

REDUCED PAIN, SHORTER HOSPITAL STAY AND EARLY RETURN TO WORK IN PCNL: COMPARATIVE STUDY ON OUTCOME OF PCNL VERSUS OPEN SURGERY IN THE TREATMENT OF LARGE RENAL CALCULI

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Abstract:

Objective: To compare the outcome of PCNL & open surgery in the treatment of large renal calculi by assessing the amount of analgesia required to relief pain, mean hospital stay, & convalescence period.

Materials & Methods: : This comparative study in during 80 patients diagnosed with kidney stone disease admitted in the NIKDU during the period of Jan' to Dec'2009. They were divided conveniently into two groups. Intervention was done in the form PCNL (40) and open surgery (40). Clinical outcome like, duration of surgery, postoperative hospital stay, doses of narcotic analgesia required to relief pain and convalescence period were reviewed. In complete follow up 9 patients were missed in PCNL group resulting in 31 patients. There was no significant difference in preoperative variables such as age, sex, stone size in cm, stone number- single/multiple and stag horn Stone.

Results: There were statistically significant difference in the parameters between the groups, (PCNL vs open surgery [mean \pm SD]): duration of operation (min), 97.90 ± 24.89 vs 136.62 ± 23.54 , postoperative hospital stay (days), 4.77 ± 3.98 vs 9.55 ± 3.65 , mean time return to work (days), 3.09 ± 1.21 vs 6.25 ± 1.53 , (p value is <0.001). The amount of analgesia required to relief pain was significantly reduced in PCNL vs open procedure (no patient required > 2 doses vs 27 patient required 3 or >3 doses), p value is <0.001 .

Conclusion: PCNL is relatively safe & better treatment option than open surgery in the treatment of large renal calculi. It has reduced pain, shorter hospital stay and more rapid return to work.

Keywords: PCNL (Percutaneous nephrolithotomy), RCT (Randomised controlled clinical trial), Open surgery, reduced pain, shorter hospital stay.

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Introduction

Kidney stone disease is existing among mankind since the earliest record of civilization. Hippocrates described the renal stone as first disease of the kidney¹. High incidence of renal stone disease is

found in U.S.A, U.K, Scandinavian countries, Mediterranean countries, portion of the Malayan peninsula and China. Low incidence is found in central and south America, most of Africa and part of Australia². (stoller et al. 2000).

Now four minimally invasive treatment modalities are available for the treatment of kidney stones such as

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ESWL (Extra corporeal shock wave lithotripsy). Percutaneous nephrolithotomy (PCNL), retrograde ureteroscopic intra renal surgery and laparoscopic stone surgery³. (Lingeman et al. 2002). Now a days all uncomplicated and most of the complicated renal stones are treated by percutaneous method as a routine procedure in the western set up, although the technique is still evolving in the developing country like ours⁴.

Open stone surgery is an old and established procedure. In Bangladesh larger kidney stones are mostly treated by open surgery because of poor socioeconomic context⁵.

PCNL was not available in Bangladesh till January 2000. In National Institute of Kidney Diseases & Urology, this technique has been regularly undertaken since 2004. The present study is the first prospective randomized work conducted in NIKDU, Dhaka to compare the outcome like efficacy, morbidity and convalescence among PCNL & open surgery. An increasing awareness of this technique by both patients & referring physicians has raised important questions regarding the safety and efficacy of the percutaneous methods Vs standard renal surgery.

If any superiority of treatment by PCNL can be provided or shown that this is relatively safe than the method can further be popularized among the Urologist of our country and this study may be the basis of further research in this field.

Materials & Methods

This Comparative study, initially includes all the patient with kidney stone disease that were admitted In urology department of NIKDU during the period of Jan'2009 to Dec'2009. Total 80 Patients were divided conveniently into two groups PCNL (40) and open surgery (40). Randomization was done by taking consecutive samples. Intervention was done in the form of PCNL and open surgery.

The cases were selected with the Inclusion criteria having stone size more than 2 cm, functioning kidney with sterile urine and the exclusion criteria is renal failure, pregnancy, uncontrolled bleeding disorder, congenital / acquired skeletal abnormalities and infected urine

All patients were evaluated by history, clinical examination and Investigations having similar protocol. Before operation, each patient of two groups were evaluated and compared for age and sex of the patients, size, number, location of the stones and pelvicalyceal dilatation.

Open surgery was performed through standered flank incision with or without rib resection. A standered PCNL was performed with subcostal single puncture in 29 units and double puncture in 2 units. Initially pneumatic, later on ultrasonic lithotripsy was used .18 Fr nephrostomy tube was left in each puncture site and D-J stent (6Fr) was kept in ureter. Radiological evaluation was done postoperatively. Patient who were completely cleared of stones were considered stone free.

