Comparison of Outcome of Percutaneous Nephrolithotomy in Adult Versus Paediatric Patients

Durre Shohab, Nadeem Iqbal, Muhammad Umar Alam, Amna Butt, Mohammad Imran Jamil, Ijaz Hussain and Saeed Akhter

ABSTRACT

Objective: To compare the outcome of percutaneous nephrolithotomy (PCNL) in terms of operative time, hospital stay, stone clearance, and postoperative complications in adult versus paediatric patients.

Study Design: Descriptive case series.

Place and Duration of Study: Shifa International Hospital, Islamabad, from January 2010 to December 2013.

Methodology: A retrospective analysis of 155 patients who underwent PCNL from January 2010 to December 2013. The patients were divided into 2 groups: patients aged ≤ 12 years were included in paedriatic group (A) while patients aged > 12 years were included in adult group (B). The patients were analyzed for age, gender, stone size, operative time, stone clearance, hospital stay, and peroperative and postoperative complications. Data was collected by chart review on specified proforma.

Results: One hundred and twenty-nine (129) patients including 44 (34.10%) females and 85 (65.89%) males with a mean age of 45.00 ±1.44 years were adults. Twenty-six parents with mean age of 9.21 ±5.70 years, 17 (65.4%) males and 9 (34.6%) females, were included in the paedriatic group. Mean stone size was 2.12 ±1.01 cm in paedriatic group compared to 2.52 ±0.77 cm in adult group (p = 0.023). Mean operative time in paedriatic group was 158.8 ±39.63 minutes compared to 119.34 ±57.06 minutes in adult group (p < 0.001). Mean hospital stay in paedriatic group was 2.76 ±1.14 days compared to 3.12 ±1.27 days in adult group (p=0.1881). Peroperative stone clearance was in paedriatic group was 93.28 ±9.23% compared to 90.81 ±12.23% in adult groups (p = 0.331). One patient in the adult group developed urosepsis.

Conclusion: There was no significant difference in outcome of percutaneous nephrolithotomy in terms of hospital stay, stone clearance, and postoperative complications in adult versus paediatric patients. Operative time was significantly shorter in adult cases compared to paedriatic cases.

Key Words: Adult. Paediatric. Operative time. Percutaneous nephrolithotomy.
was then put in prone position. Under fluoroscopic guidance, pelvicalyceal system was punctured using 23 Fr spinal needle. The glide wire was passed through spinal needle into pelvicalyceal system. The tract was dilated using metallic dilators over glide wire. A 27 Fr-PCNL sheath was introduced over metallic dilators into pelvicalyceal system under fluoroscopic guidance. A 26 Fr-nephroscope was then introduced through PCNL sheath. Pneumatic lithoclast was used to break the stones and 3-prong grasper was used to extract the stone fragments. Nephrostomy tube was passed in all patients and removed on the second postoperative day. Patients with uncontrolled diabetes, hypertension, bleeding disorders, ischemic heart disease, complex stones, upper pole stones, and positive urine culture were excluded from the study. All patients received cefoperazone plus sublactam at induction and postoperatively till discharge.

The patients were divided into 2 groups: patients aged ≤ 12 years were included in paedriatic group (A) while patients aged > 12 years were included in adult group (B). Both groups were analyzed for age, gender, stone size, operative time, stone clearance, hospital stay, and peroperative and postoperative complications (sepsis, perinephric collection, haemorrhage requiring transfusion). Sepsis was defined as postoperative fever (temperature more than 38 or less than 36 degrees centigrade), pulse more than 100/minute, Respiratory rate more than 20/minute, total leukocyte count (TLC) more than 12000/mm³ or less than 4000/mm³. Stone clearance was calculated as percentage of stone removed intraoperatively by surgeon's estimate and fluoroscopy and confirmed next day by ultrasound and X-ray of the kidney ureter and bladder region.

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, mean hospital stay, stone clearance and mean operative time. Mean ± SEM (standard error of mean) was calculated for stone size. T-test was used to calculate p-values. Online software Graphpad quick calcs was used to calculate p-value which considered significant when less than 0.05.

RESULTS

A total of 155 patients were included in the study. Group B had 129 patients including 44 (34.10%) females and 85 (65.89%) males with a mean age of 45.00 ±1.44 years. Group A had 26 children with mean age of 9.21 ±5.70 years having 17 (65.4%) males and 9 (34.6 %) females. Mean stone size was 2.12 ±0.77 cm in the paedriatic group compared to 2.52 ±0.77 cm in the adult group (p = 0.023, Table I). Mean operative time in the paedriatic group was 158.8 ±39.63 minutes compared to 119.34 ±37.06 minutes in the adult group (p < 0.001).

