

Percutaneous nephrolithotomy in supine position health and social care essay



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ABSTRACT

Aim: To evaluate PCNL in supine position under ultrasound guided puncture

regarding its technical aspects, successrate and complications. Patients and

Methods: The study included 47 patients. All patients with renal and or upper

ureteral stones wereincluded in this study while patients with uncorrectable

coagulopathy, congenital anomalies in the kidney wereexcluded. PCNL in

supine position was done under US guided puncture while dilatation was

done under fluoroscopy. **Results:** 20 cases (42. 5%) had pelvic stone, 18

cases (38. 3%) had calyceal stone, 5 cases (10. 6%) had multiple stones, 1

case (2. 1%) had upper ureteic stone and 3 cases (6. 4%) had stagehorn

stones. 25 cases (53. 2%) were right sidedand 22 cases (46. 8%) were left

sided. Stone size was 2.9 ± 1.0 29. 42 cases had radiopaque (89. 4%), while

5 cases hadradiolucent stone (10. 6%). Upper calyceal puncture was done in

2 cases, middle calyceal puncture in 6 cases, lowercalyceal puncture in 32

cases (68. 1%), and multiple punctures in 9 cases. Stone desintegration using

pneumaticlithoclast was done in 31 cases (66%), and intoto stone extraction

was done in 16 cases (34%). Mean operative timewas 70 minutes (60-120

minutes). The intraoperative complications were dilatation difficulties in 5

cases (10. 6%), bleeding requiring transfusion in 2 cases (4. 2%). Stone free

rate was achieved in 44 cases (93. 6%) and residual stonemore than 4 mm

was detected in 3 cases (6. 4%). Mean hospital stay was 3. 2 days (2-5 days),

fever in 4 cases (8. 5%), urinary leakage in 3 cases (6. 4, %). **Conclusion:**

PCNL in supine position under ultrasound guided puncture is feasible, safe,

and successful with minimalcomplications. **KEYWORDS:** Supine position;

PCNL; StonesCORRESPONDENCE: Hammouda Sherif, MD, Benha University, BenhaElgdeeda, Benha, 11513, Egypt (hammoda_elsherif@yahoo. com).

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Abbreviations and Acronyms

CT: Computed tomographyDJ: Double JESWL: Electrohydrolic lithotripsyIVU:

Intravenous urographyPCS: Pelvicaliceal systemPCNL: Percutaneous

nephrolithotomyURS: UreteroscopyUS: UltrasonographyUroToday

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Introduction

Despite newer advances in stone surgery, includingextracorporeal

shockwave lithotripsy (ESWL) and flexibleureteroscopy (URS) with laser

lithotripsy, the percutaneousapproach is still the optimal method for

minimally invasive, upper tract stone surgery [1]. Percutaneous

nephrolithotomy(PCNL) in the prone position is accepted globally for

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its familiarity, excellent understanding of the anatomy in this position, and a reduced risk of visceral complications. However, there are various concerns regarding PCNL in the prone position, especially in the morbidly obese and patients with compromised cardiopulmonary status and stature deformity who are not suitable for treatment in the prone position [2]. Moreover, the conventional setting of the prone position, the hands of the urologists are in the field of the fluoroscopy, thus increasing the radiological hazards to medical personnel [3]. Valdivia and associates [4] first described the supine position for percutaneous stone surgery. They suggested that the colon floats away from the kidney when the patient is in a supine position, which makes the colon less likely to be injured by a puncture made in the posterior axillary line. Hopper and colleagues [5] found that in a series of 90 prone and 500 supine abdominal CT scans, the bowel was posterior to the kidneys in 10 and 1.9% of cases, respectively. They suggested that the bowel might be more often encountered in the posterior of the kidney in the prone position compared to the supine position. Therefore, performing PCNL in the prone position may increase the risk of colon injury. PCNL in the supine position has several advantages. First, it does not disturb blood circulation and respiration the way the prone position does. Second, the risk of iatrogenic colon injury is lower in the supine position. Third, this position is convenient for the anesthetist to observe the patient and switch to general anesthesia with endotracheal intubation, if necessary. Fourth, the angle between the horizontal plane and working tract is small, so it is easier to wash out stone fragments through the working sheath. In addition, urologists are made comfortable by sitting while performing the operation [6]. Ultrasonography (US) has made a significant impact in the field of urinary interventions. US <https://assignbuster.com/percutaneous-nephrolithotomy-in-supine-position-health-and-social-care-essay/>

