

PERCUTANEOUS NEPHROLITOTOMY ON THE MANAGEMENT OF CALYX INFERIOR STONES

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ABSTRACT

Objectives: To compare the stone free rates of inferior calyceal stones with stone burden < 20 mm, 21-30 mm, and > 30 mm on post-percutaneous nephrolithotomy (PCNL) patients in Cipto Mangunkusumo Hospital. **Material & method:** The data was collected retrospectively from PCNL medical records in Cipto Mangunkusumo Hospital between January 2000 until May 2012. Patients were followed-up with plain abdominal radiography (BNO) or renal ultrasonography (USG). Stone free status was defined as no residual fragments on radiography or USG. **Results:** As many as 88 patients with inferior calyceal stones who underwent PCNL were included. Forty-three cases had stone burden < 20 mm, 34 cases with stone burden 21-30 mm, and 11 cases with stone burden > 30 mm. Overall, 81 (92%) cases were defined as stone free. On group < 20 mm, 21-30 mm, and > 30 mm; 41 (95%), 32 (94%), and 8 (73%) cases defined as stone free respectively ($p = 0.485$). **Conclusion:** PCNL is the primary modality on the management of calyx inferior stones with high stone free rate. The stone free rate of these three groups showed no statistically significant difference.

Keywords: Percutaneous nephrolithotomy, inferior calyx stone, stone free rate.

ABSTRAK

Tujuan: Mengetahui angka bebas batu pada batu kaliks inferior dengan kelompok ukuran batu < 20 mm, 21-30 mm, dan > 30 mm pada pasien pasca Percutaneous Nephrolithotomy (PCNL) di Rumah Sakit Cipto Mangunkusumo. **Bahan & cara:** Data penelitian dikumpulkan dari status pasien PCNL di Rumah Sakit Cipto Mangunkusumo secara retrospektif dari periode Januari 2000 sampai Mei 2012. Keseluruhan pasien di follow-up pasca PCNL dengan menggunakan foto polos BNO atau ultrasonografi renal. Kriteria angka bebas batu adalah bila tidak terdapat sisa batu pada pemeriksaan. **Hasil:** Sebanyak 88 pasien dengan batu kaliks inferior telah ditangani dengan PCNL. Kelompok ukuran batu < 20 mm sebanyak 43 pasien; 21-30 mm sebanyak 34 pasien; dan > 30 mm sebanyak 11 pasien. Secara keseluruhan, 81 (92%) kasus dinyatakan bebas batu. Pada kelompok ukuran batu < 20 mm, 41 (95%) kasus dinyatakan bebas batu. Pada kelompok ukuran batu 21-30 mm, 32 (94%) kasus dinyatakan bebas batu. Pada kelompok ukuran batu > 30 mm, 8 (73%) kasus dinyatakan bebas batu ($p = 0.485$). **Simpulan:** PCNL merupakan modalitas utama pada penanganan batu kaliks inferior dengan angka bebas batu yang tinggi. Angka bebas batu pada ketiga kelompok ukuran batu menunjukkan tidak ada perbedaan bermakna.

Kata kunci: Percutaneous nephrolithotomy, batu kaliks inferior, angka bebas batu.

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INTRODUCTION

The management of inferior calyceal stones is a challenging issue even today. There is still a controversy for the exact determination of the indications for the use of percutaneous nephrolithotomy (PCNL), extracorporeal shockwave lithotripsy (ESWL), or even retrograde ureteroscopy. Many critical factors are under evaluation,

such as the effectiveness of each method, as described by the stone free rate, the stone size, the spatial anatomy of the inferior calyx, morbidity, cost, hospital stay, and recurrence rate.^{1,2}

OBJECTIVE

This study has been conducted to compare the stone free rates of calyx inferior stones with stone

burden < 20 mm, 21-30 mm, and > 30 mm on post PCNL patients in Cipto Mangunkusumo Hospital and to evaluate the efficacy and safety of PCNL in the management of calyx inferior stones.

MATERIAL & METHOD

The data was collected retrospectively from PCNL medical records in Cipto Mangunkusumo Hospital between January 2000 until May 2012. Eighty-eight patients with inferior calyceal stone underwent PCNL.

We collected data from the patients such as sex, age, stone burden, total complication or morbidity, total transfusion, mortality, operative time, and length of post operative hospital stay. Patients were followed-up with plain abdominal radiography (BNO) or renal ultrasonography (USG). Stone free status was defined as no residual fragment on radiography or USG.

Statistic analysis used in this study were Kolmogorov-Smirnov. P value below 0.05 assumed as statistically significant.

RESULTS

There were 88 patients with calyx inferior stone underwent PCNL.

Table 1. Demographic data of patients.

Total cases	88
Gender	
Male/Female	56/32
Mean age (range)	50.6 (15-75) years
Group	
20 mm	43 (48.9%)
21-30 mm	34 (38.6%)
> 30 mm	11 (12.5%)
Kidney side	
Right/left	40/48

Table 3. The data of morbidity, mortality, operative time and hospital stay.

