

PCNL under local anesthesia with 3-week placement of nephrostomy tube before operation: A local study

Hayder I. Jawad¹, Omar Aziz Hassan², Yousif Salim Khalaf Alani³, Ehab Jasim Mohammad*⁴

¹(MBCHB, FICMS(URO), FRCS(Glasgow), Head of Endourology Committee of Arab Board Specialization in Iraq, Head of Urology at Al-Yarmouk Teaching Hospital /Iraq.

²Urologist in Al-Ramadi Teaching Hospital, Al-Anbar, Iraq.

³Urologist (FIBMS), Alkarama Teaching Hospital, Baghdad/Iraq

⁴FEBU, FABMS, FICMS, FRCS (GLASCOW), Consultant Urologist, Head of Department of Surgery/College of Medicine/ Ibn Sina University of Medical and Pharmaceutical Science/Iraq.

Abstract

Aim: To show feasibility and safety of PNL under local anesthesia and benefit of placement of nephrostomy tube before 3 week. **Patient and Methods:** 40 Patients selected from multi center in Iraq in our study with renal stone and those patient have major medical problem that prevent general or regional anesthesia so we have put a nephrostomy tube before 3 week of PCNL. Infiltration of nephrostomy tract deeply reaching parenchyma with lignocaine 2% under u/s guide and infiltration of subcostal nerve also then proceed to enter pcs. Study done in multicenter Al Yarmouk teaching hospital, Al safer private hospital, Imam Zhen Al Abdeen hospital, and Medical city hospital. Study started June 2018 end December 2020. 25 Patients have 25_40 mm renal pelvic stone, 5 patient have 15 impacted PUJ stone 5 Patients have single kidney with impacted renal pelvic stone 20mm. Other 5 patients uremic with impacted upper ureteric stone where unrolled in our study. All patients monitored for: Pain during operation; Bleeding during and post; Access feasibility; Stone clearance; Time of operation; Radiation time. **Result:** 10% of patients feel little discomfort relieved by paracetamol vial I.V No significant bleeding during procedure. Easy access and no difficulty. 96% clearance of the stone. Mean time of operation 20_ 50 minutes. **Conclusion:** Placement of nephrostomy tube 3 week before PCNL make the operation easy and decrease the time of operation, no radiation exposure less bleeding and you can make any position mainly lateral. **Keyword:** PCNL under local anesthesia, severe comorbidity with renal stone, renal stone with nephrostomy.

Keywords: health; nephrostomy tube ; patients; local anesthesia

1. Introduction

Since long time ago first removed of the renal stone through a nephrostomy tract in 1976 by Fernstrom and Johansson (1). PCNL dramatically changed and is continuing to modify for new modality and new approach all aiming to safe the patient, low cost easily operation. PCNL now is a gold standard management of large renal stone it has the possible advantage of better stone clearance rates, cost effective, recovery of function of organ and patient in comparison with other modalities such as SWL and open stone surgery. (2, 5)

Recently there has been an increased interest in performing endourological procedures including PNL under Local anesthesia this is because of most of physicians increased experience with technique (PNL), rising cost of health care and limited operation time required for procedures. (3) make some physicians make much modalities of anesthesia keeping patients well and especially old patient with renal stone and comorbidity that have high risk for general and spinal or regional

anesthesia. (4)

Both kidney position in upper quadrant of abdomen and these area supply by subcostal nerve and T9, T10, T11 and T12. So, if we infiltrated this area deep to the muscle reaching to gerota reaching to the parenchyma it's give good anesthesia reaching umbilicus make us entering kidney without pain. (5) the most painful structure in renal tissue are renal capsular and parenchyma so we need deep infiltration of lignocaine 2% (5) So we chose most of our patients old and have disease with high risk of general anesthesia and spinal or regional anesthesia.

2. Patient and methods

40 Patients enrolled in our study all have unfits for general or spinal, regional anesthesia and some have high risk for any anesthesia. All patients accepted our method of operation and given a written consent.

