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Outcomes of Percutaneous Nephrolithotomy in Patients with Previous Ipsilateral Open Renal Stone Surgery

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ABSTRACT

Background: Nephrolithiais is a recurrent disease. Recent advances have enabled stone surgeries to be performed by minimal invasive techniques; but still a large number of patients present with history of ipsilateral open renal stone surgery. Previous scar to the kidney and overlying muscles are fraught with possibility of increased complications. This study was conducted to evaluate the perioperative results of percutaneous nephrolithotomy in patients with a history of open stone surgery and to compare with those undergoing percutaneous nephrolithotomy for the first time.

Methods: A retrospective study of all the percutaneous nephrolithotomy performed by standard technique within four years at Bir Hospital was made. Patients were divided into those undergoing percutaneous nephrolithotomy for the first time and those who had undergone open renal stone surgery in the past. Preoperative and intraoperative variables were recorded and postoperative stone free status and complications were evaluated.

Results: Six hundred and twenty seven patients; out of 691, who had undergone percutaneous nephrolithotomy were included. Demographic variables and stone characteristics were similar in the two study groups. percutaneous nephrolithotomy was found to be statistically similar in the two groups in terms of the number of tracts made (p= 0.1642) and operative time (0.9197). Exit strategies were similar in both groups. Stone free rate was 83.33% in patients undergoing percutaneous nephrolithotomy for first time and 82.08% in those with history of open surgery. Average hospital stay was 3 days in both groups. Although the group with history of previous surgery had significantly more complications (p= 0.0207), Clavien grading was similar in the two groups.

Conclusions: This study shows that the rate of complications is more in patients with history of open surgery, most complications are minor, not requiring intensive management. percutaneous nephrolithotomy is efficient and safe in patients with history of open renal stone surgery.

Keywords: Complications; open renal stone surgery; percutaneous nephrolithotomy

INTRODUCTION

The incidence of nephrolithiasis is 1%[1,2] and several studies have shown increase in prevalence of urolithiasis;[3-5] which could be actual increase in stone disease, or from increased detection of asymptomatic stones with greater use and higher sensitivity of imaging studies.[3] Recurrence of stones have been reported to be 50% within 5 to 10 years of the initial stone event.[6,7] Factors responsible for increased recurrence include family history, non obstructing stone on imaging, and uric acid stone composition.[8] Residual stones after previous surgery or growth of clinically insignificant residual stones are also responsible.

Although percutaneous nephrolithotomy (PCNL) was introduced in 1976, open surgery is still prevalent[9,10] or have been added in armamentarium only recently, thus increasing the chances of PCNL in patients who have previously undergone open surgery. We have aimed to compare the the perioperative results between patients undergoing PCNL for first time with patients with history of open renal stone surgery.

METHODS

After ethical clearance for the study from the institutional review board, a retrospective observational study of all patients who underwent PCNL at Bir hospital was done from April 2015 to March 2019. Informed consents for the study were taken from all patients.

All patients were assessed preoperatively and demographic parameters were recorded. In addition to routine preoperative investigations; CT urography, along with stone density measured in unenhanced film, were done for all the patients. PCNL were done

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under general or spinal anaesthesia . All PCNL done in prone position, transpapillary puncture made under fluoroscopic guidance using 18 gauze two-part needle after retrograde opacification of the pelvicaliceal system via 6 French ureteral catheter were only included in the study. The tract dilatation and number were either by single shot technique or serial telescopic dilatation and single or multiple tracts respectively. Nephroscopy were done with a 21 Fr rigid nephroscope. Large stones were fragmented with laser or pneumatic lithotripter. Small stones and fragments were removed either by continuous normal saline irrigation using an irrigating pump or removed with forceps. The exit strategy were total tubeless, tubeless or standard. Intraoperative variables included number of the tracts, exit strategy and operative time measured from the initiation of initial puncture to exit.

Postoperatively, patients were managed with intravenous fluids, antibiotics, and analgesics, and discharged when clinically stable. The patients were routinely followed up until 4 weeks of operation. Any complications during this period were categorized according to the modified Clavien classification score for PCNL.[11] In cases when patients had more than one complication, only the highest Clavien score were included. Stone clearance was assessed by plain x-ray of kidney, ureter and bladder region (KUB) at two weeks and again at four weeks for those who had residual stones at two weeks. Final analysis was done for patients fulfilling all the inclusion criteria.

