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Supine pediatric percutaneous nephrolithotomy (PCNL)

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Summary

Introduction/background
Many authors reported their experience with supine PCNL in adult population comparing the outcome with prone PCNL and they found that the stone free rate and the operative time were in favor of prone PCNL with a lower patient morbidity among patients with supine PCNL. This encouraged us to perform supine PCNL in pediatric population.

An objective
In this study we evaluated the safety and efficacy of supine PCNL in pediatric population.

Study design (subjects/patients/materials/methods)
Between April 2011 and February 2014 a total of 27 children (6 girls and 21 boys) presented with renal calculi. The stones were single pelvic stone in 14 cases, pelvic stone with lower calyceal stones in 7 cases and pelvic stone with upper calyceal stones in 6 cases. The mean stone size was 32 mm (range 20–47 mm). All patients were managed with supine PCNL performed by a single surgeon. Marking the posterior axillary line in standing position before the operation is a mandatory initial step. The patients were placed in supine position with elevation of the ipsilateral shoulder and hip by means of two bags one underneath the shoulder and the other underneath the hip to widen the operative field. The technique was performed using a sheathless 19 fr. Richard wolf rigid nephroscope after acute tract dilation by amplatz dilators. Complications (intraoperative and postoperative) and stone free rate rates were reported.

Results
A single lower calyceal access was used in all cases through which we could successfully remove even the upper calyceal stones. Kinking of the guide wire during tract dilatation were encountered in 4 cases and the guide wire was successfully exchanged using a small Teflon dilator in 2 cases while ultrasonographic guided lower calyceal repuncture was done in 2 cases. The average operative time (from the beginning of the puncture trial to nephrostomy tube insertion) was (41 ± 15) min. The operation was successfully completed as planned in all cases with two cases of intraoperative complications (one case of pelvicalyceal system perforation and another case of intraoperative bleeding and blood transfusion). The initial stone free rate was (92.5%). Postoperative complications was reported in the form of 2 cases of fever that respond to medical treatment for 72 h.

Discussion
The main advantages of supine pediatric PCNL is that it is comfortable for the surgeon, the anesthetist and the child. The main disadvantages of supine pediatric PCNL is that it is not familiar for most urologists and small field of operation. The short outcome of our study is the small number of cases and the lack of comparative study with prone pediatric PCNL.

Conclusions
Pediatric supine PCNL is a safe and effective method for management of pediatric renal stones. It carries the advantages of easily upper calyx access through the lower calyceal tract, low incidence of fluid absorption or hypothermia and easy anesthesia monitoring. However a larger number of cases are needed to be evaluated.

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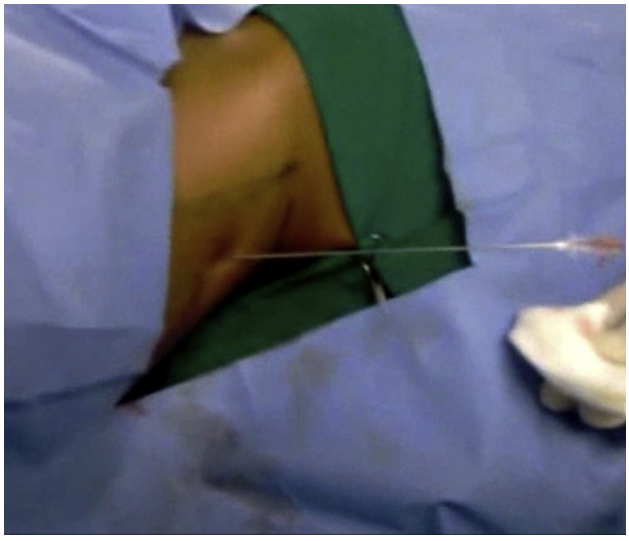

Figure Supine positioning with marked posterior axillary line and the needle puncture is horizontal.