The study done in multi-center in Iraq (Al Yarmouk teaching hospital ,medical city hospital ,Imam zhein Al Abdeen Hospital, and Al Sefer hospital) department of urology. The duration of study

started from June 2018 to December 2020.

Our technique two step 1st step we introduced a nephrostomy tub to all patients 3 week before PCNL under u/s guidance. We use bolt in type nephrostomy tub set with curved tip semi rigid end guide wire (J tip) this type of wire not cause any injuries to the pelvicalyceal system in addition it have spirited shaft make introduce other dilates easily and quickly. These procedures done under u/s guidance in our patients' clinics.

After 3-week patients admitted to hospital to prepare for 2nd step PCNL operation.

Patient's selection:

1. Patient with unfit for general and spinal or regional anesthesia.
2. Patients with obstructed kidney.
3. Uremic patient with bilateral obstructed uropathy.
4. Old patients with high risk and not tolerated prone position.

Start operation we infiltrated around nephrostomy tub tract deeply till gerota and reaching renal capsular, parenchyma with lignocaine 2% , infiltrated subcostal nerve along inferior border of 12 rib .

Access and dilatation started under US guidance and we have already tract 14 fr so we started 14 fr dilators and go on . In a selected case we check our access by using mini or smerigid ureteroscope through dilators 14 fr sheath for sure we are inside pcs and stone size if the stone size below 15 mm procedures finished with laser dusting or fragmentation or pneumatic and clearance of the stone. If stone more continues our dilatation till 24 and finished stone. We use fluoroscope in 10 patients for check our access.

All patients monitored for:

1. Pain during operation.
2. Bleeding during and post.
3. Access feasibility.
4. Stone clearance.
5. Time of operation.
6. Radiation time.
7. Infection and fever.

3. Results

30 Patients with sever comorbidity having hypertension and diabetic for long time.

5 Patients uremic with severe hydronephrotic kidney.

3 Patients paraplegic with large pelvic stone.

2 Patients with old spinal cord injury leading to quadriplegia with obstructed pelvic stone.

Mean age of patients 45____65 years.

32 Patients male and 8 patients female.

25 Patients with pelvic renal stone 25mm____40mm large renal stone.

5 Patients with 15 mm impacted PUJ stone.

5 Patients with single kidney and impacted renal stone.

5 Patients with uremic with impacted upper ureteric stone and they have symptoms of septicemia.

30 Patients access and clearance of the stone checked with U/S guidance.

10 Patients access with U/S guidance and clearance with fluoroscope guidance. Low dose.

15 Patients use mini nephroscope and sheath 14 fr with laser for clearance from the stone.

All 25 Patients clearance with pneumatic with sheath 24 fr and check for clearances by flexible nephroscope to check all calyx.

4 Patients complain from little discomfort and pain reliving by IV paracetamol vial.

10% complain from pain.

No significant bleeding during procedures.

Access easily and quickly.

38 Patients with complete clearance from the stone 96% clearance rate.

Mean time of operation 20__50 minutes.

Radiation exposure time very little 1__1,5 minute.

2 of diabetic patients complain from fever treated by admission to hospital for 3 day and discharge very well.

4. Discussion

The progresses in development of new modality, instrumentation make us change to a modern management of urolithiasis , this progresses make urologist select a variety of minimally invasive treatment options for urinary calculi including SWL ,URS and PNL .

Our study inserts nephrostomy tub 14 FR 3 week prior to PNL to creat a tract between skin and PCS by this granulated tract can enter PCS easily.

We use local anesthesia in PNL because of we found in our experience in PNL too much patients with sever comorbidity had higher risk for general or spinal or regional and cost suppression (5,6) decrease postoperative hospitalization and morbidity.

Clay an et al.in 1983 reported his early experience with four cases of complex renal stone treated by combined chemolysis and electrohydrolic lithotripsy under local anesthesia.

Preminger et.al in 1986 did 5 cases of small renal stone by PNL under LA. (7)

Our study we have already granulated tract so its easy to infiltrate local anesthesia around tract reaching to renal capsular and parenchyma.

