Research Paper

Volume : 3 | Issue : 4 | April 2014 • ISSN No 2277 - 8179

Tap Water As Irrigation Fluid in Percutaneous Nephrolithotomy

Medical Science

KEYWORDS : Percutaneous nephrolithotomy, autoclaved tap water, hyponatremia, irrigation, kidney calculi

*** Dr. Prashant Hansraj Salvi**	Resident Department of Surgery, Bharati Hospital and Research Centre, Pune. * corresponding author
Dr.Ketan Vartak	Faculty Department of Surgery, Bharati Hospital and Research Centre, Pune
Dr. Sudhir Shinde	Faculty Department of Surgery, Bharati Hospital and Research Centre, Pune

ABSTRACT

The study was to evaluate the safety and efficacy of tap water as irrigation solution in percutaneous nephrolithotomy.

237 patients with kidney calculi underwent PCNL using tap water after autoclaving as irrigation fluid. Two blood samples were taken to determine serum sodium and potassium levels just before the operation, an 12 to 18 hours after.

There were no incidences of hyponatremia in any patient undergone PCNL using tap water as irrigation fluid. No untoward effects on renal function, UTI's, cardiac events.

Absorption of the irrigation fluid during the endoscopic procedures has been reported even in ureteroscopy.(1) According to the result of our study there was not much difference in the levels of sodium/ potassium pre and post PCNL.

Tap water is an inexpensive alternative for irrigation during PCNL with no post PCNL complications and so it can be used safely as irrigation fluid during PCNL.

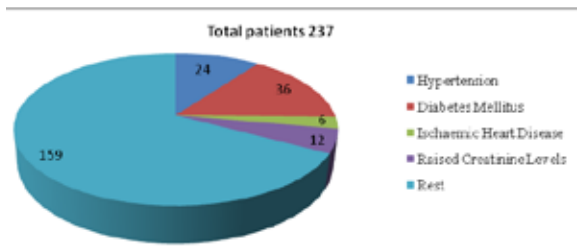
INTRODUCTION

Percutaneous nephrolithotomy (PCNL) is the standard treatment for most kidney calculi that are not good candidates for extracorporeal shock wave lithotripsy (SWL) or not responding to it. Its advantages over open surgery include the lower cost, less postoperative pain, shorter hospital stay, and minimal scarring.[1,2] However, this endoscopic procedure is associated with a number of potentially serious postoperative complications. One of them is rapid absorption of irrigating solution and results in hemodilution similar to the fluid absorption in transurethral prostate resection.[3] Also, there are some published studies that have reported hyponatremia after PCNL.[4,5] To prevent this complication, normal saline has been recommended for irrigation purposes.[6] Cost of autoclaving 10 litres of tap water comes around approximately 5o INR and cost of 10 litres of Normal Saline is 400 INR, they average use of irrigation fliud is 5-6 to 10-12litres so much of cost is also saved. Tap water is available and cheap and we have been using tap water for PCNL in our center during the past few years. Since we did not experience any significant complication, we decided to evaluate the safety of using tap water as the irrigation fluid for PCNL

MATERIALS AND METHODS

237 patients with kidney calculi underwent PCNL. The diagnosis of calculus was made by ultrasonography and plain abdominal radiography, IVP, CT urography. Among these 12 patients had raised creatinine levels pre-op, 36 patients were diabetic, 24 patients were hypertensive and 6 patients were suffering from ischaemic heart diseases.

Laboratory studies including complete blood count, blood urea nitrogen (BUN), plasma creatinine, sodium, potassium, hemoglobin, and urinalysis were performed on the day before and 12 to 18 hours after the operation. Induction of general anesthesia was achieved with the same method for all of the patients with thiopental, atracurium, and fentanyl and continued with isoflurane also Spinal and Epidural anaesthesia used. A 5-F ureteral catheter was placed and anchored to a Foley catheter, and then, the patient turned to the prone position with appropriate padding. Percutaneous access to the renal collecting system was established under the guidance of monoplane fluoroscopy by the use of a 18-gauge percutaneous needle. Then, the tract was dilated with telescopic metal dilators. Amplatz sheath of sizes varying from 22 Fr. till 30 Fr. (outer diameter) were used (open method.) Calculus fragmentation was performed with pneumatic lithotripsy using a rigid nephroscope. Irrigation was performed with autoclaved tap water with the reservoir being kept at a height of 80 cm from the patient.



