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SURGICAL OUTCOME OF MODIFIED SUPINE VERSUS PRONE PERCUTANEOUS IN PATIENTS UNDERGOING PERCUTANEOUS NEPHROLITHOTOMY (PCNL)

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Abstract:

Objective: *To compare the PCNL surgical results performed in modified supine position with those executed in the standard prone position.*

Study Design: *A prospective randomized controlled trial.*

Place and Duration: *In the Department of Urology, Sindh Institute of Urology and Transplantation, Karachi for one year duration from January 2020 to December 2020.*

Methods: *186 patients who underwent percutaneous nephrolithotomy were selected for the study, who were randomized into 2 groups of 93, in the first group PCNL was done in modified Supine position and the other was planned for Prone PCNL. Surgery time, number of punctures, complications, radiation time, stay in hospital and stone-free index were compared.*

Results: *There was no variance among the two groups in the number of punctures, number of calculi and complication rates. However, the modified supine group had shorter mean time of radiation, surgery time, and hospital stay.*

Conclusion: *Modified supine PCNL in the supine position has a much shorter exposure of radiation and operation time, shorter hospital stay, and is just as safe as traditional prone PCNL.*

Key words: *percutaneous nephrolithotomy, PCNL, supine position, renal stones.*

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INTRODUCTION:

Percutaneous nephrolithotomy (PCNL) is an ideal treatment for multifaceted and huge renal stones[1]. PCNL traditionally has been executed in the supine position due to the familiarity of the surgeon, the puncture of the posterior calyceal, the larger puncture area and the prevention of intestinal damage[2-3]. However, the prone position has anesthetic disadvantages, especially in overweight and obese patients or with pulmonary complications[3-4]. Modified supine position (Galdakao's modified Valdivia position) offers several advantages, reduced impact on the patient's circulation and ventilation, easier monitoring of anesthesia, simultaneous retrograde access, the patient needs to be positioned only once and does not need to be repositioned[5-6]. The main characteristic is the slight laterality of the opposite leg in the prone Valdivia position. The individual is positioned in the mid-lateral position with a 3-liter bottle of irrigation fluid wrapped in drapes, positioned to raise the side of the patient. The ipsilateral leg is extended and the opposite leg is abducted and flexed to obtain a modified lithotomy position.

Valdivia et al reported a supine position followed by multiple variants with the advantages and disadvantages of the patient position[7-8]. The supine PCNL has been found to be promising in terms of early complication rate; However, a recent meta-analysis does not support these findings. Intra-operative and post-operative outcomes such as hospitalization time, operative time, and blood transfusion may be important in distinguishing supine and prone positions[9-10]. The meta-analysis by Kumar et al. Showed that blood transfusions were shorter and the operation time in the supine position was shorter[9-10]. However, a recently reported meta-analysis found no difference in surgery time between supine and prone positions. Benefits of the supine position; less surgeon exposure to radiation, comfortable patient position, easy respiratory tract access, low renal pelvis pressure and concurrent retrograde access[10-12]. In the prone position, obstructing the anesthesiologist's access to the respiratory system may be a limiting factor. Several studies have been published in the literature comparing the safety and efficacy of the supine and prone position in patients undergoing PCNL. However, there is little comparison of the prone and supine positions and their efficacy who planned for mini-PCNL[13]. In the study by Tokatl et al. two positions were compared in which Mini-PCNL was done[14]. There was no noteworthy change among the two methods in terms of complication rate, stone-free percentage and stay in hospital. However, longer surgery times in the prone position have been reported[15].

The purpose of the study is to compare the results of PCNL performed in these two positions.

MATERIALS AND METHODS:

This is a prospective randomized controlled trial held in the Department of Urology, Sindh Institute of Urology and Transplantation, Karachi for one year duration from January 2020 to December 2020. 186 patients were selected and randomized into two groups of 93 patients in each. We encompassed all patient aged between 18 and 60 years, either Gender, patients who have given informed consent to participate in the study and >2cm renal stone diagnosed in CT KUB, were candidates for PCNL. Patient with already Percutaneous nephrostomy in place, BMI >35, Pregnancy, Bleeding disorders, Untreated urinary tract infection and Patient having psychiatric illness were excluded.

