

Percutaneous Nephrolithotomy (PCNL) in Adult Patients: Our Initial

Experience at Teaching Hospital Dera Ghazi Khan

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ABSTRACT

Objective: To evaluate our initial experience of PCNL for the management of renal stones in terms of stone clearance and complications.

Study Design: Prospective Observational Study

Place and Duration of Study: This study was conducted at the Urology department of Tertiary Care Teaching Hospital Dera Ghazi Khan between July 2018 to July 2020.

Materials and Methods: We included 72 adults patients with renal stones 15-50 mm. PCNL was performed in prone position under general anesthesia. Patients with anomalous kidney, stage horn stones, and simultaneous PUP narrowing, bleeding diathesis cardiopulmonary diseases, obese and pediatric age were excluded.

Results: The mean age of patients was 33 years with 12±sd and mean stone size was 24mm with 8.4± sd. Mostly were male 68% (n=49). Highest percentage of stones found in renal Pelvis (71%). Single stone was in 71% patients. Upper pole was the most common site of puncture (73.6%), while single puncture was done in 80% patients. Regarding the stone clearance 90.3% have complete stone clearance while 6 patients (8.3%) has residual stones ranging from 6mm- 15 mm. Procedure was abandoned in one patient due to failure tract access. Patients with residual stones (n=6) 8.3% underwent ancillary procedure later on. Three patients (4.2%) developed urinoma managed by URS and DJ stent insertion. One patient got urosepsis and one developed paralytic ileus. Only 2(2.8%) patients needed blood transfusion.

Conclusion: PCNL was new treatment modality at our set up yet this technique encourages us to say good bye to open surgery in future. PCNL being standard and safe procedure, is to be adapted at least at every district level hospital

Key Words: Renal stone, Percutaneous nephrolithotomy, Pneumatic lithoclast and D.J stent.

Citation of article: Siddiqui AA, Asif M, Imran Z, Khalid M, Hassan MH, Qaisrani SF. Percutaneous Nephrolithotomy (PCNL) in Adult Patients: Our Initial Experience at Teaching Hospital Dera Ghazi Khan. Med Forum 2021;32(1):40-43.

INTRODUCTION

Urinary stone disease is a major urological concern. Endourologic techniques have influenced the clinical approach and outcomes. Open surgery holds a historic importance in the management of most of the conditions.¹ Before the endourology era, the main approach has relied on conservative surveillance or open stone removal.

Since the advancement of technology, refinements of surgical instruments and endourologic options, the management of renal stones had a paradigm shift from

open surgery to the minimally invasive endourological surgery. One of them is percutaneous nephrolithotomy (PCNL) which is now considered as a standard and first line treatment according to various international guidelines specially for stone ≥ 20 mm in size. Whereas for stones of size 10 to 20mm can be treated with extra corporeal shock wave lithotripsy (ESWL), retrograde intra renal surgery (RIRS) in addition to PCNL.^{2,3} In 1976, a new horizon opened up before us when Fernstrom and Johansson first performed removal of renal stone through a nephrostomy tract⁴ leading to PCNL the most commonly performed procedure for the management of renal stones. Besides minimum incision to skin and muscles the PCNL directly approaches the collecting system/stone with less trauma to the kidney and adjacent organs as compared to the pyelolithotomy and hence a great deal of surgical expertise is required for percutaneous access to the kidney and stone removal⁵. Being minimally invasive surgery PCNL has lower morbidity, higher postoperative patient comfort, shorter convalescence, and lesser cost than open techniques, besides up to 85 % clearance rate of stones^{6,7}. But Complication rates can be as high as 15%, including severe bleeding,

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Received: September, 2020

Accepted: November, 2020

Printed: January, 2021

infection, urinary extravasation, and injury to adjacent organs, most notably the colon.⁸ The learning curve of PCNL is slow as this technique involves multiple steps yet if learned with efforts, it proves to be safe and effective treatment. We conducted this study to evaluate our initial experience of PCNL regarding stone clearance and complication encountered.