RESULTS

During the study period, a total of 691 PCNL were performed by three consultant urologists. Six hundred and twenty seven patients fulfilled the inclusion criteria and 64 patients had to be excluded due to various reasons as shown in table 1. Among the study cohort, 106 (16.91%) had a history of ipsilateral open surgery for nephrolithiasis. Table 2 summarizes the characteristics of the two study population, which were comparable.

Table 1. PCNL performed during the study period.

Total	691
Fulfilling the inclusion criteria	627
Excluded	64
- Age below 14 years	18
- No preoperative CT scan available	12
- Bilateral procedures	3
- Supine position	13
- Conversion to open procedures	2
- Concurrent ureteral calculus treatment	8
- Lost to follow up within 4 weeks	8
Primary PCNL	521
History of ipsilateral open renal stone surgery	106 (16.91%)

More than one tract was needed in 16.12% and 21.70% patients respectively in the group without and with previous open surgery. In both the groups, the number of tracts ranged from one to three. The total time in the first group ranged from 15 to 75 minutes and 20 to 120 minutes in the second group. Similarly, on comparing the exit strategy, the results of the two groups were similar. Total length of hospital stay was also similar in both the groups. The stone free rate in our study population was 83.09%, with 83.33 % of primary PCNL patients and 82.08% of patients with history of open surgery.

Table 2. Characteristics of study population.

Variables	Primary PCNL 521 (83.09 %)	History of open surgery 106 (16.91%)	Significance P
Age (Mean ± SD)	37.34 ± 13.40	38.75±16.82	0.3460
BMI (Mean ± SD)	25.38 ± 14.92	25.23 ± 15.14	0.9250
Gender			
Male (%)	297 (57.00%)	56 (52.83%)	0.4305
Female (%)	224 (43.00%)	50 (47.17%)	0.4305
Lateraliaty			
Left (%)	271 (52.01%)	47 (44.34%)	0.1502
Right (%)	250 (47.99%)	59 (55.66%)	0.1502
Stone Burden in mm2 (Mean ± SD)	312.52±237.09	341.35±255.74	0.2607
Number of calyces involved (Mean ± SD)	1.69 ± 0.82	1.57 ± 0.73	0.2138
Stone Density (HU) (Mean ± SD)	1046.27 ± 242.77	1081.36 ± 172.51	0.1626
Solitary Stones (%)	401 (76.97%)	80 (75.47%)	0.7393
Full Staghorn (%)	39 (7.49%)	8 (7.55%)	0.9830
Partial Staghorn (%)	141 (27.06%)	27 (25.47%)	0.7364

Table 3. Perioperative Outcome.

Variables	Primary PCNL 521 (83.09 %)	History of open surgery 106 (16.91%)	Significance P
Multiple tracts (%)	84 (16.12%)	23 (21.70%)	0.1642
Operative time (min)	45.57 ± 19.95	45.35 ± 22.91	0.9197
Exit strategy			
DJ + NT	87 (16.70%)	11 (10.38%)	0.1027
DJ	287 (55.09%)	61 (57.55%)	0.6425
NT	14 (2.69%)	5 (4.72%)	0.2670
TT	133 (25.33%)	29 (27.36%)	0.6950
Hospital Stay	3.29±1.21	3.48±1.05	0.1328
Stone free	434 (83.33%)	87 (82.08%)	0.7543
Complications	143 (27.45%)	41 (38.68%)	0.0207

Table 4. Description of Clavien grading of complications.

Variables	Primary PCNL 143	History of open surgery 41	Significance P
Clavien 1	82 (57.34%)	22 (53.66%)	0.6760
Clavien 2	30 (20.98%)	10 (24.39%)	0.6416
Clavien 3a	28 (19.58%)	7 (17.07%)	0.7188
Clavien 3b	3 (2.10%)	2 (4.90%)	0.3329
Clavien 4a	-	-	-
Clavien 4b	-	-	-
Clavien 5	-	-	-

The only statistically significant difference was found in the frequency of complications. The total complication rate was 29.34 %; with 38.68 % in the previously operated group and 27.45 % in the primary group, which was statistically significant (p=0.0207). In both the groups, the highest numbers of complications were postoperative fever, managed with observation alone (Clavien 1). The patients with complications were again taken as separate cohort and analyzed, as shown in table 4. No statistically significant difference in the Clavien score was noted in the two groups.