The ethical approval was taken from the Hospital Ethical Committee and the patient's informed consent was taken for collecting data. The procedure was done under general Anesthesia. Baseline demographics including BMI, gender, age, laterality, location and size of stone was recorded. Stone clearance rate and operative time was recorded on a predesigned proforma

In the first group; PCNL was accomplished in a modified supine position and in a traditional prone position in the second group. All cases were done under GA. The subjects included to the prone position group were positioned in the lithotomy position and retrograde ureteral catheterization was done. The supine position was suggested for all other procedures. Patients in the modified supine group were placed mid-lateral with a 20–30-degree tilt with a 3-liter bottle of irrigation wrapped in drapes to elevate the flank. The ipsilateral leg was extended and the opposite leg is abducted and flexed to obtain a modified lithotomy position. The arm on the same side was supported by the elbow bent at the chest, the opposite arm tucked into the body and the elbow straightened. In both cases, the needle puncture was performed using fluoroscopy - the triangulation technique, then the path was widened with serial amplatz dilators, and the procedure was completed with a Storz 24 Fr nephroscope and a pneumatic lithotriter. In all cases, a DJ stent and a nephrostomy were accomplished.

Statistical methods: The data was entered and analyzed in SPSS version 21. Frequency and

percentage was calculated for categorical variables like gender, laterality and stone location. Mean and SD was calculated for age, BMI, operative time and stone size. Independent sample t-test was utilized for comparison of the mean operative time and stone clearance rate. P value ≤0.05 was considered as significant. Confounders like stone size and location was controlled.

RESULTS:

Patient characteristics are presented in Table 1.

Patient Characters	Modified Supine	Prone	p value
No of patients	93	93	
Sex			
Male	58	41	
Female	35	52	
Mean Age	48.8	51.9	1
Mean BMI	31.5	30.8	0.83

There was no significant change between the distribution of patients in both groups by age and gender and their BMI.

The surgical parameters are presented in Table 2.

Surgical Outcomes	Modified Supine	Prone	p value
Surgery time in Minutes	98±41.2	125+45.3	< 0.001
Radiation time in Seconds	460±201	630±302	0.005
Number of Punctures			0.45
< 3	21	26	
> 3	5	6	
Stone Free Rates (in %)	85.1	87.9	0.04
Hospital Stay duration in days	2.1+1.9	2.9+2.5	0.005

The modified supine group had a statistically significantly shorter operation time (<0.001) (98±41.2 minutes) compared to the prone group (125+45.3 minutes). The modified supine group was also exposed to shorter radiation for 460±201 seconds; it was less than 630±302 seconds for the prone group which was statistically significant (0.005).

The patient's complications among two groups are given in Table-3

Complications	Modified Supine	Prone	p value
Major	0	1	
Minor	21	23	0.92
Transfusions	9	13	
Fever	25	19	
Colic	8	11	
Urine leak	6	5	

The modified supine group also had a statistically significant (0.005) shorter hospital stay compared to the prone group (2.1+1.9 days vs 2.9+2.5 days). The postoperative parameters are presented in Table 3. No major complications were found during the study. There was no statistically significant difference in the rates of minor complications such as transfusion, fever, colic, and urine leakage rates between the two groups.

DISCUSSION:

PCNL is traditionally executed in the prone position, which is most frequently used. However, over the past decade, several patient position changes have been proposed for PCNL. The Valdivia in 1998 described supine position, with a 3-liter bag of saline under the flank[12]. This position was further modified in 2006, a modified position of Valdivia Galdakao, some rotation of the contralateral limb in flexion with the patient in supine position, and the ipsilateral leg in extension. Bart's modified Valdivia position was first described in 2008 by manipulating the nephroscope, which resulted in a larger surface area for easier access[13-15]. Kumar and his colleagues described "Bart's flank-free modified supine position in 2012[16]. The supine position benefits comprises of better patient care, better Amplatz sheath drainage, both retrograde and anterograde approaches, the surgeon's capacity to be seated, easier transition from regional or spinal to

