



## Tubeless, Stentless Percutaneous Nephrolithotomy: An Initial Study

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### ABSTRACT

**Objective:** To study the ability of rendering our patients tube and stent free after percutaneous nephrolithotomy (PNL).

**Patients and Methods:** Between February 2011 and March 2012, 38 patients (40 units) with 20 to 60 mm (mean: 31.17) renal stones underwent tubeless stentless PNL. The sample consisted of 28 males and 10 females, and their ages ranged between 17 and 65 years (mean: 33.7). Twenty-two cases were in the right kidney while 18 were in the left, and the stones were bilateral in 2. Most of the stones were in the renal pelvis and lower calyx and removed through the lower calyx subcostal with a single puncture. After ensuring that the patient was almost stone free, no nephrostomy was left and the ureteric catheter was removed within 30 minutes.

**Results:** Operative time ranged between 15 and 80 mins (mean: 42.34) and no blood transfusion was needed. The mean reduction in hemoglobin level was 1.52 gm (range: 0.3 to 4.8) and the hospital stay ranged between 12 to 36 hours (mean: 17.7). The success rate was 100% while the stone free rate was 95%. Analgesia was needed in 20% of cases. There were no intraoperative complications while postoperative complications occurred in 3 patients (7.9%) in the form of leakage, perirenal collection, and secondary hemorrhage.

**Conclusion:** Tubeless, stentless PNL is safe with acceptable complications, provided patients are stone free with no or minimal extravasations, have acceptable bleeding, and there is a single puncture. It decreases hospital stay, postoperative pain, and the need for analgesia, and subsequently lowered work abstinence. A further study with a larger sample is needed.

### INTRODUCTION

In recent years, percutaneous nephrolithotomy (PNL) has replaced open surgery in treating renal stones. Nephrostomy tubes with different diameters were the standard postoperative method for drainage, aiming at tamponade bleeding [1,2]. However, postoperative pain and prolonged hospital stays proved to be outcomes [3,4]. Hence it was recently replaced by either the double-J stent or externalized ureteric catheter [1,5],

which was known as tubeless PNL. Further advancement in PNL is omitting both the nephrostomy tube and ureteric catheter or double-J stent; this is known as totally tubeless PNL [3,6].

### PATIENTS AND METHODS

Between February 2011 and March 2012, 38 patients (40 units) out of 350 patients admitted to our department for PNL and underwent tubeless stentless percutaneous nephrolithotomy

**KEYWORDS:** Stentless, tubeless, PNL

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(TSPNL). The files were retrospectively reviewed in order to study the outcome.

After obtaining approval from the medical committee and written consent from the patient, we made a decision to enroll him/her for TSPNL. Our inclusion criteria were: the patient must be stone free with acceptable bleeding, no or minimal extravasation, and a single puncture.

Under general anesthesia, a ureteric catheter of 6 Fr was inserted with a 14 Fr Foley urethral catheter. Thirty-six patients were treated in the prone position while 2 patients were treated in the supine position (the standard method). Our method of tract dilatation used the one-shot dilatation method through insertion of a 30 Fr Amplatz dilator over the central Alken, and then sliding a 34 Fr Amplatz sheath over. Bilateral PNL was done in 2 patients, 1 simultaneously and the second was staged. Toward the end of the procedure, we examined the pelvicalyceal system by nephroscope and by fluoroscopy guidance to be sure that the patient was stone free. Retrograde pyelography was done so there was no or minimal extravasation, the Amplatz sheath was removed (tubeless), and the wound was stitched using o/silk. The ureteric catheters were removed within 30 minutes, and 1 hour later the Foley catheter was also removed. The patients were transferred to the ward and observed for pain and analgesic need. Hemoglobin (Hb), kidney, ureter, and bladder X-rays (KUB), and abdominal ultrasound during the first postoperative day were routinely done.

## RESULTS

The stone burden was 20 to 60 mm (mean: 31.17) in the greatest diameter. Operative time was between 15 to 80 mins (mean: 42.34). There were 2 patients who had bilateral kidney stones; in one, both sides were treated simultaneously (Figure 1a, Figure 1b, Figure 2) while the other one was staged. No patient needed a blood transfusion and the Hb drop ranged between 0.3 to 4.8 gm (mean: 1.65). Eight patients (20%) needed analgesia in the form of 75 mg of declofenac (once in 5, twice in 1), 50 mg of tramadol in 2, and the rest (80%) did not need any. Hospital stay was 12 to 24 hours (mean: 17.4) with only 1 patient needing 36 hours due to urine leakage. The success rate was 100% while the stone-free rate was 95%, as 2 patients had residual 4 mm lower calyceal stones. Postoperative complications occurred in 3 patients (7.9%): 1 developed mild retroperitoneal collection and was treated conservatively; another developed leakage stopped by double-J stent insertion; and the third developed bleeding 5 days after discharge, was readmitted, and was given 2 units of blood with embolization.

## DISCUSSION

The technique of PNL has been steadily refined and improved since its development in the 1970s. During this process of evolution,

Figure 1a. Preoperative KUB.



there was a tendency to drain the kidney percutaneously in the belief that this was the safest option while also allowing a second-look procedure [6]. Omitting a nephrostomy tube was established without serious complications. Lastly, avoiding ureteric stenting with a double-J stent, or externalized ureteric catheter, is the most recent improvement in the PNL technique in selected patients [7]. As ureteric stenting is associated with significant symptoms, it has been necessary to devise validated stent symptom scores for use in trials [8]. Also, the necessity for performing a cystoscopy for removal with potential for further morbidity can be avoided by the use of an externalized ureteric catheter [9].

There was no significant postoperative ureteral obstruction. This is attributed to the careful selection of patients with minimal or no residual stone load. Also, the potential for clot colic is probably not as likely as might be expected, because it's well established that urine has a thrombolytic effect due to the presence of urokinase [10].

Figure 1b. Preoperative IVP.



Figure 2. Postoperative KUB..



Gupta et al. performed totally tubeless PNL on 96 patients, with symptomatic lower calyceal stones < 1 cm that were resistant to extracorporeal shockwave lithotripsy [11]. All patients were stone free with minimal morbidity and shorter hospital stays. Istanbuloglu et al. compared totally tubeless PNL with standard PNL, with a mean stone burden of 448.93 and 453.35, respectively, and found that totally tubeless PNL can be performed safely in selected patients when there is no major bleeding or perforation of the collecting system, no residual stone fragments, or congenital anomalies. Analgesia requirement and hospital stay are significantly less than with the standard method [12]. A limited number of tubeless PNL in children were reported [13], with only 1 study with a limited number of cases of totally tubeless in preschool children, which was performed by Oztrurk et al. They stated that the maneuver is safe and effective with no significant difference between it

and the standard method in terms of analgesia hospital stay [14]. The stone size was 15.24 mm.

From our point of view there was a tendency to make PNL a day case as the hospital stay was less than 24 hours in most cases (mean: 17.4). Also, the stone size was 2 to 6 cm (mean: 3.41), which means that the stone burden was increased in comparison to previous studies [4,11,14].

Few minor complications occurred and were managed conservatively; apart from serious bleeding that occurred in 1 patient who needed readmission and was treated by embolization. Analgesia was needed in only 20% of patients and blood transfusion was needed in 1 case.

## CONCLUSION

Stentless, tubeless PNL is a useful option to consider. It has



the advantages of decreased postoperative pain, analgesia need, and hospital stay; decreased cost; and less missed work. It should be restricted to patients who are stone free with acceptable bleeding, and a single puncture without or with minimal extravasation. Further studies with a larger sample may decrease these limitations.

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