Paediatric Percutaneous Nephrolithotomy (PCNL)

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ABSTRACT

Objective: To describe Paediatric Percutaneous Nephrolithotomy (PCNL) in terms of safety and efficacy in a group of 26 children.

Study Design: An observational study.

Place and Duration of Study: Shifa International Hospital, Islamabad, from January 2011 to June 2013.

Methodology: PCNL of 26 children was done by standard technique. The patients were analyzed for age, gender, presenting symptoms, stone size, site, PCNL approach, operative time, stone clearance, hospital stay and per-operative and postoperative complications. Descriptive statistics were obtained.

Results: The mean age was 9.21 ± 5.70 years. Seventeen (65.4%) patients were male whereas 9 (34.6%) patients were female. Flank pain was the most common presenting symptom. Mean stone size was 2.21 ± 1.04 cm. Mean operative time was 158.8 ± 39.63 minutes and mean hospital stay was 2.84 ± 1.14 days. Postoperative transfusion was required in only one case (4%). There was no episode of sepsis or perinephric collection. Per-operative stone clearance was 93.28% ± 9.23%. Conversion to open was seen in one (4%) case. DJ stent was placed in 7 (27%) cases.

Conclusion: PCNL is a safe and effective way of treating renal stones in paediatric age group.

Key Words: Renal stones. Percutaneous Nephrolithotomy (PCNL). Paediatrics renal stones.

INTRODUCTION

Renal stone disease is one of the most common urological disorders recognized since ancient times. The prevalence of renal stone is approximately 2 - 3% in the general population.¹ The estimated lifetime risk of developing a kidney stone is about 12%.¹ Pakistan is located in stone belt region with very high incidence of urolithiasis.² Renal stones are not uncommon in children and overall incidence of nephrolithiasis in the paediatric population appears to be increasing at a rate of 4% per year.³

PCNL is the procedure of choice in patients having renal stones of size more than 2 cm in adult population.⁴ Miniaturization of endoscopic instruments has made it possible to do minimally invasive endoscopic procedures for renal stones in children as well.⁵

The objective of this study was to describe Paediatric Percutaneous Nephrolithotomy (PCNL) in terms of safety and efficacy in a group of 26 children.

METHODOLOGY

It was a retrospective observational study of 26 children who underwent PCNL, from January 2011 to June 2013 at Shifa International Hospital, Islamabad. All the children below the age of 17 years with uncomplicated renal stones who underwent PCNL were included in the study. Patients with anatomic abnormalities of the kidney (horseshoe kidney/malrotated kidney), complex staghorn stones, pathogen-positive urine cultures, deranged renal functions and bleeding disorders were excluded from the study.

PCNL was done by a standard technique. All procedures were done under general anaesthesia. Three French (Fr) open end catheter was passed cystoscopically upto renal pelvis in lithotomy position under fluoroscopic guidance. The patients were then put in prone position. Under fluoroscopic guidance, pelvi-calyceal system was punctured using 23 Fr spinal needle. The glide wire was passed through spinal needle into pelvi-calyceal system. The tract was dilated using metallic dilators over the glide wire. A 27 Fr PCNL sheath was introduced over metallic dilators into pelvi-calyceal system under fluoroscopic guidance. A 26 Fr paediatric nephroscope was then introduced through PCNL Sheath. Pneumatic lithoclast was used to break the stones and three-prongs grasper was used to extract the stone fragments.

Nephrostomy tube was passed in all patients and removed on the second postoperative day. The patients were noted for age, gender, presenting symptoms, stone size, site, PCNL approach, operative time, stone clearance, hospital stay and per-operative and postoperative complications (sepsis, perinephric collection, haemorrhage). Sepsis was defined as postoperative fever (temperature more than 38 or less than 36 degree centigrade), pulse more than 100/minute, respiratory rate more than 20/minute, TLC more than 12000/mm³ or less than 4000/mm³. Per-
Table I: Patient characteristics.

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Number of patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>17 (65.4%)</td>
</tr>
<tr>
<td>Female</td>
<td>9 (34.6%)</td>
</tr>
<tr>
<td>Mean age</td>
<td>9.21 ± 5.70</td>
</tr>
<tr>
<td>Mean stone size</td>
<td>2.21 ± 1.04 cm</td>
</tr>
</tbody>
</table>

Table II: Results.

