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PCNL in the Management of Lower Pole Caliceal Calculi

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ABSTRACT

Purpose: Several therapeutic methods are used in the management of lower pole caliceal calculi. This survey has been conducted to evaluate the safety and efficacy of percutaneous nephrolithotomy in the management of lower pole calculi.

Materials and Methods: Fifty-five patients, 43 males and 12 females with a mean age of 41.5 (range 11 to 75) years, who had suffered from lower pole caliceal calculi and treated by standard percutaneous nephrolithotomy (PCNL) between 1997 and 2001, were enrolled in this study. The stones were classified as follows: small (less than 25 mm), intermediate (25 to 34 mm) and large (more than 35 mm). Mean follow-up was 6.2 months (range 2 weeks to 34 months).

Results: The stones were completely extracted by one session PCNL in 43 patients (79%). Repeat PCNL was needed in one patient and another method was used for stone extraction in another patient. Regarding the size of stone, 88%, 79%, and 74% of small, intermediate, and large stones were completely extracted, respectively. No major complication was noted.

Conclusion: PCNL has high success rate in patients with stones larger than 2 cm and its morbidity would be low, provided that it is performed by skilled surgeons.

KEY WORDS: percutaneous nephrolithotomy, calculus, lower pole calyx, treatment

Introduction

Controversy still remains in the treatment of lower pole caliceal calculi. Extracorporeal shock wave lithotripsy, percutaneous nephrolithotomy (PCNL), and flexible ureteroscopy are the currently used therapeutic methods. While SWL has lower morbidity, its success is directly related to the size and composition of stone; moreover, stone clearance is dependent on anatomic features.[1-6]

Percutaneous therapeutic methods are effective, but they have a higher morbidity rate. PCNL is preferred to SWL in the management of stones larger than 20 mm.[7-10] Retrograde flexible ureteroscopy for lower pole caliceal calculi is a remarkable alternative for PCNL or SWL in small stones. Furthermore, it is potentially less invasive than PCNL. This study has been conducted to evaluate the efficacy and safety of only PCNL in the management of lower pole caliceal calculi.

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Materials and Methods

One thousand patients with renal stone, who had been treated by PCNL at Shaheed Labbafinejad Medical Center from January 1998 through January 2002, were studied in a retrospective fashion. Fifty patients (56 kidneys) had symptomatic renal stones, exclusively in lower pole. Those who simultaneously had stones at other parts of kidney were excluded from the study.

One session PCNL was performed for all the patients following general anesthesia and insertion of ureteral catheter. All phases were controlled via fluoroscopy with contrast media. Nephrostomy tract was made toward the stone through lower pole and dilatation was made by dilatators. Following the insertion of Amplatz

sheet and nephroscopy, the stone was fragmented, if needed; otherwise, it was extracted by grasping forceps. To extract the residual fragments, revision of system was performed 48 hours after the procedure with an analgesic injection (with no anesthesia), and then nephrostomy tube was fixed. Patients were followed up two weeks later by KUB, urinary system ultrasonography, and chemical analysis of stone. Mean follow-up was 6.2 months (2 weeks to 34 months).

Results

Fifty-five patients (56 kidneys) with renal stone, exclusively in lower pole, underwent PCNL. Patients consisted of 43 males and 12 females with a mean age of 41.5 (range 11 to 75 years). The stones were located at left in 38 and bilaterally in one. Size of the stones was classified into 3 groups: small (less than 25 mm), intermediate (25 to 35 mm) and large (more than 35 mm). The stones were single in 27 patients and multiple in 29; however, all stones were located at lower pole calices. A history of open renal surgery or PCNL was noted in 16 patients and 19 had failed SWL (1 to 9 sessions).

PCNL by itself led to complete extraction of stone in 43 patients (79%). Revision was required in one patient and a new nephrostomy tract was needed in another one to extract the stone.

Lithotripsy with pneumatic probe was performed in 27 patients; while, the stone was extracted only by grasping forceps in 27. The remaining 12 patients were lost to follow up. Considering the size of stones, 88%, 79%, and 74% of small, intermediate, and large stones were extracted, respectively.

Complications included hemorrhage (required transfusion) in 4 patients, delayed hemorrhage in 1, long-term urinary leakage from nephrostomy site in 2, urinary tract infection in 2, and mild increase of creatinine in 4, which were medically managed. Mean hospitalization was 5.9 (range 3 to 19) days and mean time of procedure was 55 (range 40 to 80) minutes.