general anesthesia, and greater acceptance, particularly in individuals with cardiovascular or pulmonary disease. Simultaneous anterograde and retrograde access, a benefit of the modified supine position, additionally provides dual access to large horny stones and ureters, resulting in better stone removal in one treatment[17-18]. The modified supine position provides several anesthetic benefits. First of all, because the patient remains supine during the procedure, less pressure is exerted on the lungs than in the prone position. This reduces the difficulty of maintaining stable ventilation in the prone position in patients, especially patients who were obese, however supine pressure may reduce venous outflow. The supine position also provides faster and easier airway access when re-intubation is required. Moreover, the prone position is related with an augmented jeopardy of postoperative vision loss, peripheral nerve damage and direct trauma especially in patients who are obese. Modified PCNL in the supine position prevents all these complications[19]. In our study, we found that the modified supine position had an operative time of less or more than 20 minutes, which can be attributed to a patient who did not reposition, prepare and cover after ureteral catheter insertion. Similar studies by Jones et al., Liu et al. Show a similar result for the modified supine position and shorter operative times. Our study also showed shorter radiation exposure with a modified supine position, which means that the access time and accessibility are similar to or better than PCNL in the prone supine position. Our study also found that patients with modified supine PCNL on their back had shorter hospital stay, possibly associated with lower anesthesia incidence and early recovery from supine positioning[20]. Several other studies showed similar results to PCNL in the supine position. No patient in this study has significant complications. Complications can occur after or during PCNL and include transfusion, fever and extravasation, with 83% inclusive complication rate. However, rates of serious complications have been found to range from 0% to 4.7%, including sepsis, colon or pleural trauma, and severe bleeding. There was no significant change between the minor complication rate and the necessity for a transfusion among the two groups. However, some studies have found higher complication and transfusion rates for PCNL in the supine position; this can be attributed to the surgeon's learning curve and different transfusion thresholds at different centers[21-22]. The limitations of our study include small sample size, non-randomization of stone load, many surgeons performing the procedure, and the experience and learning curve of each surgeon. In addition, we did not take into account the properties of the stones, such as hardness (composition of stone), location (lower and upper calyx, renal pelvis) and multiplicity (multiple or single stones).

CONCLUSION:

We conclude that the modified supine position PCNL is an effective and safe procedure for the surgeon and patient, with less radiation exposure, shorter surgery time, and shorter hospital stays, while stone removal rates and complications were similar to those of traditional prone PCNL for treatment.

Ethical Approval
IRB Number: 212
Approval No: SIUT-IRB-212

REFERENCES:

1. Melo PA, Vicentini FC, Perrella R, Murta CB, Claro JF. Comparative study of percutaneous nephrolithotomy performed in the traditional prone position and in three different supine positions. International braz j urol. 2019 Jan;45(1):108-17.
2. Chu IE, Ranasinghe W, Jones MN, McCahy P. Prone versus modified supine percutaneous nephrolithotomy: which is more cost effective in an Australian tertiary teaching hospital?. Journal of Clinical Urology. 2019 Sep;12(5):391-5.
3. Proietti S, Rodríguez-Socarrás ME, Eisner B, De Coninck V, Sofer M, Saitta G, Rodriguez-Monsalve M, D'Orta C, Bellinzoni P, Gaboardi F, Giusti G. Supine percutaneous nephrolithotomy: tips and tricks. Translational andrology and urology. 2019 Sep;8(Suppl 4):S381.
4. Armas-Phan M, Tzou DT, Bayne DB, Wiener SV, Stoller ML, Chi T. Ultrasound guidance can be used safely for renal tract dilatation during percutaneous nephrolithotomy. BJU international. 2020 Feb;125(2):284-91.
5. Chung JW, Ha H, Park DJ, Ha YS, Lee JN, Chun SY, Kwon TG, Kim BS. Efficacy and safety of modified tract dilation technique using simultaneous pulling of proximal and distal ends of a guidewire for percutaneous nephrolithotomy in modified supine position. Investigative and Clinical Urology. 2020 Aug 27;62.
6. Desoky E, Abd Elwahab KM, El-Babouly IM, Seleem MM. Outcomes of Flank-Free Modified Supine Percutaneous Nephrolithotomy Based on BMI. Urologia Internationalis. 2021;105(1-2):77-82.
7. Li J, Gao L, Li Q, Zhang Y, Jiang Q. Supine versus prone position for percutaneous nephrolithotripsy: A meta-analysis of randomized

