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An Experience of Supine PCNL in Tertiary Care Hospital in Gujranwala, Pakistan

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Abstract: *A prospective analytical study was conducted at the Urology Department of Gujranwala Teaching Hospital from January 2022 to April 2023. The aim was to experience the safety & efficacy of supine PCNL performed at tertiary care hospital at Gujranwala which is being performed in few centers in Pakistan. A total of 98 patients undergoing percutaneous nephrolithotomy (PCNL) were included in the study. The majority of patients presented with flank pain. Complete stone clearance was achieved in 67 cases, and 31 patients became stone-free after extracorporeal shock wave lithotripsy (ESWL). Post-operative complications were minimal, with only two cases of sepsis and 10 cases of post-operative fever. No mortality was reported during the study. Percutaneous nephrolithotomy was found to be the preferred treatment option for renal stones larger than 20mm, offering a high stone-free rate and low complication rates. Further advancements in treatment modalities may help reduce complications and improve outcomes.*

Key Words: PCNL, Renal Stones, Tertiary Care Hospital

Introduction

Nephrolithiasis is the most prevalent urologic disease in South Asia. Prevalence ranges from 1%–5% in Asia, and 7% to 13% in Northern American states. The preferred method of treating renal stones is known as percutaneous nephrolithotomy (PCNL), which was initially introduced by Fernstrom and Johansson in 1976 as the preferred method of treating renal calculi larger than 2 cm, calculi of the lower pole, and staghorn calculi. Other indications are calculi in renal calyceal diverticula, and anatomical anomalies like ectopic, horseshoe kidneys (Cracco and Scoffone, 2020.). The use of balloon dilatation or single-step dilatation for tract dilatation, as well as improvements in lithotripsy methods from ballistic, electro-hydraulic, ultrasound, and laser, have all resulted in significant advancements in

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PCNL techniques. Device sizes have also been reduced to reduce tract size. Evolution in the fields of radiology and the use of CT in place of plain radiographs and ultrasounds helps urologists to plan their line of treatment. Different scoring systems also help to determine the outcome of PCNL like the stone nephrolithometery score, and Guy's score (Jones et al., 2021). Staghorn morphometry is also a predictive indicator for the PCNL outcome (Xu et al., 202).

Subject & Method

In the study, we prospectively surveyed the outcome of supine PCNL done at a tertiary care hospital in Gujranwala, Pakistan between January 2022 to April 2023, a total of 98 patients underwent supine PCNL. The operative time ranged from 60-120 minutes. Detailed history and examination of patients were done before surgery. Routine investigations are required for anaesthesia fitness along with specific investigations for renal stones. Patients diagnosed with renal stones on USG or plain X-ray KUB were further advised to CT urogram to rule out the retro-renal colon and to visualize the anatomy and function of affected and normal kidneys. Approval from the institutional review board ethical committee was taken before the start of the study.

PCNL Technique

Under general anaesthesia, in cystoscopy position 6-Fr ureteric catheter was placed with the help of cystoscopy or ureteroscope over a guide wire in the collecting system under the guidance of fluoroscopy. Retrograde pyelography was performed to map out the pelvicalyceal system and to plan the puncture location and calyx once the patient's posture was altered to supine. Under fluoroscopy, a targeted calyx was punctured with an 18g needle. After the confirmation of puncture guide wire was passed and directed into the ureter. The tract is dilated with the help of dilators up to 30 Fr, for dilation, we used single stem, sequential or balloon dilatators, and appropriately sized Amplatz sheath placed. Stone was identified with the Nephroscope and pneumatic and ultrasound lithotripsy of stone done (EMS).

Fragmented stones were retrieved with the help of forceps. After the procedure 4.7 or 6-Fr double-J stent was passed. Complete blood count, X-ray of Kidney ureter and bladder or USG was done on the 1st postoperative day. No discernible stone on an X-ray or USG or remaining stone particles less than 5 mm in size, were considered SFRs. Patients who had residual stones were advised and planned for ESWL later.