According to the chemical analyses, the stones consisted of calcium oxalate in 22 patients, calcium oxalate and calcium phosphate in 17, calcium oxalate and uric acid in 7, calcium phosphate in 6, cystine in 2, and uric acid in one.

Discussion

Different management methods are used for lower pole caliceal calculi; however, the selection of proper therapeutic method has still been a matter of discussion. In this study the outcomes of PCNL in the management of lower pole calculi has been reported and compared to other reported studies and methods. This report is the first of its kind throughout the country.

Extracorporeal lithotripsy is an alternative therapeutic method for most patients with stone and without urinary system problem. Lower pole caliceal calculi which are treated by SWL have low stone-free rate due to anatomic position of lower pole.[11,12]

The size of stone is the most important factor that has been considered in the outcome of SWL in many studies;[1,11] furthermore, factors such as stone composition and anatomic position could potentially affect the outcome of SWL.[2]

Infundibulopelvic angle as well as infundibular width and length are three anatomic factors which affect stone clearance. An open infundibulopelvic angle, and a short and wide infundibulum positively affect stone clearance.[12] However, some authors do not consider such factors.[13]

When the stone is larger than 20 mm stone-free rate after SWL decreases considerably; while, the rate of repeated therapies and complementary therapeutic methods increase.[1,11] Although some authors suggest SWL for stones smaller than 20 mm, this size has been recently lowered to smaller than 10 mm.[3,11]

Following SWL, other measures should be taken for most of patients with unimportant small fragments.[14] Some authors suggest that holding the patients upside-down and hitting his back could be useful in the expulsion of such fragments.[15] Inserting ureteral catheter before SWL and direct washing of lower pole calices during SWL in order to increase stone-free rate have been reported.[16,17] Probably, the chance for recurrent stone formation following SWL is higher, which is due to the fragments and their migration to the respective calices.[2]

Prognostic factors cited for the failure of SWL consist of hard stones which need high voltage and multiple sessions of SWL, multiple stones in lower pole calyx, history of PCNL, and lower pole calculi, which are formed in other parts of the kidney following the SWL.[18]

Ureteroscopy for lower pole caliceal calculi is an acceptable alternative therapeutic method. Although it is more invasive than SWL, it can be done outpatiently. It is slightly more successful than SWL in the management of stones smaller than 1 cm and considerably more successful for

stones between 1 to 2 cm. Applying Zero-type basket increases the success rate of this method, by which the stones are led to pelvis and upper pole, where SWL can be performed in a better situation.[6,9] Moreover, it highly prevents any damage to ureteroscope which mostly occurs during bending and lithotripsy by laser.

Comparing to SWL, anatomic situation is less important in ureteroscopy; however, when anatomic abnormalities are present it may have a negative effect.[12] Furthermore; surgeon should be talented enough to insert the ureteroscope and grasp the stone.

Some authors believe that PCNL is the choice therapeutic method in the management of stones larger than 2cm, while others recommend PCNL for stones larger than 1 cm.[3,11]

Regarding stone clearance, PCNL is more effective than SWL and ureteroscopy for large stones.[6] PCNL is also preferred to SWL considering repeated treatment and other modalities.[1,11] Economically, PCNL is more cost effective than SWL for lower pole caliceal calculi larger than 2 cm.[8] Although PCNL has a higher morbidity rate than SWL or ureteroscopy, regarding the recent progresses in PCNL technique and high stone-free rate as well as earlier return to daily life, morbidity of PCNL is not so higher than SWL; therefore, it should be considered for calculi between 1 to 2 cm.[3,11]

This study indicates that outcome of PCNL is better than SWL for small and intermediate calculi (88% and 79% comparing to 69% and 44%) and ureteroscopy is more appropriate for small, intermediate, and large calculi (88%, 79%, and 74% comparing to 82%, 71%, and 65%). Moreover, the need for repeated treatments and other treatment modalities is lower in PCNL. Findings of this study also show good outcome of PCNL in the treatment of lower pole caliceal calculi in comparison with ureteroscopy and SWL outcome, reported in other articles. However, only the outcome of PCNL in our center was reported in this article and the comparison of findings should be performed in another study with proper circumstances.

Conclusion

PDNL is a safe and effective method for lower pole caliceal calculi greater that 2 cm. This method in skilled hand surgeons is safe and has low morbidity rates.

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