controlled trials. International Journal of Surgery. 2019 Jun 1;66:62-71.
8. Axelsson TA, Cracco C, Desai M, Hasan MN, Knoll T, Montanari E, Pérez-Fentes D, Straub M, Thomas K, Williams JC, Brehmer M. Consultation on kidney stones, Copenhagen 2019: lithotripsy in percutaneous nephrolithotomy. World journal of urology. 2020 Jul 29:1-8.
9. Roodneshin F, Kermany MP, Rostami P, Ahmadzadeh N, Gharaei B, Kamranmanesh MR. Comparison of Hemodynamic Stability and Pain Control in Lateral and Prone Positions in Patients Undergoing Percutaneous Nephrolithotomy: A Randomized Controlled Trial. Urology journal. 2020 Mar 16;17(2):124-8.
10. Mostafa EA, Abouzeid AM, Hammady AR, Elmoghazy HM. The Outcome of supine versus prone percutaneous nephrolithotomy in multiple renal stones Author:-Emad Abdellah. prof Dr Abd Elmoneim Abou zeid. prof Dr Ahmed Hammadi. Assit prof Hazem Elmoghazy. Sohag Medical Journal. 2020 Apr 1;24(2):82-9.
11. Ferreira TA, Dutra MM, Vicentini FC, Szwarc M, Mota PK, Eisner B, Murta CB, Claro JF. Impact of Obesity on Outcomes of Supine Percutaneous Nephrolithotomy. Journal of Endourology. 2020 Dec 1;34(12):1219-22.
12. Birowo P, Raharja PA, Putra HW, Rustandi R, Atmoko W, Rasyid N. X-ray-free ultrasound-guided versus fluoroscopy-guided percutaneous nephrolithotomy: a comparative study with historical control. International Urology and Nephrology. 2020 Jul 24;52(12):2253-9.
13. Zhao F, Li J, Tang L, Li C. A comparative study of endoscopic combined intrarenal surgery (ECIRS) in the galdakao-modified supine valdivia (GMSV) position and minimally invasive percutaneous nephrolithotomy for complex nephrolithiasis: a retrospective single-center study. Urolithiasis. 2020 Aug 10:1-6.
14. Karsli O, Ustuner M, Voyvoda B, Memik O, Halat AO, Ozcan L. A new percutaneous nephrolithotomy position in horseshoe kidney: 45 degrees sided prone. Central European Journal of Urology. 2020;73(3):349.
15. Choudhury S, Talukdar P, Mandal TK, Majhi TK. Supine versus prone PCNL in lower calyceal stone: Comparative study in a tertiary care center. Urologia Journal. 2020 Oct 7:0391560320962404.
16. Xia Q, Zhao Z, Li C, Hao X, Dun W. Application of a Self-Made Equipment for Patient Positioning during Percutaneous Nephroscopy in the Oblique-Supine Position. Urologia internationalis. 2019;103(1):89-94.
17. Manzo BO, Gómez F, Figueroa A, Sánchez HM, Leal M, Emiliani E, Sánchez FJ, Angerri O. A new simplified biplanar (0-90°) fluoroscopic puncture technique for percutaneous nephrolithotomy. Reducing fluoroscopy without ultrasound. Initial experience and outcomes. Urology. 2020 Jun 1;140:165-70.
18. Giusti G, De Lisa A. PCNL in the prone position VS PCNL in the modified supine Double-S position: is there a better position? A prospective randomized trial. Urolithiasis. 2020 Feb;48(1):63-9.
19. Gupta S, Maurya AK, Pal DK. Observational prospective study for surgical outcome and anesthetic feasibility of tubeless and totally tubeless supine PCNL: A single centre initial experience. Turkish journal of urology. 2019 Mar;45(2):146.
20. Mourmouris P, Berdempes M, Markopoulos T, Lazarou L, Tzelves L, Skolarikos A. Patient positioning during percutaneous nephrolithotomy (PCNL): is there an optimal position?. Hellenic Urology. 2019 Mar 14;30(4).
21. Birowo P, Raharja PA, Putra HW, Rustandi R, Atmoko W, Rasyid N. X-ray-free Ultrasound-guided Percutaneous Nephrolithotomy in Supine Position Using Alken Metal Telescoping Dilators in a Large Kidney Stone: A Case Report. Research and reports in urology. 2020;12:287.
22. Basulto-Martínez M, Proietti S, Yeow Y, Rapallo I, Saitta G, De Coninck V, Luciani L, Bellinzoni P, Gaboardi F, Giusti G. Technique for supine percutaneous nephrolithotomy. Urology Video Journal. 2020 Sep 1;7:100042.