Patients were followed monthly for 3 months where 9 patients were missed in PCNL group resulting in 31 patients. Again history, clinical examination and Investigations like urine routine and culture, plain X-ray KUB were done and post PCNL data were recorded . All patients were asked about the time required to return to normal activities.

Statistical analysis was done meticulously by SPSS for windows-14 version program. Data was presented as mean ± SD. probable value of less than 0.05 was considered significant. Test of significance was done by student t-test , z-test and chi-square test.

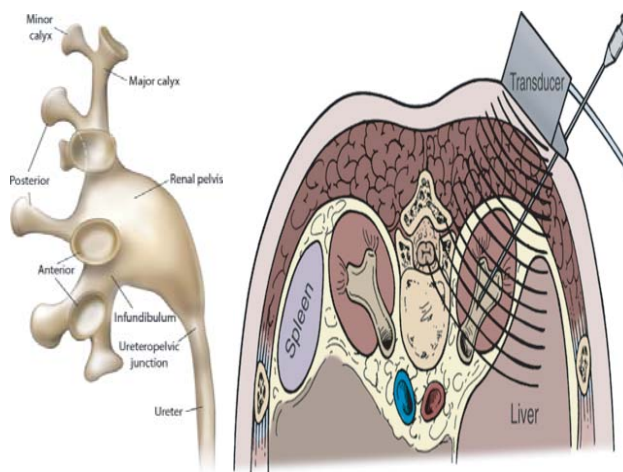


Fig.-1 : Basic pelvicalyceal anatomy : Wein et al. (2007) p.3230

Results

Preoperative characteristics (mean ± SD) were as follows: (PCNL vs open surgery): age, 44.48 ± 10.31 vs 45.22 ± 15.53 yrs; sex, (male/female), 20/11 vs 24/16; stone size in cm, 3.07±0.93 vs 3.44±1.09; stone number- single/multiple, 26(83.9%)/5(16.1%) vs 26(65.0%)/14(35.0%); stag horn Stone, 5(16.1%) vs 4(10.0%). There were no significant difference between the two groups (p>0.05).

Table-I

Reoperative characteristics of the study subjects

Characteristics	Name of Operation	
	PCNL	Open surgery
No of patients	31	40
Age in year (Mean ± SD)	44.48±10.31	45.22±15.53
Sex (male/female)	20/11	24/16
Stone size in cm (Mean ± SD)	3.07±0.93	3.44±1.09
Stone number- Single/Multiple	26(83.9%)/5 (16.1%)	26(65.0%)/14(35.0%)
Stag horn Stone	5(16.1%)	4(10.0%)

Among the chief complains, pain was present in 27 vs 37 patients, fever in 8 vs 8 patients, haematuria 5 vs 6 patients and pyuria 5 vs 6 patients in PCNL and open surgery respectively. Total 3 patient (2 in PCNL, 1 in open surgery) had no complaints of stone disease.

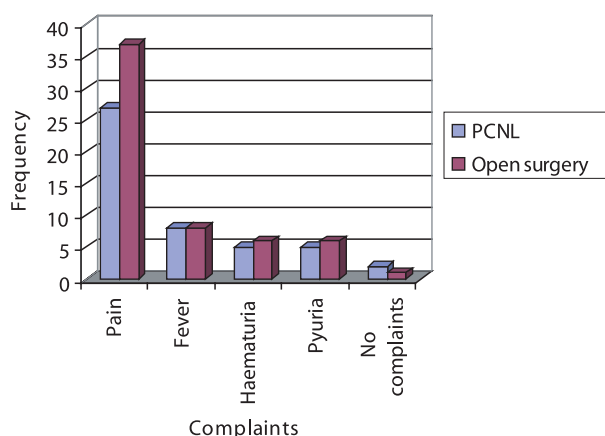


Fig.-3: Chief complaints of the patients

Table-II

Total operation time, post operative hospital stay and convalescence period

Parameters	PCNL N= 31	Open surgery N=40	p value
Duration of operation (Min.) (Mean ± SD)	97.90±24.89	136.62±23.54	<0.001
Hospitalstay (days) (Mean ± SD)	4.77±3.98	9.55±3.65	<0.001
Convalescence Period (days) (Mean ± SD)	3.09±1.21	6.25±1.53	<0.001

Table- II shows, time required to complete the operation and the post operative hospital stay in PCNL group and open surgery group. In PCNL group the mean operation time was 97.90 min (SD-24.89) and the post operative hospital stay was 4.77 days (SD- 3.99), whereas in open surgery group the time was 136.62 min (SD-23.55) and hospital stay was 9.55 days (SD- 3.65). The mean operation time (t= -6.704 ;p value is <0.001) and the post operative hospital stay (t= -5.250 ;p value is <0.001) was very significantly lower in PCNL group than in open surgery group. The mean time return to work in PCNL group was 3.09 weeks (SD-1.21) and in open surgery was 6.25 weeks (SD-1.53) . Return to work was significantly faster in PCNL group than open surgery group (p value is <0.001).

