

ORIGINAL ARTICLE

Management of Complications Secondary To Post Supracostal Mini Percutaneous Nephrolithotomy

Mati ur Rehman, Haris Hameed^{2*}, Naqib Ullah³

¹Department of Urology Pak International Medical College Peshawar, Pakistan.

²Department of Urology Khalifa Gul Nawaz Teaching Hospital, Bannu, Pakistan.

³Department of Urology Rehman Medical Institute Peshawar, Pakistan.

Abstract:

Background:

Objectives: The objective of the study is to share experience of management of complications secondary to supracostal mini percutaneous nephrolithotomy (PCNL) in tertiary care hospital.

Methods: This is retrospective study conducted in department of urology Khalifa Gul Nawaz teaching hospital Bannu from January 2018 to December 2020, age ranges from 14 years to 56 years, ⁹2 patients have right kidney stones and 68 has left side, 103 were male and 57 were female. All procedure was performed through supracostal single puncture. Mean size of stone range from 2.6 ± 1.2cm.

Results: Patients with supracostal mini PCNL were divided into 3 groups depend upon the access to kidney through intercostal space. Group 1 access between 11th and 12th rib, group 2 access between 10th and 11th rib and group 3 access between 9th and 10th rib. Among 12 patients who developed hydrothorax 4.3% (7) patients were managed conservatively 2.5% (4) patients needed needle aspiration while single patient undergone chest intubation in main operation theater. 1.25% (2) patients had bleeding intraoperative and managed conservatively with blood transfusion. 1.8% (3) patients had urosepsis and presented after 2 days of discharge from hospital and managed with intravenous empirical antibiotic.

Conclusion: The management of complications secondary to supracostal mini PCNL depends upon the vital signs, symptoms of patient, type and amount of fluid in the pleural space. The complications encountered with supracostal mini PCNL can be diagnosed and safely managed in urology ward in close collaboration with other specialized units.

Keywords: Hydrothorax, angioembolization, Intercostal chest intubation, mini percutaneous nephrolithotomy

How to cite: Rehman M, Hameed H, Naqib Ullah. Management of Complications Secondary To Post Supracostal Mini Percutaneous Nephrolithotomy. *Avicenna J Med Sci* 2021; 1 (2): 16-20

Introduction

The prevalence of renal stone is about 10% in Pakistan, has been increased in the recent past and male to female ratio is getting closed due to westernization of diet and sedentary life style(1). Before the era of endourology kidney stones were treated with

pyelolithotomy and nephrolithotomy which beside larger skin incision has many adverse effects on kidney function in long term. Kidney stone has a big impact on the health budget of every country and this is the reason that the treatment modalities are changing quickly as doctors are in search of the treatment which has less morbidity, more cost effective and early return to work(2).

There are various treatment options for kidney stones depend upon the size, type, location of stone and associated condition of the patients, which include medical therapies, extracorporeal shockwave lithotripsy (ESWL), percutaneous nephrolithotomy (PCNL), ureterorenoscopy (URS), retrograde intrarenal surgery (RIRS), open and laparoscopic surgery(3).

Nowadays PCNL is considered as the gold standard procedure for treating stone in kidney irrespective of the size and type of stone(4).

Corresponding Author: Haris Hameed Assistant Professor

Affiliation: Department of Urology Khalifa Gul Nawaz Teaching Hospital Bannu, Pakistan.

Email: haris_hamid1990@yahoo.com

Received: May 19, 2022

Revised: May 24, 2022

Accepted: May 30, 2022

DOI: [https://doi.org/10.59119/ajms.2022\(2\).1.3](https://doi.org/10.59119/ajms.2022(2).1.3)



This is an Open Access article distributed under the terms of the Creative Commons Attribution-Non Commercial 2.0 Generic License

eISSN 2958-2741 | pISSN 2958-2733

There are various approaches of getting access to PCS through PCNL i.e. subcostal and supracostal routes, most urologists and interventional radiologists use subcostal access for kidney stones but the author is using generously supracostal access for PCNL, as this approach is very dynamic and can easily access all calyces as well as proximal ureteric stones, though it has 10%-14% extra risk of chest complications(5) (6).

The purpose of this study is to recognize complications secondary to supracostal mini PCNL as early as possible and manage it effectively to decrease the patient's morbidity and overall health status of the patient(7). Similarly, we made certain modifications in our technique based on our clinical experience with supracostal PCNL, like the more lateral the puncture and puncture on full expiration to reach the surface of kidney and then penetration the kidney parenchyma on full inspiration resulted in decrease chest complications intraoperative and postoperative(8).

