 ± 1.13	3.67 ± 0.60	0.399
Nephrostomy tube remove (day)	1.11 ± 0.35	1.09 ± 0.28	0.765
Drop of Hb level (gm/dl)	0.85 ± 0.55	0.94 ± 0.52	0.504

Stone was not cleared only in 1 (03.3%) patient in group I and 2 (6.7%) patients in group II. There was no statistically significant difference in stone clearance between the groups. (Table-IV)

**Table-IV:** Distribution of patients by stone clearance in groups

Stone clearance	Groups		P value
	Group I	Group II	
Stone cleared	29 (96.7)	28 (93.3)	
Not cleared	01 (03.3)	02 (06.7)	
Total	30 (100.0)	30 (100.0)	0.554

**Discussion**

The indications for open renal surgery to treat renal calculi are limited to special situations; it is needed in only 0.47% to 5.4% of the time. Over time, renal stone management has undergone a dramatic change, from the era of open pyelolithotomy to the first percutaneous lithotomy (PCNL) in 1976.<sup>4,5</sup>

Mean stone size among the respondents in Group I and Group II were 2.98 ± 0.65 and 3.03 ± 0.67 cm respectively.

Study of Khan et al showed the mean stone size was 2.7cm with a range of 1.5 to 3.5cm.<sup>6</sup> Gupta et al. in their study reported that blood transfusion rate was comparable in the two groups which was similar to our study (40.0% vs 30.0%).<sup>4</sup>

Mean operative time of the respondents in Group I and Group II were 1.50 ± 0.46 hours and 1.52 ± 0.33 hours respectively. Falahatkar et al in a study showed that the mean operating time was 75.41±17.2 minutes in the group of previous surgery and 67.42±26.25 minutes in the group of no previous surgery.<sup>7</sup> Gupta et al in a study reported that the mean operative time was longer in the group of previous surgery (88.4 min vs 80.2 min), but it was not statistically significant (p = 0.44).<sup>8</sup> Kurtulus et al. in a similar study no significant difference was found in terms of operative time (2.3 v 2.2 hours) (p> 0.05).<sup>9</sup>

Average drop in hemoglobin level was comparable in both groups (0.85vs0.94 g/dl). Falahatkar et al in a study showed that the mean postoperative hospital stay was 85.88±17.25 hours and 80.20±17.71 hours in the group of previous surgery and in the group of no previous surgery, respectively that results were similar to our result.<sup>7</sup> Gupta et al reported that the hospital stay was similar in both groups.<sup>8</sup> Kurtulus et al in a similar study found no significant difference in hospitalization time (4.4 v 4.2 days).<sup>9</sup> Complete stone clearance was achieved in 96.7% of patients in the study group and 93.3% patients in the control group. Similar result was seen in studies of Shah et al<sup>10</sup> and Falahatkar et al.<sup>7</sup>

Khan et al, Falahatkar et al, Gupta et al and Resorlu et al in their studies reported that previous open stone surgery does not alter the outcome of subsequent PCNL significantly.<sup>6,7,8,11</sup>

In the present study it was found that there is no difference in outcome of PCNL between the two groups based on the previous open renal surgery and primary patients without previous renal surgery. Previous open stone surgery does not alter the outcome of subsequent PCNL.

**References**

1. Fernstrom I, Johannson B. Percutaneous pyelolithotomy. A new extraction technique. Scand J Urol Nephrol. 1976;10: 257.
2. Aboumarzouk OM, Somani BK, Monga M. Flexible Ureteroscopy and Holmium:YAG Laser Lithotripsy for Stone Disease in Patients with Bleeding Diathesis: a Systematic Review of the Literature. Int Braz J Urol. 2012; 38 (3): 298-306.

3. Asplin JR, Favus MJ, Coe FL. Nephrolithiasis. In: Brenner BM, editor. Brenner and Rector's the kidney. 5th ed. Philadelphia: Saunders; 1996. pp.1893-1935.
4. 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(6):739-44.
5. Huang Z, Fu F, Zhong Z, Zhang L, Xu R. Chinese Minimally invasive percutaneous nephrolithotomy for intrarenal stones in patients with Solitary Kidney: A single-center experience. *PLOS ONE.* 2012;7: 40577.
6. Khan S, Toori LA, Anwer K. Efficacy of Percutaneous Nephrolithotomy in renal and upper ureteric calculi. *Pakistan J Med Res.* 2005 ; 44(2):89 -91.
7. Falahatkar S, Panahandeh Z, Ashoori E, Akbarpour M, Khaki N. What Is the Difference Between Percutaneous Nephrolithotomy in Patients with and without Previous Open Renal Surgery? *Journal of Endourology.* 2009;23(7): 1107-1110.
8. Gupta NP, Mishra S, Nayyar R, Seth A, Anand A. 2009. Comparative analysis of percutaneous nephrolithotomy in patients with and without a history of open stone surgery: single center experience. *J Endourol.* 2009;23(6):913-6.
9. Kurtulus FO, Fazlioglu A, Tandogdu Z, Aydin M, Karaca S, Cek M. Percutaneous nephrolithotomy: primary patients versus patients with history of open renal surgery. *J Endourol.* 2008;22(12):2671-5.
10. Shah HN, Mahajan AP, Hegde SS, Bansal M. Tubeless percutaneous nephrolithotomy in patients with previous ipsilateral open renal surgery: a feasibility study with review of literature. *J Endourol.* 2008;22(1):19-24.
11. Resorlu B, Kara C, Senocak C, Cicekbilek I, Unsal A. Effect of previous open renal surgery and failed extracorporeal shockwave lithotripsy on the performance and outcomes of percutaneous nephrolithotomy. *J Endourol.* 2010; 24(1):13-6.