DISCUSSION

Although only few studies have been conducted on this topic, authors have debated on the safety of PCNL in previously operated population. While most studies have found them to have equal efficacy[12-23], others have shown higher failure rates.[24,25] In our study, we have found that previous open renal surgery does not significantly affect the intraoperative and postoperative results.

Nylon suturing used in previous open renal surgery, retroperitoneal scars around the kidney, and anatomical modifications in the kidney may adversely affect introduction of access needle and prevent proper dilatation of the tract in subsequent PCNL procedures,[18,21,26] thus increasing the number of tracts and total operative time. In our study, the number of tracts and operative time were statistically similar in both the groups. Several authors[17,18,23] have also reported no difference in the number of tracts. While most[14,15,17-23] have found similar operative times in the two groups, others[12,16,21,27] have reported significantly longer operative time in previously operated patients.

Difference in exit strategy has not been found to be significantly different in available literature[18,28] We had total tubeless in 25.53 % in primary PCNL group and 27.36 % in those with previous surgery. Similarly 55.09% and 57.55%; 2.69 % and 4.72 %; 16.70% and 10.38% respectively had only double J stent, only nephrostomy tube or both at exit.

Mean hospital stay has been reported to be similar in between the two groups in most of the studies.[13,14,16-19,21-23,29] We had a mean hospital stay of 3.29 days and 3.48 days respectively in the two groups, which was statistically not significant. We had a stone free rate of 83.09 %; with 83.33 % and 82.08 % respectively in the two study populations. Other studies[13-15,17,18,21,26] have also found statistically similar results in the two groups.

The only statistically significant outcome in our study was the total complication rates. We had a total complication rate of 29.34%; with 27.45 % in primary PCNL group and 38.68 % in group with previous open surgery. In contrast, most authors[13-15,17-19,23,27,29] have not reported a statistically difference in complication rates. The most frequent complication in both the groups were clinically insignificant postoperative fever - 20.73 % and 23.58 % in the two groups. Falahatkar[19] had reported 26.5 % and 33.3 % respectively. All the complications were Clavien 1 to 3b. No statistically significant difference was found among the two groups when individual Clavien scores were analyzed.

Ten patients had bleeding complications, out of which one each in both groups required only transfusion, bladder clot evacuation were required in two patients in both the groups, and three patients in the primary group and one in the previously operated group required angioembolisation. Available literatures have been inconsistent in their outcome with reports of equal transfusion rates[13,17,18,28] or increased transfusion rates[16] in previously operated patients and also increased rate of angioembolisation.[30]

CONCLUSIONS

PCNL is effective and safe in patients who have history of ipsilateral open renal stone surgery when compared to those undergoing PCNL for first time. Although rate of complications are more with patients with history of ipsilateral open renal stone surgery, higher grade of complications are few.