guidance makes procedure safer, limiting the number of needle punctures and decreasing radiation exposure. In most cases, it is complementary to fluoroscopy, providing image guidance for different urinary procedures [7]. In addition to avoidance of contrast material administration, identification of all the tissue between the skin and kidney, and the energy expenditure of the surgeon and other staff of the operating room, decreases as it is not necessary to wear a lead shield [8]. In this study, we evaluated PCNL in the supine position under an ultrasound-guided puncture in regards to its technical aspects, success rate, and complications.

Patients and methods

This study included 47 patients (30 males and 17 females) admitted to the urology department of Benha University Hospital between January 2010 and December 2010. All patients with renal and or upper ureteral stones were included in this study, while patients with uncorrectable coagulopathy, congenital anomalies in the kidney, such as a horseshoe kidney, and ectopic pelvic kidney were excluded. Informed written consent was taken from all participants after the study protocol was approved by the Research Ethical Committee, Faculty of Medicine, Benha University. All patients were investigated preoperatively via routine laboratory tests, pelvic abdominal US, KUB, IVP, and spiral CT, when indicated. PCNL in the supine position was done under high spinal anesthesia, with the patient placed in the supine position with the side harboring the stone close to the operating table (Figure 1). Figure 1. Position of the patient. <http://dx.doi.org/10.3834/uij.1944-5784.2012.02.07f1UIJ> UroToday International Journal®

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Percutaneous Nephrolithotomy in Supine Position with Ultrasound-Guided Renal Access ©2012 Digital Science Press, Inc. UIJ / Vol 5 / Iss 1 / February / <http://dx.doi.org/10.3834/uij.1944-5784>. 2012. 02. 07 <http://www.urotodayinternationaljournal.com> ISSN 1944-5792 (print), ISSN 1944-5784 (online) The ipsilateral flank was elevated with a water bag, and the ipsilateral arm was laid on the thorax. Intravenous access was established in the contralateral arm after a standard cystourethroscopy and 6 Fr, open tip, ureteral catheter was inserted into the ipsilateral ureteral orifice. A kidney puncture was done under real-time US (Toshiba), after distending the pelvicalyceal system with saline from the ureteric catheter for better US imaging and puncture. The puncture site and path was chosen in the mid axillary line, and then an 18-gauge puncture needle was advanced into the appropriate calyx using a needle-guiding system fixed to the US probe. A US-guided puncture through the cup of the desired calyx was established. A 0.38, floppy-tip guide wire was advanced into the chosen calyx. Tract dilatation was performed after opacification of the PCS, with a contrast medium in a retrograde fashion, under fluoroscopic guidance using Alken dilators up to 27 Fr, except in 5 cases where hypermobile kidney balloon dilatation was used. A 30 Fr Amplatz sheath was used, and then a standard 26 Fr, rigid nephroscope was used for stone retrieval (Figure 2). A 26 Fr nephrostomy tube was fixed at the end of procedure. Patient demographics, body mass index (BMI), stone characteristics, operative time, intra- and postoperative complications, stone clearance, and the total number of sessions of the PCNL required were collected, tabulated, and analyzed using the Statistical Package of Social Science (SPSS), version 11, software. <https://assignbuster.com/percutaneous-nephrolithotomy-in-supine-position-health-and-social-care-essay/>

Suitable statistical techniques were computed (frequencies, mean, standard deviation, and range).