In 2006 Dalela et.al novel techniques for performing PNL under LA he inject lignocaine directly at the site of renal entry for renal capsular block in 11 patients with a well tolerated the technique.(6)it's different from our study we modified technique by fixation a nephrostomy tub 14 FR 3 week prior to PNL makes tract granulation and easy entering PCS by dilators and sheath 14 FR and mor . So we are easily to get access inside PCS within a minute and complete our duties inside kidney.

If the stone less then 10 mm its easy to get outside without fragmentation if its mor then 10–20 sometimes use mini nephroscope of flex URS or semirigid URS to compleat clearance be cause our

duties clean the kidney with minimal effect on renal tissue and patients morbidity. According to our study no significant bleeding or other PNL complication happened.

There are many theory explain the cause of pain during PNL one is renal capsular and parenchyma dilatation rather than stone disintegration so our target in LA in PNL is renal capsular and parenchyma. (8)

We use lateral position in our study to avoid complication of prone position (9) espically our patients have sever comorbidity and most of them not tolerated prone position for long time.

Pain is subjective symptom ,many factor had identified one of them is duration of operation , Lang et.al reported duration of procedures important factors effect the pain .(10)our duration 20__50 minutes and most of patients comfortable during the procedures. In addition to less exposure to radiation because we can use radiation only for checking large stone clearance and we use U/S guidance in two step of our study in placement of nephrostomy or access for PNL.

Regarding to other complication of PNL there is no significant bleeding happened during procedures and no need for blood transfusion.

Two patient's diabetic have postoperative high fever they treated well in hospital

No access failed because already we have good tract 14 FR.

5. Conclusion

1. PNL under LA very good solution for high risk and sever comorbidity patients unfit for general, spinal or regional anesthesia.
2. Introducing nephrostomy tub 3 week prior to PNL is highly recommended especially in hydronephrotic obstructed kidney that drain the pus inside kidney and decrease bd urea creatinine in uremic patients.
3. Creating granulated a nephrostomy tract 14 FR make easily access, less radiation affects, less complication, and shorter time of operation.

Reference

1. Fernstrom I, Johansson B. Percutaneous pyelolithotomy: a new extraction technique. *Scandinavian Journal of urology and Nephrology* 1976; 10: 257-9.
2. Kukreja R, Desai M, Sabins RB, Patel SH . Factors affecting blood loss during percutaneous nephrolithotomy :prospective study .*Journal of Endourology* 2004;18(October (8)):715-22 .
3. Turk C, Knoll T, Petrik A .Guidelines on urolithiasis . Arnhem , The Netherlands :European Association of urology ;2010 updated 2016 .
4. Karatag T , Buldu I , Inan R , et al : Is micro percutaneous nephrolithotomy technique really efficacious for the treatment of moderate size of renal calculi ? Yes. *Urol Int* 2015; 95: 9-14.
5. Gokten OE, Kilcarslan H, Dogan HS, et al:

Efficacy of levobupivacaine infiltration to the nephrostomy tract in combination with IV paracetamol on postoperative analgesia in percutaneous nephrolithotomy patients. *J endourology* 2011; 25:35-39.

6. Dalela D, Goel A, Singh P ,Shankhwar SN. Renal capsular block: a novel method for performing percutaneous nephrolithotomy under local anesthesia. *Journal of Endourology* 2004; 18: 544-6.

7. Preminger GM, Clayman RV Curry T, Redman HC , Peters PC. Outpatient percutaneous nephrolithotomy. *Journal of Urology* 1986; 136: 355-7.

8. Wang J, Zhang C, Tan D. The effect of local anesthetic infiltration around nephrostomy tract on postoperative pain control after percutaneous nephrolithotomy: a systemic review and meta-analysis 2016 *urologic internationalis* 97(2); 125-133.

Jason Chui, Rosemary Ann Craen. *Canadian Journal of anesthesia* 63; 737-767 2016.

9. Lang EV, Benotsch EG, Fick LJ, Lutgendorf S ,Berbaum ML ,Berbaum KS, et al . Adjunctive nonphar-macological analgesia for invasive medical procedures: a randomized trail. *Lancet* 2000; 355:1486-90.