<table>
<thead>
<tr>
<th>Table I: Patient characteristics.</th>
<th>Adult group</th>
<th>Paedriatic group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of patients</td>
<td>129</td>
<td>26</td>
</tr>
<tr>
<td>Male</td>
<td>85</td>
<td>17</td>
</tr>
<tr>
<td>Female</td>
<td>44</td>
<td>09</td>
</tr>
<tr>
<td>Mean age in years</td>
<td>45.00 ±1.44</td>
<td>9.21 ±5.70</td>
</tr>
<tr>
<td>Mean stone size</td>
<td>2.52 ±0.77</td>
<td>2.12 ±0.77</td>
</tr>
</tbody>
</table>

Mean hospital stay in the paedriatic group was 2.76 ±1.14 days compared to 3.12 ±1.27 days in the adult group (p = 0.1881). Peroperative stone clearance in paedriatic group was 93.28% ±9.23% compared to 90.81% ±12.23% in the adult group (p = 0.331, Table II). There was no significant complication in both groups. One patient in adult group developed urosepsis. No patient in either group required blood transfusion.

DISCUSSION

PCNL is considered the standard of care in the treatment of renal stone of more than 2 cm in adult population. More recently PCNL has gained popularity for paedriatic renal stones patients as well. Samad et al. found PCNL a safe and effective modality for treating paedriatic renal stone. Similar results were found by Mahmud et al. in pre-school going children. Noorulizadeh et al. performed PCNL in children using adult instruments, results again showed safety and efficacy of PCNL. On the other hand, there are reports of possible parenchymal damage, impairment in renal function, higher radiation exposure and the risk of major complications, like urinary sepsis and bleeding.

Etemadian et al. carried out PCNL in 38 patients with a mean stone size of 2.93 ±0.89 cm, using adult size instrument and found a clearance rate of 67% and a mean hospital stay of 3.5 ±1.1 days with no significant postoperative complications. Badway et al. in their series of 60 children using a 26 Fr and 28 Fr Amplatz sheath, reported a stone-free rate of approximately 84% with PCNL with minimal complication. Some other studies, however, do not advocate using adult size instruments in paedriatic population owing to complications such as drop in haemoglobin, blood transfusion, damage of renal parenchyma, and postoperative analgesic requirement. Currently, mini-PCNL and micro-PCNL are described to increase safety of PCNL in children. PCNL, using all seeing needles, is opening new eras in management of paedriatic renal stones.
Only one study was found which compared adult and paediatric PCNL. Zeng et al. compared 331 paediatric and 8537 adult renal units undergoing PCNL. They found that children required fewer percutaneous accesses, there was a smaller nephrostomy tract, shorter operative time, and less haemoglobin drop. Initial stone clearance was also better in children (80.4% vs. 78.6%).

In Pakistan, PCNL has just been gaining its ground as a standard of care for adult renal stones. But owing to the technical difficulties and lack of experience on the part of urologists, there is still reluctance in doing PCNL in paediatric population owing to procedural failure and fear of aforementioned complications. We compared adult and paediatric PCNL and ruledout any difference with respect to outcome, operative difficulties and postoperative complications.

The present results did not show any significant difference in paediatric and adult populations undergoing PCNL with respect to mean hospital stay (2.76 ±1.14 days compared to 3.12 ±1.27, p-value= 0.1881), stone clearance (93.28% ±9.23% vs. 90.81% ±12.23%, p-value=0.331) and postoperative complications. However, mean operative time was significantly shorter in adult population (119.34 ±37.06 versus 158.8 ±39.63 minutes, p-value=0.0001). This is contrast to results of study by Zeng et al., showing fewer percutaneous accesses, smaller nephrostomy tract, shorter operative time, less haemoglobin drop, and better stone clearance in children. This may represent learning curve and initial hesitancy in doing procedure. Also, we were using adult instruments making us more careful. However, we found overall paediatric PCNL is as safe and efficacious as adult PCNL.

CONCLUSION

There is no significant difference in adult versus paediatric patients undergoing PCNL with respect to hospital stay, stone clearance, and postoperative complications. Operative time is significantly shorter in adult population. Paediatric PCNL is as safe and efficacious as adult PCNL.

REFERENCES