Results

Patient demographics and stone features were summarized in Tables 1 and 2. Intraoperative data of the study group were demonstrated in Table 3. Multiple punctures were done in 7 cases: lower and middle calices in 5 cases, lower and upper calices in 2 cases. The intraoperative complications, including dilatation difficulties, were found in 5 cases (10.6%), and bleeding requiring transfusion was found in 2 cases (4.2%). Visceral injury did not occur in any of the studied cases. The stone-free rate was achieved in 44 cases (93.6%). Residual stones more than 4 mm were detected in 3 cases (6.4%). Stone-free was considered if there were no residual stones or stones less than 4 mm. Subsequent auxiliary procedures were used as DJ insertion and ESWL in 2 cases (4.2%), while in the third case of residual stones with prolonged leakage there was a Figure 2. PCNL in the supine position. <http://dx.doi.org/10.3834/uj.1944-5784.2012.02.07f2> 6 mm stone that passed spontaneously after 5 days without intervention. the mean hospital stay was 3.2 days (range 2 to 5 days). Postoperative complications in the form of fever occurred in 4 cases (8.5%), and urinary leakage in 3 cases (6.4%). There was insignificant difference ($p = 0.018$) between pre- and postoperative hemoglobin (11.3 ± 0.95 , 10.8 ± 1.3 , respectively), as well as pre- and postoperative hematocrite value (32.7 ± 1.9 , 31.2 ± 3.25 , respectively; $p = 0.003$).

Discussion

The prone position has been the most commonly used position for PCNL, because this was the way the technique was invented; however, the main reason for perseverance with this position must be the apprehension of colonic and vascular injury [9]. Various modifications in patient positioning for PCNL emerged as urologists understood more of the surface anatomy of the kidney and related viscera. When patients were placed in the supine position for percutaneous nephrolithotomy, the ipsilateral flank was elevated with a 1L or 3L water bag, depending on a patient's body mass [9].

Falahatkar and colleagues [8] performed complete supine PCNL without a rolled towel under the flank, and no change in leg position. We considered that there was no essential difference in the basic UIJ UroToday International Journal®

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ISSN 1944-5792 (print), ISSN 1944-5784 (online) to 120 minutes). The mean operative time in studies by Manoharet al. [2], Valdivia et al. [4], and Rana et al. [9] was 85, 74, and 65 minutes, respectively, which are comparable to this study. DeSio et al. [11] reported a much shorter mean operative time (43 minutes), while others reported a much longer mean operative time, such as Zhou et al. [6], Neto et al. [13], and Basiri et al. [14], who reported 162, 120, and 111 minutes, respectively.

Intraoperative Complications In the current study, intraoperative

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complications included dilatation difficulties (10.6%), which were due to anteromedial displacement of the kidney during dilatation of the tract when the dilators met the resistance of the renal capsule. The tract became longer and more perpendicular rather than parallel to the fluoroscopy table. This issue was solved by extra abdominal compression during dilatation to minimize renal movement, the use of super-stiff guide wire, and 1-step balloon dilatation. Dilatation difficulties were reported by others (11 to 12%) principles and surgical techniques between 2 supine positions. The mean age in this study was 46.12 ± 10.75 (range 24 to 65 years). A patient's number was 47, which was comparable to studies done by Shoma et al. [10], Ng et al. [3], Manohar et al. [2], and De Sio et al. [11], who studied 53, 62, 62, and 39 cases, respectively. Larger studies were done by Valdivia et al. [4], Steele and Marshall [1], and Rana et al. [9], who studied 520, 322, and 184 cases, respectively. In this study, the mean BMI in kg/sqm (\pm SD) was 23.6 ± 5.92 (4 patients, 8% were morbidly obese), which is comparable to a study done by Manohar et al. [2], who did supine PCNL in obese patients, and the mean BMI was 24. While Hoznek et al. reported 26.1 ± 5 [12]. Others used body weight instead of BMI [1, 4, 9, 10]. In this study, the mean operative time was 70 minutes (range 60).

