

Research Article

Supine percutaneous nephrolithotomy post-operative hospital stay assessment



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Abstract

Background: Since it was first used in 1976, percutaneous nephrolithotomy (PCNL) has become the industry standard treatment for significant renal calculi. Initially, as mentioned sixty years ago, only the prone position was used for percutaneous access to the kidney. Valdivia provided the first account of supine positioning in PCNL. Both positions have since been adopted by PCNL. To enhance the surgical results, modifications to the initial supine position were created. The advantages of each supine position were discussed for five different supine postures (full supine, Valdivia, Galdakao-modified Valdivia, Barts-modified Valdivia, and Barts flank-free modified supine positions). In this study, we evaluated the results of supine PCNL surgery. **Methods:** All patients were evaluated at baseline to complete diagnosis of renal stones, evaluation of previous line of management if present, confirm indication for surgery and fitness for surgical procedure, where patients selected for operative procedure had been counseled and written consent is obtained for the surgical procedure, then admitted patients will be assigned to certain hospital admission number. **Results:** This study was conducted on 53 patients (31male & 22 female), age range 18 to 65 years old. there were 58.5% of the studied cases were males and 41.5% were females. The mean age was 36.09 ± 12.14 SD with range (18.0 – 65.0). There were 13.2% of the studied cases had Co-morbidities and 86.8% had no Co-morbidities. The current study showed that mean hospital stay was 2.23 ± 0.64 SD with range (2.0 – 5.0). **Conclusions** In comparison to prone PCNL, supine PCNL is a quick, simple, and efficient treatment for the therapy of renal stones. It is a good alternative to traditional prone PCNL because to its simple placement, safety in high-risk patients, good stone-free rate, decreased complications, and ease for the anesthesiologist. Patients with renal abnormalities also benefit greatly from it. It will take more research with a larger sample size and a longer follow-up period to confirm our findings and pinpoint the risk factors for unfavourable outcomes.

Key words: PCNL; Renal stones, Supine position.

Introduction

Since 1976 (Fernström et al., 1976), percutaneous nephrolithotomy (PCNL) has been used, and it is currently the gold standard treatment for large renal calculi (Türk C et al., 2016). Initially, as previously mentioned, only the prone posture was used for percutaneous access to the kidney (Goodwin WE et al., 1955).

Supine placement in PCNL was first described in 1987 by Valdivia Ura JG et al. Both positions have since been adopted by PCNL.

To enhance the effectiveness of surgery, modifications to the original supine posture were devised (Kumar P et al., 2012) The advantages of each supine position were

discussed for five different supine postures (full supine, Valdivia, Galdakao-modified Valdivia, Barts-modified Valdivia, and Barts flank-free modified supine positions). They came to the conclusion that there was no single best supine position. The ideal position was determined by the patient and their particular stone burden.

Kumar also talked about the dearth of strong evidence contrasting the various supine PCNL positions. There is no agreement on the ideal posture for PCNL, nor is it obvious which supine position is ideal.

Patient and Methods

On 53 individuals, our prospective clinical investigation was carried out. diagnosed with renal stones and indicated for percutaneous renal surgery for renal stones at Urology Department at Minia University, Nephrology and Urology hospital in the period between June 2021 to December 2022

All patients will be evaluated at baseline as follow, detailed medical history with extra attention on lower urinary tract symptoms (LUTS) And loin pain, pervious medical treatment if present. **Surgical history**; whether open or endoscopic surgery .

Physical examination; abdominal examination, and genital examination.

Laboratory investigation; Urine analysis: to detect UTI and any other abnormal parameter CBC with focusing upon HGB, HCT, WBCs, Renal function test, Coagulation profile. RBS, Serum electrolyte

Imaging: Pelvi-abdominal ultrasound, Plain X-ray K.U.B, CT KUB, IVU.

Surgical technique:

Preoperative:

A single dose of broad-spectrum parenteral prophylaxis antibiotic was administered to all patients one hour prior to surgery.

Anesthesia: General anesthesia.

Position: Flank free modified supine position.

The procedure:

General endotracheal anesthesia with muscle relaxant was used.

The patient was positioned in the lithotomy position.

Using cystoscopy and under fluoroscopic guidance a 6 Fr open tip ureteric catheter was advanced till it reaches the renal pelvis.

The ureteric catheter was fixed to 14 Fr urethral catheter and its end was connected to an infusion set that was connected to a sterile syringe containing the iodinated non-ionic contrast material.

Identification of post axillary line, last rib and iliac bone is done by drawing a line.

Then the patient was turned to the supine position.

The ordinary wrapping and disinfection of the patient was performed.

Injection of the contrast material used via the open tip ureteric catheter to opacity the collecting system.