REFERENCES

1. Ramello A, Vitale C, Marangella M. Epidemiology of nephrolithiasis. J Nephrol. 2000;13 Suppl 3:S45–S50. [PubMed]
2. Bartoletti R, Cai T, Mondaini N, Melone F, Travaglini F, Carini M, et al. Epidemiology and risk factors in urolithiasis. Urologia Internationalis. 2007;79(Suppl. 1):3-7.[PubMed]
3. Curhan GC. Epidemiology of stone disease. Urol Clin North Am. 2007;34(3):287-293.[PubMed]
4. Romero V, Akpinar H, Assimos DG. Kidney stones: a global picture of prevalence, incidence, and associated risk factors. Rev Urol. 2010;12:e86–e96.[PubMed]
5. Routh JC, Graham DA, Nelson CP. Epidemiological trends in pediatric urolithiasis at United States freestanding pediatric hospitals. J Urol. 2010;184:1100–1104. [PubMed]
6. Ljunghall S, Danielson BG. A prospective study of renal stone recurrences. Br J Urol. 1984;56(2):122-124. [PubMed]
7. Trinchieri A, Ostini F, Nespoli R, Rovera F, Montanari E, Zanetti G. A prospective study of recurrence rate and risk factors for recurrence after a first renal stone. J Urol. 1999;162(1):27-30.[PubMed]
8. Rule AD, Lieske JC, Li X, Melton LJ, Krambeck AE, Bergstralh EJ. The ROKS nomogram for predicting a second symptomatic stone episode. J Am Soc Nephrol. 2014;25(12):2878-86.[PubMed]
9. Rizvi SA, Sajid Sultan HI, Mirza ZN, Ahmed B, Saulat S, Umar SA, et al. Open surgical management of pediatric urolithiasis: a developing country perspective. Indian J Urol. 2010;26(4):573.[PubMed]
10. Borofsky MS, Lingeman JE. The role of open and laparoscopic stone surgery in the modern era of endourology. Nat Rev Urol. 2015;12:392–400.[PubMed]
11. De La Rosette JJ, Opondo D, Daels FP, Giusti G, Serrano A, Kandasami SV, et al. Categorisation of complications and validation of the Clavien score for percutaneous nephrolithotomy. Eur Urol. 2012;62(2):246-55.[PubMed]
12. Netto Junior N, Lemos GC, Fiuza JL. Percutaneous nephrolithotomy in patients with previous renal surgery. Eur Urol. 1988;14:353–5.[PubMed]
13. Basiri A, Karrami H, Moghaddam SM, Shadpour P. Percutaneous nephrolithotomy in patients with or without a history of open nephrolithotomy. J Endourol. 2003;17(4):213-6.[PubMed]
14. Lojanapiwat B. Previous open nephrolithotomy: does it affect percutaneous nephrolithotomy techniques and outcome. J Endourol. 2006;20:17–20.[PubMed]
15. Sofikerim M, Demirci D, Gülmez I, Karacagil M. Does previous open nephrolithotomy affect the outcome of percutaneous nephrolithotomy?. J Endourol. 2007;21(4):401-3.[PubMed]
16. Tugcu V, Su FE, Kalfazade N, Sahin S, Ozbay B, Tasci AI. Percutaneous nephrolithotomy (PCNL) in patients with previous open stone surgery. Int Urol Nephro. 2008;40(4):881-4.[PubMed]
17. 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):2671-6.[PubMed]
18. 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?. J Endourol. 2009;23(7):1107-10. [PubMed]
19. 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.[PubMed]
20. 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.[PubMed]
21. Khorrami M, Hadi M, Sichani MM, Nourimahdavi K, Yazdani M, Alizadeh F, et al. Percutaneous nephrolithotomy success rate and complications in patients with previous open stone surgery. Urol J. 2014;11(3):1557-62.[PubMed]
22. Aldaqadossi HA, Kotb Y, Mohi K. Efficacy and safety of percutaneous nephrolithotomy in children with previous renal stone operations. J Endourol. 2015;29:878–82. [PubMed]
23. Telli O, Haciyev P, Karimov S, Sarici H, Karakan T, Ozgur BC, et al. Does previous stone treatment in children generate a disadvantage or just the opposite?. Urolithiasis.

201543(2):141-5.[PubMed]

24. Viville C. Percutaneous nephrolithotomy: Personal experience in 100 cases (Fre). J Urol (Paris). 1987;93:253–258.[PubMed]

25. Atmoko W, Birowo P, Rasyid N. Factors affecting stone free rate of primary percutaneous nephrolithotomy on staghorn calculi: a single center experience of 15 years. F1000Research. 2016;5:2106.[PubMed]

26. Hu H, LuY, Cui L, Zhang J, Zhao Z, Qin B, et al. Impact of previous open renal surgery on the outcomes of subsequent percutaneous nephrolithotomy: a meta-analysis. BMJ Open. 2016;6(4).[PubMed]

27. Margel D, Lifshitz DA, Kugel V, Dorfmann D, Lask D, Livne PM. Percutaneous nephrolithotomy in patients who previously underwent open nephrolithotomy. J Endourol. 2005;19(10):1161-4.[PubMed]

28. 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. [PubMed]

29. Gupta NP, Mishra S, Nayyar R, Seth A, Anand A. 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. [PubMed]

30. Yesil S, Ozturk U, Goktug HN, Tuygun C, Nalbant I, Imamoglu MA. Previous open renal surgery increased vascular complications in percutaneous nephrolithotomy (PCNL) compared with primary and secondary PCNL and extracorporeal shock wave lithotripsy patients: a retrospective study. Urol Int. 2013;91(3):331-4.[PubMed]