Methodology

This study was approved by the institutional review board of Khalifa Gul Nawaz teaching hospital Bannu, all patients signed an informed consent form and duration of study was from January 2018 to December 2020. Patients were sampled through nonprobability randomized technique all surgeries were performed by single surgeon under standard condition. There were 160 patients in the study 103 patients were male and 57 were female, 92 kidney stones were right side and 68 were left side and mean size of stone was 2.6 ± 1.2 cm as shown in table 1. All puncture was through supracostal access using 16Fr nephroscope and 18Fr sheath. Patients were divided into 3 groups based on access to PCS through supracostal route, group 1 puncture between 11th and 12th rib, group 2 puncture between 10th and 11th rib and group 3 puncture above 10th rib(between 9th and 10th). All patients were meticulously monitored post operatively and those who have intraoperative or presented postoperatively with complications of PCNL were managed as per standard guidelines

Results

There were 160 patients in the study 103 patients were male and 57 were female, 92 kidney stones were right side and 68 were left side and mean size of stone was

2.6 ± 1.2 cm as shown in table 1. Overall 7.5% (12) patients developed hydrothorax secondary to supracostal mini percutaneous nephrolithotomy. Among 12 patients who developed hydrothorax 4.3% (7) patients were managed conservatively 2.5% (4) patients needed needle aspiration while single patient undergone chest intubation in main operation theater as fluid in pleural cavity was not resolving. 1.25% (2) patients had bleeding intraoperative and who were managed conservatively with blood transfusion. 1.8 % (3) patients had urosepsis and presented after 2 days of discharge from hospital and managed with intravenous empirical antibiotics as shown in Table 2.

Table 1: Demographics and clinical characteristics of the patient sample (n=160)

Age	14 to 56 years
Gender No (%)	
Male	103 (64.2%)
Female	57 (35.8%)
Laterality No (%)	
Right	92(57%)
Left	68 (43%)
Stone Location No (%)	
	Pelvic stone 61(41.4%)
	Upper calyx 35(21.8%)
	Lower calyx 25(15.4%)
	Stag horn stones 21(12.7%)
	Proximal ureteric stone 17 (10.8 %)
No of patients in different groups No (%)	
group 1	124(76.5%)
group 2	30(18.7%)
group 3	6 (4%)

Table 2: Management of complication secondary to supracostal PCNL

Complication	Management	Frequency (%)
Hydrothorax	Needle aspiration	4(2.5%)
Hydrothorax	Chest tube intubation	1(0.6%)
Bleeding	Conservative with blood transfusion	2 (1.25%)
Urosepsis	iv antibiotics	3(1.8%)
Pelviureteric junction injury	Nephrostomy for double drainage	1 (0.6%)
Residual stones	Re PCNL	7 (4.3%)

Discussion:

Mini percutaneous nephrolithotomy has revolutionized management of kidney stone and all types of stones irrespective of size and type can be managed if surgical protocol is followed stickily. All procedures were performed in prone position under general anesthesia and complications encountered during surgery discussed with specialized units and managed accordingly (8). The author uses 16G spinal needle for puncture once glide wire stabilized in the system then single step dilatation is done and metallic amplatz is put in PCS, pneumatic lithoclast is used for stone fragmentation and stone retrieval is done with wash and bifrong forceps (9). During the procedure in close collaboration with anesthetist monitor oxygen saturation, positive oxygen pressure and sometimes uses ultrasound and fluoroscope to know the level of fluid in the pleural space (10). Blood is more hyper echoic than water on ultrasound scan (11). Twelve patients who developed hydrothorax or hemothorax were treated either conservatively, or needle aspiration of fluid or intercostal chest intubation (12-14). These treatment options depend on the patient clinical status (oxygen saturation, air entry, volume of fluid and type of fluid in pleural space) (15). Seven patients with hydrothorax were conservatively managed only with perurethral catheter and monitored with daily chest x rays to know the improve-

ment in hydrothorax, meanwhile patient clinical status (respiratory rate, chest expansion, air entry, oxygen saturation with pulse oxymeter) were monitored, in case clinical status deteriorated or hydrothorax not resolving then patients were actively managed with either needle aspiration or intercostal chest intubation (16, 17). Four patients with clear fluid in the pleural space who were symptomatic or hydrothorax were not resolving conservatively were treated with needle aspiration and 1 patient having hemothorax were treated with intercostal chest intubation (18). The most worrisome complication of percutaneous nephrolithotomy is bleeding and most bleeding secondary to pcnl can be monitored if it is not much excessive and Hb is stable the complete blood count should be repeated every 12 hours and if Hb is not dropping by 1g % every 24 hour all such patients can be managed conservatively if patients are hemodynamically stable. 3 patients with urosepsis were admitted all presented with fever. As per standard guidelines urine sent for culture and sensitivity and started as per local antibiotics protocol on intravenous empirical antibiotics and is charged after 2 days of stabilization (21).