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean stone clearance (per-operative)</td>
<td>93.28% ± 9.23%</td>
</tr>
<tr>
<td>Mean operative time</td>
<td>158.8 ± 39.63 minutes</td>
</tr>
<tr>
<td>Mean hospital stay</td>
<td>2.84 ± 1.14 days</td>
</tr>
<tr>
<td>DJ stent used</td>
<td>7 (27%) patients</td>
</tr>
</tbody>
</table>

Table III: Complications.

<table>
<thead>
<tr>
<th>Complication</th>
<th>Number of patient having complication</th>
</tr>
</thead>
<tbody>
<tr>
<td>Per-operative blood loss needing transfusion</td>
<td>1 (4%)</td>
</tr>
<tr>
<td>Conversion to open</td>
<td>1 (4%)</td>
</tr>
<tr>
<td>Urosepsis</td>
<td>0%</td>
</tr>
<tr>
<td>Perinephric collection</td>
<td>0%</td>
</tr>
</tbody>
</table>

operative haemorrhage was estimated by subtracting postoperative from pre-operative Hb (haemoglobin).

Data was collected by chart review on specified proforma. SPSS version 16 was used for data analysis. Mean ± SD was calculated for quantitative variables like age, stone size, operative time and hospital stay. Frequency percentage was calculated for qualitative variables like gender, presenting symptoms, site, approach, per-operative stone clearance and per-operative and postoperative complications.

RESULTS

A total of 26 children with mean age of 9.21 ± 5.70 years were studied. Seventeen (65.4%) patients were male whereas 9 (34.6%) patients were female. Flank pain was the most common presenting symptom. Mean stone size was 2.21 ± 1.04 cm. PCNL was done by lower pole approach in 19 (73.1%) patients, by mid pole approach in 4 (15.4%) patients and by upper pole in 3 (11.5%) patients. Mean operative time was 158.8 ± 39.63 minutes and mean hospital stay was 2.84 ± 1.14 days. Postoperative transfusion was required in only one case (4%). There was no episode of sepsis or perinephric collection. Per-operative stone clearance was 93.28% ± 9.23%. Conversion to open was seen in one (4%) case only. DJ stent was placed in 7 (27%) cases.

DISCUSSION

PCNL is an accepted modality to treat renal stones in adult population. More recently, PCNL has been successfully used in paediatric population as well. Samad et al. found age and weight not to be a barrier to performing PCNL successfully. Veeratterapillay et al. in a study of 31 children with a mean age of 10.8 years having mean stone diameter of 19 mm, found a complete stone clearance in 84% patients without significant complications. Romanowsky et al. found a clearance rate of 80% without major post-operative complications in a study of 9 patients with a mean age of 10.1 years having mean stone size of 45 mm. Mean operative time was 88 minutes. Bayrak et al. compared PCNL with open renal surgery and concluded that PCNL supersedes open surgery.

Schuster et al. described PCNL as completely replacing open surgery for renal stones in paediatric population. Shokeir et al. compared PCNL versus ESWL and found PCNL to be better for treatment of renal stones in range 1 - 2 cm. Kumar et al. described PCNL as a safe and effective procedure even for management of staghorn renal calculi in children. Zeng et al. compared adult versus paediatric PCNL. In their study, there were 331 children with mean age of 7.8 ± 3.9 years, mean stone size of 2.3 ± 0.6 cm. Operative time was 73.6 ± 20.2 minutes, stone free rates were 80.4% and mean hospital stay was 5.2 ± 2.4 days.

The present results were comparable to most of the published data. Mean age of these patients was 9.21 ± 5.70 years which is almost similar to above mentioned studies. Mean stone size (2.21 ± 1.04 cm) was also similar i.e. 1 - 2 cm (Shokeir et al.) and 19 mm (Veeratterapillay et al.), however, Romanowsky et al. reported a larger stone size (45 mm). Mean operative time (158.8 ± 39.63 minutes) is much more compared to international data (88 minutes by Romanowsky et al.) and (73 minutes by Zeng et al). This may reflect the learning curve for paediatric PCNL in the reported scenario. Stone clearance (93.28% ± 9.23%) which is also comparable with that of published data. In majority of cases lower pole puncture was used to gain access to pelvi-calycetal system. No major postoperative complication was seen.

CONCLUSION

PCNL is a safe and effective way of treating simple renal stones in paediatric age group.

REFERENCES