MATERIALS AND METHODS

This prospective observational study was carried out at urology department of tertiary care teaching hospital Dear Ghazi Khan between July 2018 to July 2020. After ethical approval we recruited 72 patients irrespective of gender, all were ≥ 17 years old with normal renal function. Patients demographic data, puncture site, no. of punctures, no. of stones, size of stones, residual stones, complications, nephrostomy/DJ placement and post-operative blood transfusion were recorded on questionnaire. We included renal stone size range from 15 mm -50 mm, patient with both primary & recurrent renal stones. All the patients were evaluated with history, physical examination, laboratory investigation including urine culture & sensitivity, ultrasonography and radiological contrast studies for stone disease. Complete pre-operative evaluation done. All the patients were operated under general anesthesia. Pre-operative broad spectrum antibiotics were injected to all patients. Initially lithotomy position was made and ureteric catheter of 06 Fr was placed on the side to be operated for contrast study. Then patient was turned to the prone position. The puncture was done with nephrostomy needle of 16 gauge under fluoroscopic guidance. Guide wire of 0.032 inches was placed then track was dilated with Alken dilators up to 27 FR and Amplants sheath of 28 gauge was placed. The nephroscope was introduced in the collecting system of kidney and stone was fragmented by pneumatic lithoclast. Larger pieces of stone were removed with the help of stone grasper. At the end of procedure D.J (Double J) ureteric stent was placed in most of the cases alone and in some cases D.J stent along with nephrostomy tube was placed. In a few cases only nephrostomy was placed. These patients observed post operatively to check any hemodynamic instability due to excessive blood loss. Blood was transfused after proper blood grouping and cross matching in the patients where required. Residual stone were confirmed post operatively by X-ray KUB and Ultrasound KUB. Patients with anomalous kidney, stage horn stones, simultaneous P.U.J narrowing, bleeding diathesis, cardiopulmonary diseases, obese and pediatric age were excluded.

Statistical Analysis: Data was entered in SPSS version 24.0 and analyzed. Frequency with percentage was calculated for qualitative parameters and mean + standard deviation calculated for quantitative parameters. Chi-square was applied to assess the

significant relation among gender, age groups and outcome categories on the base of nephrolithotomy parameters.

RESULTS

The mean age of patients was 33 years with ± 12 standard deviation and mean stone size was 24mm with $8.4 \pm$ standard deviation. Male gender was predominant with 68% (n=49) while females were 32% (n= 23). Highest percentage of stones found in renal Pelvis (71%). Single stone found in 71% patients. Upper pole was the most common site of puncture (73.6%), while single puncture was done in 80% patients. Both DJ stent and nephrostomy were placed in 23 patients (32%) placed in cases of residual stones. Table-1.

Table No.1: Stone Demographics

		Frequency	(%)age
Stone location	Renal pelvis	51	71
	Upper Pole	1	1.4
	Lower pole	3	4.2
	Combined upper +lower +middle pole	17	23.6
Stone number	Single Stone	51	70.8
	Multiple stones	21	29
Site of puncture	Upper Pole	53	73.6
	Lower Pole	6	8.3
	Multiple location	13	18
Number of puncture	One puncture	58	80.6
	2 puncture	11	15.3
	3 puncture	3	4.2
Stone primary /recurrent	Primary	63	87.5
	Recurrent Post ESWL	2	2.8
	Recurrent Post Pyelolithotomy	7	9.7
DJ stent only		14	20
Nephrostomy only		31	43
Both DJ +Nephrostomy		23	32
None		4	5.5

Regarding the stone clearance 90.3% have complete stone clearance with no residual stone while 6 patients (8.3%) has residual stones ranging from 6mm- 15 mm. Procedure was abandoned in one patient due to failure to access the collecting system in spite of multiple punctures and simultaneously per operative bleeding. This patient referred to a center where PCNL was a routine practice for many years.

Patients with residual stones (n=6) 8.3% underwent ancillary procedure later on. ESWL was performed in 3 patients, URS and stone extraction performed in 2 patients while one patient lost follow up. Regarding post-operative complications Three patient (4.2%) developed urinoma that was managed by URS and DJ stent insertion. One patient got urosepsis and one developed paralytic ileus both were managed conservatively. Only 2 patients needed blood transfusion. Table-2.