Hanan Goldberg et. al, in their study concluded that the incidence of hydrothorax is significantly higher in nephrostomy group as compared to tubeless (djs only) group. AShaban et al in there study of 30 supracostal pcnl, 63.3% had one access to kidney while 37.7% had secondary access to kidney for stone clearance.6 patients had supra 11th access while 24 patients had supra 12th puncture .Intraoperative bleeding occurred in one patient, one patient had hydrothorax and one patient had pleurorenal fistula for which intercostal tube insertion done along with djs. All thoracic complications were in supra11th rib puncture (22). Sudhir sukumar et al in their prospective study of 110 supracostal pcnl in 11th intercostal space,101 patients had only one access while 9 patients had additional access to kidney for stone clearance, overall stone clearance was 86.4% with pcnl only and it reached to 97.3% with secondary procedures.10 patients had thoracic complications, two patients had intraoperative bleeding, one patient had perinephric collection of fluid and two patients had

sepsis. All patients with complications were managed conservatively with hospital stay ranges from 2 to 15 days. Our study shows that supracostal puncture between 11th and 12th rib for mini PCNL is safe procedure with risk of chest complications of 7.5% if surgical boundaries are not violated. The thoracic complications associated with supracostal pcnl can be managed in urology ward with consultation of pulmonologist. As the study has small sample size so it needs more randomization to know exactly the safety of supracostal mini PCNL and management of thoracic complications

Conclusions

The management of complications secondary to supracostal mini pcnl depends upon the vital signs, symptoms of patient, type and amount of fluid in the pleural space. The complications encountered with mini pcnl can be diagnosed and safely managed in urology ward in close collaboration with other specialized units.

Ethical approval and consent

The study was approved by the institutional board of studies and informed consent was obtained from each participants included in the study.

Acknowledgment

We thank the study subjects for participating in this study.

Disclosure

The authors report no conflicts of interest.

Author's contributions

MR was involved in the execution of the project. HH designed, executed the study and wrote the manuscript. NU helped in the editing. All named authors have read and approved the final version of the manuscript.

Data availability

Available from the corresponding author on reasonable request.

References

1. Curhan GC. Epidemiology of stone disease. *Urologic Clinics of North America*. 2007 Aug 1;34(3):287-93.
2. Strohmaier WL. Economics of stone disease/treatment. *Arab Journal of Urology*. 2012 Sep 1;10(3):273-8.
3. Raheem OA, Khandwala YS, Sur RL, Ghani KR, Denstedt DJEuf. Burden of urolithiasis: trends in prevalence, treatments, and costs. 2017;3(1):18-26
4. Meria P, Milcent S, Desgrandchamps F, Mongiat-Artus P, Duclos JM, Teillac P. Management of pelvic stones larger than 20 mm: laparoscopic transperitoneal pyelolithotomy or percutaneous nephrolithotomy? 2005;75(4):322-6.
5. El-Assmy AM, Shokeir AA, Mohsen T, El-Tabey N, El-Nahas AR, Shoma AM, et al. Renal access by urologist or radiologist for percutaneous nephrolithotomy—is it still an issue? 2007;178(3):916-20.
6. Soares RM, Zhu A, Talati VM, Nadler RBJU. Upper pole access for prone percutaneous nephrolithotomy: advantage or risk? 2019;134:66-71.
7. Kesar A, Jat KS, Suri A. To Study the Outcomes of Supracostal and Infracostal Access Approach in Treating Renal Calculi using PCNL (Percutaneous Nephrolithotomy).
8. Omaña P, Lantin PJPJoU. Analysis of Risk Factors of Complications in Percutaneous Nephrolithotomy at the East Avenue Medical Center. 2018;28(2):90-6.
9. Mücke VT, Fitting D, Dultz G, de Leuw P, Weiler N, Mücke MM, et al. Application of contrast-enhanced ultrasound to detect hepatic hydrothorax in patients with liver cirrhosis. 2020
10. Ridha A, Al-Abboodi Y, Fasullo MJGR, Practice. The outcome of thoracentesis versus chest tube placement for hepatic hydrothorax in patients with cirrhosis: a nationwide analysis of the national inpatient sample. 2017;2017.
11. Boersma WG, Stigt JA, Smit HJJRm. Treatment of haemothorax. 2010;104(11):1583-7.
12. Benson JS, Hart ST, Kadlec AO, Turk TJJoE. Small-bore catheter drainage of pleural injury after percutaneous nephrolithotomy: feasibility and out-

- come from a single large institution series. 2013;27(12):1440-3.
13. Bjurlin MA, O'Grady T, Kim R, Jordan MD, Goble SM, Hollowell CMJU. Is routine postoperative chest radiography needed after percutaneous nephrolithotomy? 2012;79(4):791-5.
 14. Baig MA, Majeed MB, Attar BM, Khan Z, Demetria M, Gandhi SRJC. Efficacy and safety of indwelling pleural catheters in management of hepatic hydrothorax: a systematic review of literature. 2018;10(8).
 15. Meyer DMJTsc. Hemothorax related to trauma. 2007;17(1):47-55
 16. Ogan K, Pearle MSJU. Oops we got in the chest: fluoroscopic chest tube insertion for hydrothorax after percutaneous nephrostolithotomy. 2002;60(6):1098-9.
 17. Tanaka Y, Taguchi K, Hamamoto S, Ota Y, Oda R, Yokota K, et al. Hemothorax during miniaturized endoscopic combined intrarenal surgery under ureteroscope-assisted ultrasound-guided access. 2019;2(5):257-60.
 18. Shaban A, Kodera A, Elghoneimy MN, Orban T, Mursi K, Hegazy AJJoE. Safety and efficacy of supracostal access in percutaneous renal surgery. 2008;22(1):29-34