Data	Number	Percent	Total number
of cases	47		
Age (mean + SD)	$46.12 + 10.75$		
BMI in kg/sqm (mean + SD)	$23.6 + 5.92$	(8% were morbid)	
Gender	Male 30	63.8%	
	Female 17	36.2%	
Comorbidity	DM 4	8.5%	
	COPD 6	12.7%	
	Hypertension 6	12.7%	
	IHD 3	6.4%	
	Liver disease 1	2.1%	
	Multiple comorbidities* 4	8.5%	
Previous renal stone surgery (total)	6	12.7%	
	Open 4	8.5%	
	PCNL 2	4.2%	

*Multiple comorbidities in 4 cases (2 cases had DM and hypertension; 1 case had COPD and IHD; 1 case had liver cirrhosis, DM). Table 1. Patient demographic data. <http://dx.doi.org/10.https://assignbuster.com/percutaneous-nephrolithotomy-in-supine-position-health-and-social-care-essay/>

3834/uij. 1944-5784. 2012. 02. 07t1Data Number PercentStone sitePelvic stone 20 42. 5Calyceal stone (total) 18 38. 3Upper calyceal 2 4. 2Middle calyceal 5 10. 6Lower calyceal 11 23. 4Staghorn 3 6. 4Upper ureteric stone 1 2. 1Multiple stones* 5 10. 6Stone sideRight 25 53. 2Left 22 46. 8Stone size mean (+ SD cm) 2. 9 + 1. 029Stone radiopacityOpaque 42 89. 4Lucent 5 10. 6*Regarding multiple stones, 2 cases had stones in upper andlower calices, while the other 3 cases had stones in the middleand lower calices. Table 2. Stone characteristics. [http://dx. doi. org/10. 3834/uij. 1944-5784. 2012. 02. 07t2](http://dx.doi.org/10.3834/uij.1944-5784.2012.02.07t2)UIJUroToday International Journal®

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Percutaneous Nephrolithotomy in Supine Position with Ultrasound-Guided Renal Access©2012 Digital Science Press, Inc. UIJ / Vol 5 / Iss 1 / February / [http://dx. doi. org/10. 3834/uij. 1944-5784. 2012. 02. 07](http://dx.doi.org/10.3834/uij.1944-5784.2012.02.07)[http://www. urotodayinternationaljournal. com](http://www.urotodayinternationaljournal.com)ISSN 1944-5792 (print), ISSN 1944-5784 (online)[9, 10]. Bleeding requiring transfusion occurred in 2 cases (4. 2%), whichwas directly related to stone size, procedure duration, and thecreation of multiple tracts. One of them had a 2 cm stone inthe middle anterior calyx and underwent direct puncture onthe stone (single stage, 1 tract). Another, with a 4 cm staghornstone calculus without hydronephrosis, underwent lower andmiddle-caliceal puncture (single stage, 2 tracts) for completestone clearance. Both of these patients were diabetic andhypertensive. This was comparable with other series (3. 2 to5. 2%) [1, 2, 3, 8, 14]. Fewer incidences were reported in somecases (0 to 1. 4%) [4, 11], while a higher incidence was reportedin others (9. 4 to 11%) [6, 10], and this was attributed to theirlearning curve. Visceral injury did not occur in any of thestudied cases.