Table-III

Narcotic Analgesic Required

Doses of analgesics	PCNL N= 31	Open surgery N=40
Single	25(80.6%)	8(20.0%)
Multiple	6(19.4%)	32(80.0%)

Chi-square = 25.82; p = <0.001

In this study in PCNL group, 25 cases required 1 dose and 6 cases required 2 dose of narcotic analgesics. In open surgery group, 8 cases required 1 dose and 9 cases required 2 dose, 20 cases required 3 dose and 3 cases required >3 dose of narcotic analgesics. So dose

of narcotic analgesia were very significantly reduced in PCNL group than open surgery group (Chi-square=25.82; p value is <0.001).

Post operative pain was compared in both group of patients. In this series dose of narcotics required to relief pain was significantly reduced in PCNL group (no patient required > 2 doses) than open procedure (27 patient required 3 or >3 doses). Chi-square=25.82 ; p value is <0.001.

Discussion:

The present study has been designed to compare the outcome of PCNL and open surgery for the management of renal stone disease more than 2 cm in size. After counseling, taking consent and considering the inclusion and exclusion criteria finally 80 Patients were selected and divided into two groups, PCNL(40) and open surgery (40). In complete follow up 9 patients were missed in PCNL group resulting in 31 patients.

The mean age of the patients was 44.48 years (SD-10.31) in PCNL group and 45.22 years (SD-15.53) in open surgery. The age of the patient was statistically insignificant(>0.05). The age range of the present study is more or less comparable with the study done by Assimos et al⁶. in 1991,(age:23 to 79 years) & by Brannen et al⁷. in 1985,(age:21 to 94 years) . The highest age is higher in those countries is due to long life expectancy of that country and elderly people attending in the clinic .

The mean size of the stone in PCNL group was 3.07 cm (SD-0.94) and in open surgery was 3.44 cm (SD-1.09). The size of the stone in both groups were analysed and found no significant difference (p>.05). In a study by Wong YC,⁸. in 1998,stone size was recorded between 2 to 7.5 cm which is almost similar to the size of stone of present study.

In present study, the mean operation time was noted 97.90 min (SD=24.89) in PCNL and 136.62 min (SD=23.55) in open surgery,which was very significantly lower in PCNL (t= -6.704; p value is <0.001). Al-kohlany et al.⁹.showed that the mean operation time was 127 vs 204 min in PCNL vs open surgery. Snyder¹². also showed lower time (155 vs 266 min) required in PCNL than open procedure. The overall time mentioned were longer as because the above studies were conducted on the staghorn calculi absolutely.

Mean hospital stay was 4.77 days for PCNL and 9.55 days for open surgery. In a comparative study between PCNL and open surgery Preminger⁹ reported mean hospital stay for PCNL is 4 days and for open surgery is 10 days. Brannen et al.⁷ in 1985, reported similar result of 5.5+-0.3 days hospital stay after PCNL and 8.4+-0.5 days after open surgery. The present study is almost similar to the above studies. Time return to work, in PCNL was significantly faster (mean 3.09 weeks) than in open surgery (mean 6.25 weeks) (p value is <0.001). Brannen and associates in 1985⁸ (within 2 weeks vs more than 3 weeks) & Al-kohlany et al.⁹. reported the earlier (2.5 weeks vs 4.1 weeks) return to work in PCNL group than open surgery group.

In this study in PCNL group, 25 cases required 1 dose and 6 cases required 2 dose of narcotic analgesics. In open surgery group, 8 cases required 1 dose and 9 cases required 2 dose, 20 cases required 3 dose and 3 cases required >3 dose of narcotic analgesics. So dose of narcotic analgesia were vary significantly reduced in PCNL group. (Chi-square=25.82 ; p value is <0.001).

Likewise, Snyder and Smith in 1986¹⁰ found reduced dose (16 vs 33 doses) of narcotics needed in PCNL group than open operations. The result of the present study was compatible with the above study.

Conclusion:

PCNL is relatively safe & better treatment option than open surgery in the treatment of large renal calculi. It has reduced pain, shorter hospital stay and more rapid return to work, inspite of some limitations like small sample size, purposive sampling technique, surgery was not done by single surgeon & stone composition was not considered here. Further research should be conducted on two well matched comparative groups of large sample size to establish the findings of the present study.

Conflict of Interest : None Declared

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Abbreviations

- PCNL : Percutaneous nephrolithotomy
ESWL : Extracorporeal Shortwave Lithotripsy