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OUTCOME OF PERCUTANEOUS NEPHROLITHOTOMY IN 10-20 MM LOWER CALYCEAL RENAL CALCULI

Urology

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ABSTRACT

Objective: The best method of treatment of patients with lower calyceal (LC) renal stones remains controversial. In this study, we analyse the safety and efficacy of percutaneous nephrolithotomy (PCNL) in the management of LC stones 10-20 mm in maximum dimension.

Methods: A retrospective analysis was done in 50 patients having 10-20 mm size lower calyceal renal calculi who were treated by standard Percutaneous Nephrolithotomy (PCNL) through upper calyceal approach. Chi Square test for statistical analysis was done.

Results: Stone clearance was achieved in 44 (88%) patients while 6 (12%) patients had significant residual fragments (>4mm size). In 40 (80%) patients, PCNL was done through a single percutaneous tract while in 10 (20%) patients; additional tracts were made in an attempt to clear the stones. The duration of surgery ranged from 1 - 2 hours (Mean 1.5 ± 0.49) and postoperative hospital stays varied from 2 – 5 days (Mean 3.5 ± 1.5). Significant haemorrhage (4%), pleural injury (6%) and hydrothorax (8%) were the main complications.

Conclusion: PCNL through upper calyceal access for treatment of complex lower pole renal calculi offers good stone clearance with chances of increased but manageable thoracic complications.

KEYWORDS

Percutaneous Nephrolithotomy, Lower Calyceal Calculus, Stone Clearance.

INTRODUCTION

The worldwide prevalence of urinary stone disease is 5-15%.[1] Open surgery was the mainstay of treatment for renal calculus but has now been replaced by minimally invasive techniques including extracorporeal shock wave lithotripsy (ESWL), ureteroscopic intracorporeal lithotripsy and percutaneous nephrolithotomy (PCNL).[2,3] PCNL is a technique of removing stone from the kidney via a percutaneous tract passed into the kidney.[3,4,5,6] It is the treatment of choice for large renal stones >25 mm, stones resistant to ESWL and some upper ureteric stones.[6,7,8,9] An ideal tract provides the straight access to all or most the calculi.[7,8,10,11] Inferior calyceal stones are usually removed through the inferior calyx.[12,13,14] However, in complex inferior calyceal calculi, complete stone clearance may often not be possible through a single tract in an inferior calyx. This is because of problems in negotiating the acute angles between calyces.[7,8,12] Superior calyceal approach can be used to clear such stones. The superior calyx provides straight access to the inferior group of calyces. [7,8,9] The problem of superior calyceal puncture include haemorrhage (causing difficulty in visualizing the stone) and injury to pleura, lung or diaphragm (resulting in pneumothorax, hydrothorax or haemothorax).

METHODS

A retrospective analysis was done in 50 patients having 10-20 mm size lower calyceal renal calculi who were treated by standard Percutaneous Nephrolithotomy (PCNL) through upper calyceal approach. PCNL was performed by using rigid nephroscope under fluoroscopic guide through upper calyx approach. Per-operative findings like significant hemorrhage, number of additional tracts and duration of surgery were analysed. Post-operative outcomes such as pleural injury (pneumothorax, hydrothorax or haemothorax) and visceral injury were also noted from the case files. Stone clearance rate was evaluated from radiological findings (X-ray KUB and abdominal ultrasound) after 24 hours. Number of repeat procedures and postoperative duration of hospital stay <2 or >2 days were noted. Statistical analysis was done using SPSS 20 software. The study variables were stone size, number of additional tracts, operative time, complications (hemorrhage, pleural injury, and abdominal visceral injury) stone clearance and postoperative duration of hospital stay. The quantitative variables like stone size, operating time, number of additional tracts and postoperative duration of hospital stay were presented as mean and standard deviation. The qualitative variables like stone clearance and complications were presented as frequency and percentage. Chi Square test for statistical significance of outcomes was applied. $P<0.05$ or 5% was considered significant.

RESULTS

Total number of patients was 50. The age of the patients was from 18 to 50 years. Stone size varied from 10 mm to 20 mm. All the patients were operated under General Anaesthesia. Operative duration ranged from 1 - 2 hours (Mean 1.51 ± 0.49). In majority of patients (80%) stone removal was done through a single percutaneous tract. Postoperative hospitalization varied from 2 – 5 days (Mean 3.5 ± 1.5). Haemorrhage and pleural injury were the main complications. Hydrothorax with minimal blunting of the costophrenic angle was seen in three patients, which was managed conservatively. Pleural injury was seen in 3 patients. One patient having significant hydrothorax required daily aspiration of fluid under ultrasound guidance. Visceral injury was not seen in any patient. Stone clearance was seen in 18 out of 20 patients (90%) for stone size between 10mm to 15 mm and stone size between 15 mm and 20 mm, the stone clearance was seen in 26 out of 30 patients (Table 1). However, 6 patients (12%) had significant residual stone fragments (no clearance). These patients were subjected to either ESWL or repeat PCNL alone or ESWL followed by PCNL (sandwich therapy).

Table 1. Summary of results

Parameters	Value
Mean operating time	1 – 2 hours (Mean 1.51+0.49)
Single percutaneous tract	40 (80%)
Extra percutaneous tract	10 (20%)
Stone free rate for stone size 10mm to 15 mm	90 % (18 out of 20 patients)
Stone free rate for stone size 15mm to 20mm	86.67 % (26 out of 30 patients)
Mean Hospital stay	2 – 5 days (Mean 3.5 ± 1.5)
Complications-	
i) Significant Haemorrhage	4 % (2 out of 50 patients)
ii) Hydrothorax	8% (4 out of 50 patients)
iii) Pleural Injury	6 % (3 out of 50 patients)
iv) Abdominal visceral injury	0%

DISCUSSION

Management of renal calculus disease has been revolutionized by the advent of ESWL and PCNL. The success of PCNL depends upon the formation of percutaneous tract.[2,3,4] Middle or inferior calyceal approach can be used for stones in these calyces or for renal pelvic stones. Upper ureteric, superior calyceal, complex lower polar and staghorn stones are easily approached through the superior calyx. Superior calyceal access provides a straight tract along the long axis of the kidney, with better visualization of the superior calyx, PUJ and lower pole calyces. It also favors easy manipulation of the rigid endoscopic instruments. Access through the middle or inferior calyx can lead to angulation between more complications took more

time.[15,16,17,18,19] Monish et al. showed that in 4% patients more than one tract was made to clear the stones especially the larger ones.[2] In our study, 20% patients required additional tracts for stone clearance. This difference will hopefully be solved with time and practice as observed towards the end of the study. Postoperative hospital stay varied from 2 to 5 days (Mean 3.5) which is a bit higher than observed in the work done by Carson Wong et al. where mean postoperative hospital stay was 2 days.[19] Stone clearance was seen in 88% patients. Our success rate is better than the study of Monish et al. where it was 87%[2] and R. Gupta et al. where it was 75%.[10] In another study by Ziaee S et al. the success rate was 79%.[4] To conclude, the superior calyceal approach provides optimum access to lower polar renal calculi. Although the morbidity is slightly higher, to some extent this may be avoided by following the adequate precautions as outlined above.

CONCLUSION

Percutaneous nephrolithotomy for removal of lower polar renal calculi through upper pole access offers good results. This is because of provision of an enhanced surgical field and greater maneuverability together with the treatable nature of the associated complications.

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