Results

During the study period, a total of 98 patients underwent PCNL.60 were male and 38 were female. 54 Patients had Right sided renal stones and 44 had left-sided renal stones. A major number of patients (n =92) had flank pain as the main presenting complaint. The operative time ranged from 60-120 minutes. The SFRs Complete stone clearance was done in 67 cases. When there was a single staghorn calculi maximum stone clearance was achieved and minimum stone clearance was achieved when stones were more in number and scattered in different calyces. Patients with residual fragments greater than 5mm were advised and underwent ESWL. 31 patients who underwent ESWL were found to be free from renal stones after ESWL. 24 patients needed only 1 session of ESWL whereas 7 underwent more than 1 session of extracorporeal shock wave lithotripsy (ESWL). Only 1 surgery was converted to open due to a horseshoe kidney. 15 cases needed a post-operative blood transfusion due to Intraoperative blood loss or postoperative blood loss. Post-operative symptoms of sepsis were seen in only 2 cases. Intraoperative or postoperative complications or uncontrolled bleeding leading to nephrectomy were not seen in any procedure. 10 cases had fever post-operatively which was controlled by antipyretics (paracetamol, IV or oral) and antibiotics (I.V). One patient had exploratory laparotomy two days after the surgery but that was negative. Intra-operative and post-operative no mortality was noted during the study.

Table 1

Total Patients		98
Gender		
	Male	Female
	60	38
Laterality		
	Left	Right
	45	54
Need of ESWL		
Yes		No
Only one Session	more than one Session	67
24	07	
31 total		
Conversion to Open or case SEPSIS		
	Yes	No
	02	96
Blood Transfusion		
	Yes	No
	15	83

Discussion

The stone disease has a high prevalence in Pakistan. Many treatment options are available for the stone diseases like RIRS (Retrograde intrarenal surgery) ESWL and PCNL. Percutaneous nephrolithotomy is the treatment of choice for renal calculus greater than 2 cm in the upper and mid pole and greater than 1.5cm for the stones of the lower pole because of greater Stone free rate and lower levels of morbidities (Inoue et al., 2021). The concept of open renal surgery for stones has been remarkably reduced other than in some developing countries in which open renal surgeries have been performed due to a lack of resources and expertise (Agbo, 2021).

CT Urogram of every patient included in our study was done preoperatively to access the size of stones, number of stones, to rule out retro renal colon, to access the Hounsfield units (HU) of stones, for the purpose of organizing access to the collection system and anticipating issues(Sigde et al., 2022).

67 participants in this research had 100% stone removal (residual particles less than 5 mm). A clinically insignificant residual stone (CIRF) or no discernible stone on USG and X-ray were in the "Stone Free Rate." So, the SFR in the present study was 67 patients which is close to the previously performed studies which showed the complete clearance of stone nearly to 93% and stone-free rate of PCNL was about 98% .when clinically significant residual stones was included (Deole et al.,2020).

Those patients who underwent ESWL after Percutaneous Nephrolitomy were found to be stone free some after 1 session and some after multiple sessions. Whereas a CT scan was only done in those patients who had radiolucent stones to confirm the Stone free rate.

In a multicentre study, High body mass index was seen to be associated with less stone free rate, increased operative time, and increased risk of bleeding per operatively (Ergani et al., 2019) our study also observed low Stone free rate in patients with high BMI. The results were noted by another study performed.

The use of a Flexible Nephroscope improves the stone-free rate. All punctures were done under fluoroscopic guidance in our study. The use of USG for the guidance of puncture has also been used these days due to easy availability and less exposure to radiations as per Fluoroscopic techniques (Tzou et al., 2023). USG-guided punctures have become the choice for many urologists as they can also be done during Pregnancy and are very helpful in ectopic kidney and horseshoe kidneys. Operative time in our study ranges from 60-120 minutes; this time comes under a long time group according to the Clinical Research Office of End urological Surgeries (Ketsuwan et al., 2020). Increased risk of anaesthesia, chances of DVT, and many respiratory complications can also occur due to increased operation time (Grønkjær, et al., 2014) many other complications such as the need for intraoperative need of blood transfusion also increases due to increased loss of blood intraoperatively (Rosenbluth, et al., 2023). Stone size, type, collecting system anatomy, BMI and expertise of the surgeon affects the operative time (Deole et al., 2020). According to Bolton and Hennessey (2019), the CROES PCNL worldwide research group reported a complication rate of

roughly 20.5%. Another research (ElSheemy et al., 2019) reveals a 48.2% complication rate. In our study, the prevalence of complications was low as compared to the previous.

With the advancements in the field of urology use of small-sized instruments, puncture under USG guidance, flexible instruments, and laser devices for lithotripsy, the Stone free rates can be enhanced, and the number of complications can be reduced but not applied in our study and have limitations.

Conclusions

Percutaneous Nephrolithotomy is the treatment of choice for renal stones greater than 20mm with least complication rates and morbidities. With the improvements in the modalities, these complication rates can be reduced with an increase in the stone-free rate.

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