Table No.2: Outcomes and Complication

		Frequency	(%)age
Outcomes	Complete clearance	65	90.3
	Abandon	1	1.4
	Residual 6mm-15mm	6	8.3
Complications	No Complications	67	93.1
	Paralytic Ileus	1	1.4
	Urinoma	3	4.2
	Urosepsis	1	1.4
Blood transfusion	No	70	97.2
	Yes	2	2.8

DISCUSSION

In the last 2 decades the evolution of renal stone treatment from open surgery (with significant post-operative morbidity) to minimally invasive techniques like PCNL and retrograde intra renal surgery (with less morbidity and good outcomes) is significant. PCNL is now considered the standard treatment for nephrolithiasis. The important factors in PCNL which affect the outcomes of kidney stone treatment in terms of stone clearance are stone size, its location and expertise of surgeon. In this study we shared our initial experience of PCNL in adult patients. Similar study was published by Malik MA, et al about their initial experience. Complete stone clearance rate was 85.7% while three (8.6%) patients had residual stones while two (5.8%) patients had PCNL failure due to failed tract access.⁷ While in our study complete clearance (no residual stone) was achieved in 90% patients and 9% had partial clearance (residual stone 6mm-15 mm), In one patient procedure was abandoned due to failed tract access. In a study by Atta Ullah in his study mentioned stone clearance in 78.8% patients with single session of PCNL.⁹

In another study stone free rate (SFR) in PCNL was compared to SFR of ESWL, which was 80% in PCNL and 27.5% in ESWL, stone size was in the range of 15-25 mm.¹⁰ The overall stone-free rate of 91.7% is also reported in literature which was in accordance with our study.¹¹

We did standard PCNL with standard endourology gadgets and when standard PCNL was compared to mini PCNL the difference in stone free rate was insignificant among the two. Although Mini-PCNL has advantages of significantly less bleeding and hospital stay.¹² Similarly the current and evolving techniques i.e. tubeless PCNL and total tubeless PCNL are in current practice and under discussion. The advantages of both techniques is decreased transfusion rate and length of hospital stay and no leakage of urine from the wound which are favorable as compare the standard PCNL with nephrostomy tube. But regarding Stone-free rate, both techniques have equal results of 91%-97%, almost same like standard PCNL result of our

study.¹³ but we being infantile, introduced nephrostomy in majority of patients and even both DJ and nephrostomy tube, where we felt difficulty or lack of surety of stones clearance per operatively.

Though in different studies the commonest complication encountered was bleeding in 4/52 (7.7%) patients necessitating blood transfusion.⁹ and even high percentage 18.3% in a study.¹⁴ the reasons of low blood transfusion (2.8%) in our study, are single stone, single puncture site and strict inclusion criteria. The study conducted by Malik MA, et al coincides with our study as their (2.9%) patients required a pint of blood transfusion due to excessive bleeding.⁷

We also performed PCNL in previously operated kidney (pyelolithotomy) and found no difference in stone clearance and complications in these and virgin cases. Although number of previously operated patient were quite low (n=7) in our study as compared (n= 66) patients in study by Siddiq A.A et al yet safety and efficacy of PCNL in both studies are comparable.¹⁵

The complication of urinoma was found in 3 patients (4.2%) in our study, in literature the incidence of renal collecting system injury during PCNL resulting in extravasation and absorption of irrigation fluid, occurs in up to 8% of patients.¹⁶

The rate of sepsis is much lower, ranging from 0% to 3% in patients treated with appropriate perioperative antibiotics.¹⁷ also in our study it was similar i.e. in a one patient (1.4%).

CONCLUSION

PCNL was new treatment modality for us yet this technique encourages us to say good bye to open surgery in future at our set up. PCNL being standard and safe procedure, is to be adapted at least to every district level hospital.

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Conflict of Interest: The study has no conflict of interest to declare by any author.

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