The ureteral catheter was removed after 48 hrs of the procedure. Intravenous isotonic saline was infused during and after the operation. The dose was calculated by the anesthesiologist according to the ongoing and insensible water loss, as well as blood pressure; hence, it was individualized for each patient and included 100 mL/kg for the first 10 kg of the weight, 50 mL/kg for the second 10 kg, and 20 mL/kg for the remainder of weight, plus 15 mL/kg/d as the insensible water loss. However, when hypotension was encountered during the operation, additional booster doses of isotonic saline were administered to keep the systolic blood pressure above 100 mm Hg. The patient was kept nil per os 4-6 hours, when the intravenous fluid was discontinued and oral intake started. Pulse oxymetry and non-invasive monitoring of the cardiac function and blood pressure were established during the operation and in the recovery room. The patients were continuously checked for restlessness, confusion, incoherence, coma and seizures, in the recovery room, and at 3-hour intervals in the ward for the next 24 hours, afterwards. The parameters such as pulse, blood pressure, ECG changes, serum electrolytes, sensorium, Hb changes, cardiac events, septicaemic episodes were taken into considerations. Comparison of values measured before and after the procedures were done

RESULTS

In 89% patients, PCNL was performed using the access from the inferior calyx, 8% mid calyx and 3% upper calyx. Target stone-free rate was 96%, while complete stone-free rate was 81%. The mean hospital stay was 2-3 days The serum levels of sodium and potassium are listed in Table 1. There was no difference between sodium values before and after the procedure. All the measured electrolytes were within the reference ranges. None of the patients developed hyponatremia and transfusion was required only in 5 to 7% of patients. 11.3% patients developed UTI post-op, patient with known cardiac risks were shifted to ICU for 24 hours post-op for observation, ICU stay was uneventful. No untoward effects on renal function, UTI's, cardiac events.

Table 1. Blood Laboratory Values Before and After Percutaneous Nephrolithotomy Using Tap Water

Parameter	Before	After
Sodium, mEq/dL	140.80 ± 3.30	140.40 ± 1.90
Potassium, mEq/dL	4.16 ± 0.30	4.00 ± 0.56
Creatinine, mg/dL	1.10 ± 0.22	1.20 ± 0.31
Hemoglobin, g/dL	14.50 ± 1.15	13.68 ± 1.17

DISCUSSION

Absorption of the irrigation fluid during the endoscopic procedures has been reported even in ureteroscopy.[1] Irrigation solutions are widely used in endourological procedures for better vision. Ideally, they should be isotonic, nonhemolytic, nontoxic, transparent, easy to sterilize, and inexpensive. However, such a solution is not yet available. Solutions such as isotonic saline or Ringer Lactate are least harmful when absorbed into the circulation.

The concern about using tap water were: Hyponatremia, hypokalemia, water absorption, hemolysis, infection-sepsis, untoward systemic complications- cardiac/ cerebral/ renal etc.

To our knowledge, there is no study evaluating tap water as irrigation fluid for PCNL. Tap water is cheap and easily available. According to the results of our study, there was a no difference between the serum sodium levels of the serial samples taken before and after the operation. We found no case of symptomatic or asymptomatic hyponatremia among our patients

CONCLUSION:

Tap water is an inexpensive alternative to isotonic saline for irrigation during PCNL. According to our findings, using tap water during PCNL for irrigation does not cause any clinically significant decrease in serum levels of sodium. There were no post PCNL complications related to tap water use in any of our patient. Larger studies on the efficacy and safety of tap water for irrigation in endoscopic procedures are warranted.

DRUM SYSTEM IN OT WITH THE STAND:



AUTOCLAVE UNIT:



REFERENCE

1.Cybulski P, Honey RJ, Pace K. Fluid absorption during ureterorenoscopy. J Endourol. 2004;18:739-42 | 2. Fellahi JL, Richard JP, Bellezza M, Antonini A, Thouvenot JP, Cathala B. The intravascular transfer of glycine during percutaneous kidney surgery. Cah Anesthesiol. 1992;40:343-7 | 4. Lauritz JB. Hyponatremic coma following percutaneous nephrolithotomy. Anaesth Intensive Care. 1986;14:210-1. | 5. Chou CH, Chau T, Yang SS, Lin SH. Acute hyponatremia and renal failure following percutaneous nephrolithotomy. Clin Nephrol. 2003;59:237-8 | 6. Seyed Mohammad Kazem Aghamir,1 Farshid Alizadeh,2 Alipasha Meysamie,3 Shadi Assefi Rad,4 Ladan Edrisi. Sterile water Versus Isotonic Saline Solution as Irrigation Fluid in Percutaneous Nephrolithotomy. Urology Journal Vol 6 No 4 Autumn 2009 |