Obtaining access to the desired calyx:

Fluoroscopic guidance 18-gauge Chiba needle was inserted through skin puncture to be directed to the desired calyx

The C arm was tilted to the oblique view (30 degree towards the patient head) to get the depth of penetration of the needle so as not to go either superficial or deep to the kidney and desired calyx.

The needle was advanced till it was noticed to move up and down with respiration indicating that it is attached to the kidney.

The C-arm was tilted back to vertical (antero-posterior) position and the needle was advanced through the calyceal fornix till urine seen coming out of the needle.

A super-stiff guide wire was introduced through the needle and manipulated to be passed to the ureter or to the upper calyx. If the manipulation was difficult the wire was allowed to coil in the collecting system to a reasonable length to allow proper dilatation.

Under fluoroscopic guidance the Alken dilators from 8 to 22 Fr in cases of mini PERC and up to 30Fr in Standard PCNL were advanced over the wire into the collecting system, also, acute dilation was done in some cases by introducing central rod then passing amplats dilater over it and then by rolling gently to reach the desired destination.

The Amplatz sheath was advanced over the last dilator.

The rigid nephroscope (22, 26 Fr, Karl Storz) was introduced to the collecting system through sheath to visualize the collecting system and to localize the stone.

The stone was disintegrated by pneumatic lithotripter.

Any large fragments were removed by stone forceps through the working channel of the rigid nephroscope.

In mini PCNL we also used vacuum effect for removing small gravels.

After removal of the stones and finishing of the procedure we inserted DJ stent.

20 Fr nelaton catheter was inserted as a nephrostomy tube over the wire and its position was confirmed by fluoroscopic guidance. The nephrostomy was removed when urine become clear and after obtaining a plain x ray (usually in the 2nd or 3rd post-operative day).

The following was recorded in our study:

Demographic data as age, comorbidity also post-operative hospital stay was recorded.

All patients will be assessed during post-operative period as follows:

A patient who did not experience any issues right away after the surgery will be discharged after 48 h of monitoring and after doing plain X-Ray KUB film.

Data were checked, entered, and analyzed using SPSS (version 15, special package for social science).

Results

Table (1): Distribution of the examined cases based on demographic information (n = 53)

Demographic data	No.	%
Sex		
Male	31	58.5
Female	22	41.5
Age		
Min. – Max.	18.0 – 65.0	
Mean $\pm$ SD.	36.09 $\pm$ 12.14	
Median (IQR)	35.0 (26.0 – 45.0)	
Co-morbidities		
Yes	7	13.2
No	46	86.8

IQR: Inter quartile range

SD: Standard deviation

Post-operative hospital stay(days)	
Min. – Max.	2.0 – 5.0
Mean $\pm$ SD.	2.23 $\pm$ 0.64

Discussion

Regarding, demographic data among the studied groups, we found that there were 58.5% of the studied cases were males and 41.5% were females. The mean age was 36.09 $\pm$ 12.14 SD with range (18.0 – 65.0). There were 13.2% of the studied cases had Co-morbidities and 86.8% had no Co-morbidities.

Also, Gupta et al., 2022 enrolled 90 patients who underwent supine PCNL patients ranged in age from 14 to 67, with a mean age of 39.712.4 years. 90 patients were involved, of which 55 were men and 45 were women... the most prevalent comorbidities were Hypertension in 34.4%, Diabetes mellitus in 31% and ischemic heart disease in 32.8%.

In addition, Nour et al., 2013 aimed to determine whether it is possible to perform

percutaneous nephrolithotomy (PCNL) on a patient while they are supine. There were 54 patients in the trial (median age 39 years, range 19–62; 31 men and 23 women).

Similarly, McCahy et al., 2013 comparing the surgical results of PCNLs carried out in the modified supine position to those carried out in the traditional prone position. Each group of 36 participants in the study Included 41 PCNLs. The groups' ages, sexes, and comorbidities were evenly distributed. There were (23 male, 13 female) underwent 41 PCNLs in the modified supine position with mean age was 53.4 (17.8) years.

The current study showed that mean hospital stay was 2.23 ± 0.64 SD with range (2.0 – 5.0). However, Gupta et al., 2018 reported that the mean hospital stay was 3.5 ± 0.66 days. As well, Gupta et al., 2022 revealed that the mean post-operative hospital stay was 2.88days ranging from 2 to 4days.

Also, Nour et al., 2013 declared that the mean hospital stay was 4.6 ± 0.10 days.

As well, McCahy et al., 2013 announced that mean hospital stay was 2.5 (1.8) years.

Furthermore, Sohail et al., 2017 revealed that the mean (SD, range) hospital stay was 2.7 (1.05, 2–5) days in the supine group.

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