Cases	Total
Total complications /total cases	4/88 (4.5%)
Total transfusion cases /total cases	5/88 (5.7%)
Mortality /total cases	0/88 (0%)
Mean duration of operation (range)	58 (20-140) min
Mean post op hospital stay (range)	4 (1-28) days

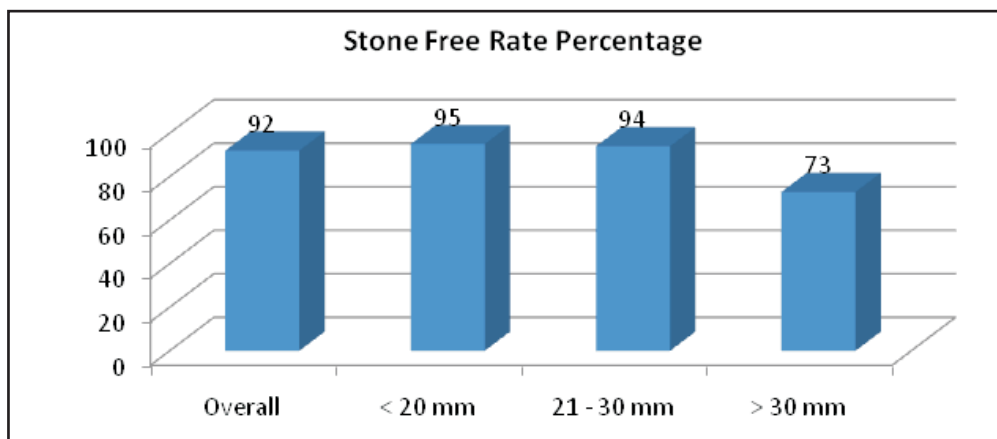


Figure 1. Stone free rate percentage.

Table 2. The analysis of stone-free rate.

Group	= 20 mm	21 – 30 mm	> 30 mm	p
Stone free rate	41/43 (95%)	32/34 (94%)	8/11 (73%)	0.485*

Almost all of the complication was intraoperative bleeding with as many as 2 cases (50% from all complication cases). Other complication was long term urinary leak from nephrostomy (1 case) and urinary tract infection (1 case). Total cases which needed blood transfusion was 5 cases (5.7%), and 2 cases had blood transfusion intraoperatively.

DISCUSSION

On calyx inferior study, Albala et al divided stone burden into 3 groups, such as 1-10 mm, 11-20 mm, and 21-30 mm groups, with the most cases in 11-20 mm group (50.5%).³ Sam et al. classified size of the stones into 3 groups, small (less than 25 mm), intermediate (25-35 mm) and large (more than 35 mm).⁴ We divided three groups in this study also, such as < 20 mm with 43 cases (48.9%), 21-30 mm with 34 cases (38.6%), and > 30 mm with 11 cases (12.5%). We divided stone burden into three groups to represent the small, medium, and large stone. We chose the cut-off point of 20 mm based on the EAU Guideline.⁵ The cut-off of 30 mm was done in order to balancing the distribution of large stone group since the largest stone burden on this study was 37 mm.

EAU Guidelines 2012 recommended PCNL procedure over ESWL on calyx inferior stone with stone burden 10-20 mm if anatomic factors was found (steep infundibulopelvic angle, calyx height > 10 mm, and infundibulum width < 5 mm).⁵ ESWL for the lower pole is often disappointing, therefore, endourological procedures are recommended.⁵ Sampaio and Aragao first described the parameter that affects the effectiveness of ESWL were the spatial anatomy.⁶ Spatial anatomy of the lower pole, as defined by the infundibulopelvic angle (LIP angle), infundibular length (IL), and infundibular width (IW), plays an influential role in the stone free rate after ESWL. A wide LIP angle, a short IL, and a broad IW, individually or in combination, favor stone clearance, whereas an LIP angle of < 70 degrees, an IL of > 3 cm, or an IW of > 5 mm is individually unfavorable.⁶ When all three unfavorable factors of unfavorable LIP and IL coexist, the post ESWL stone free rate falls to 50% or less.⁷ On the contrary, PCNL is not affected by spatial anatomy, which is another advantage of this technique.⁸ The management of calyx inferior stone with PCNL was recommended on stone size > 10

mm and could be alternative management on calyx inferior stone < 10 mm.⁵ If there are negative predictors for ESWL, PCNL might be a reasonable alternative, even for small stone.⁵

Several studies reported high stone free rate on calyx inferior management with PCNL (79-96.7%).^{1,3,4,9} Our study reported the stone free rate on calyx inferior stone which underwent PCNL was 92%.

In our study, we found that the stone free rate was not statistically significant on patients with calyx inferior stone underwent PCNL on these three groups (< 20 mm, 21-30 mm, and > 30 mm). PCNL is an effective procedure regardless of stone size, with an average stone free rate of 92%.

Previous study reported complication rates intra and post PCNL was 23.6%.⁴ Complication rate intra and post PCNL on this study was 4.5%.

To minimize hemorrhage which is the most worrisome complication of PCNL, the puncture should pass through the Brodel's a vascular line.¹ With this approach, we can avoid damage to major blood vessels, especially the posterior segmental artery, which is the artery most commonly damaged during endourologic procedures.¹ Safest access is also through a calyx inferior, because it eliminates the risk of pleural injury and allows for observation of the entire collecting system with flexible instruments.¹ Sam et al. reported the blood transfusion rate post PCNL was 7%.⁴ Our study showed that blood transfusion rate post PCNL was 5.7%.

Sam et al. reported mean duration of operation was 55 minutes.⁴ We found it similar with our study. Our study showed that mean duration of operation was 58 minutes. Several studies reported mean post PCNL hospital stay was 2.3-5.9 days.^{1,3,4} Our study showed that mean post PCNL hospital stay was 4 days.

CONCLUSION

PCNL is the primary modality on the management of calyx inferior stones regardless of stone size, with high stone-free rate.

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