Introduction and objectives

Pediatric percutaneous nephrolithotomy (PCNL) is recommended in cases of large stone burden or failed ESWL [1]. Many centers have reported experience in pediatric prone PCNL with high success rate [2]. Also, many authors have reported experience with supine PCNL in adult populations comparing the outcome with prone PCNL, and it has been found that stone-free rate and operative time are in favor of prone PCNL with a lower patient morbidity among patients with supine PCNL [3]. This encouraged us to perform supine PCNL in a pediatric population, to evaluate the safety and efficacy of this technique among pediatric group patients. To our knowledge, this is the first series reporting the outcome of supine pediatric PCNL.

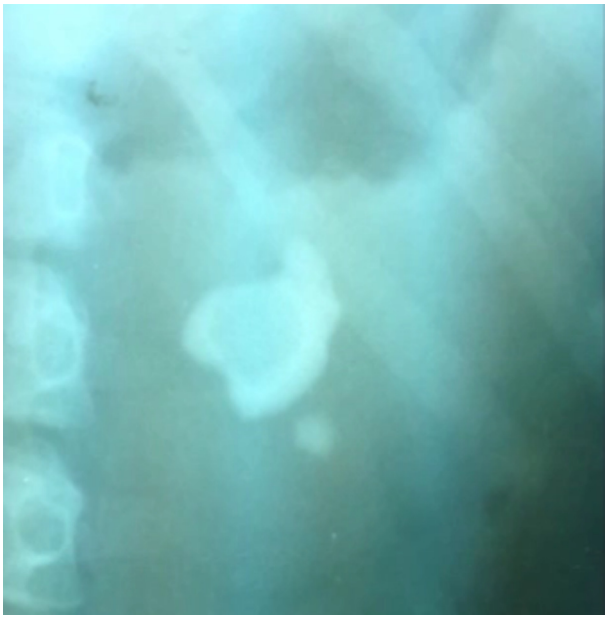

Figure 1 Plain X-ray showing stone pelvis and lower calyceal stone.

Figure 2 Supine positioning with flank and pelvis elevation with marked posterior axillary line.

Patients and methods

Laboratory tests, abdominal ultrasound, plain urinary tract and intravenous urography were done for all cases. If needed, noncontrast computed tomography scanning was done in patients with radiolucent stones. Patients with positive urine culture were managed with preoperative appropriate antibiotics.

Marking the posterior axillary line in a standing position before the operation is a mandatory initial step. All procedures were done under general anesthesia with continuous monitoring of temperature using the nasopharyngeal probe and continuous monitoring of the volume overload through the central venous pressure. The first step was insertion of a retrograde 5 fr. ureteric catheter in the lithotomy position. Then the patient was placed in supine position with the operating side close to the operating table edge keeping the child in an oblique position by means of two bags, one underneath the shoulder and the other underneath the ipsilateral hip joint. This position provides a flank-free area that gives a wider range for nephroscopic movement (Fig. 2). Then, the 12th rib and the iliac crest were marked. The ipsilateral arm was put on the thorax as described with Barts modified Valdivia supine position. Soft pads were applied under all the pressure points.

The operator was working in a sitting position. A fluoroscopy-guided puncture using an 18 fr. puncture

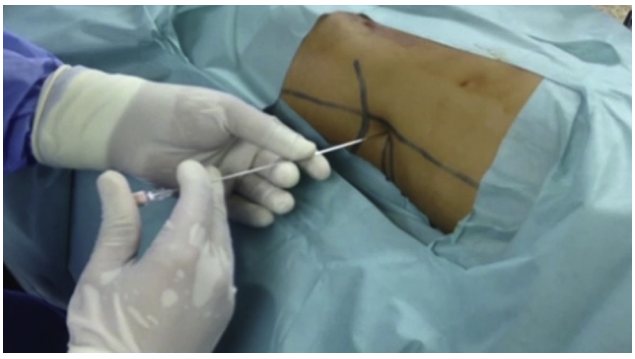

Figure 3 Horizontal access.