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Stone clearance rate in this study was 93.6%, which is comparable to other studies (70.5 to 95%) [2, 3, 9, 10, 11, 13, 14]. Residual stones more than 4 mm occurred in 3 cases (6.4%). Postoperative Complications In this study, fever did not exceed 38.5 and responded well to cold fomentation and antipyretic drugs, while De Sio et al. [11] reported 1 case suffering from fever > 38.8 for 2 days, and their PUT showed a steinstrasse in the distal part of the ureter, managed by a DJ stent. Hoznek et al. [12] reported that 1 case, out of 47 patients, had a fever. In our study, urinary leakage occurred in 3 cases after the removal of the nephrostomy tube (after 48 hours). One case was managed conservatively, while DJ stents were inserted one week postoperatively in the other 2 cases. Steele and Marshall [1] reported urine leaks in 3 out of 322 patients, who then underwent supine PCNL. De Sio et al. [11] reported a prolonged leak from the percutaneous access in 4 out of 39 patients, managed by stenting. Hoznek et al. [12] reported 2 cases of urinary fistulas out of 47 patients. In this study, the mean hospital stay was 3.2 days (76.8 hours), Hoznek et al. [12] reported 3.4 ± 1.9 days, while Ng et al. [3] reported a mean hospital stay of 209 hours in supine PCNL cases. Steele and Marshall [1] reported the range of hospital stay as 72 to 144 hours, De Sio et al. [11] reported the mean hospital stay as 103 hours, and Neto et al. [13] reported the mean hospital stay as 129.6 hours. Ultrasound before performing PCNL helps to plan the procedure and access site. The depth of the target and angulations of the needle and access can be planned, keeping in mind the avascular Brodel's line. Usually, the posterior calyx is selected and the ultrasound can provide radiation-free, real-time imaging guidance for the needle puncture. [7]. Basiri et al. [15] compared fluoroscopy and ultrasonography in a clinical trial and concluded that access for PCNL

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using ultrasound guidance is an acceptable alternative to fluoroscopy. They found less radiation exposure with ultrasonography, and success and complication rates comparable with those of fluoroscopy. Hosseini et al.

[16] started prone PCNL with ultrasound guidance in 39 cases. They showed that ultrasound-guided PCNL can be a feasible, reliable, safe, and effective

alternative to fluoroscopy in experienced hands. Falahatkar and Allahkhan

[17] noticed ultrasound-guided PCNL without fluoroscopy has some

disadvantages. One problem is the use of lubricant gel on the sonography

probe at the time of dilatation. A second problem is that urologists are

unfamiliar with sonographic images of the kidney. Because the Amplatz

dilatator and Amplatz sheath echo do not have good imaging quality, the

experience of the surgeon plays a large role in finding the best access.

Recently, Hoznek et al. [12] proceeded to puncture the kidney under

combined ultrasound and fluoroscopic control, as in our study. Published

studies from different centers have shown that

Data	Number	Percent	Calyx
Puncture	Upper calyceal	2	4
	Middle calyceal	6	12
	Lower calyceal	32	68
1	Multiple punctures	7	15
Track dilation	Alken	42	89
	Balloon	5	10
6	Stone		
disintegration	Lithoclast	31	66
In toto extraction		16	34
Nephrostomy drainage		47	100

Mean operative time (mins) 47 100

Table 3. Intraoperative data.

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urotodayinternationaljournal. com|ISSN 1944-5792 (print), ISSN 1944-5784 (online)supine PCNL is safe, and it has several benefits for the patient and several technical advantages for the surgeon [9, 10, 11, 18]. Patient positioning is less demanding and time-consuming because a change is not required from the lithotomy to the prone position during the procedure [19]. The supine position also allows greater versatility during stone management since ureteroscopy can be performed if there is contralateral ureteral stones, or simultaneous procedures for renal, ureteral, and bladder stones in the same single supine lithotomy position. A final advantage of the supine PCNL position is that urologists are more comfortable adopting a sitting posture during stone management. Although supine percutaneous nephrolithotomy is routine in some surgical centers throughout the world, its popularity in the field of urology, due to a deficiency in its training in educational centers, as a whole, is still minimal [20]. Lastly, systematic literature review was performed by Wu and his colleagues [21] who concluded, for general patients with kidney calculi, PCNL in the supine position has similar stone-free rates compared with the prone position. Supine PCNL does not increase related complications. The operative time significantly decreases in the supine position. However, there is still no consensus on the optimal position for PCNL.

Conclusion

PCNL in the supine position, under ultrasound-guided puncture, is feasible, safe, and successful, with minimal complications.

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