SUCCESS OF PERCUTANEOUS NEPHROLITHOTOMY: COMPARING SPINAL ANESTHESIA WITH GENERAL ANESTHESIA

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ABSTRACT

Objectives: *The purpose of this study compared the outcome of PCNL under general and spinal anesthesia for the outcome.* ***Material & Methods:*** *PCNL had been performed from 2000 until 2011 with total 760 PCNL divided into 220 PCNL using general anesthesia (Group A) and the remaining 540 PCNL using spinal anesthesia (Group B) The data of both groups were evaluated with Chi square test, and Mann-Whitney test.* ***Result:*** *Stone free rate in Group A was 71.37% similar with Group B 72.97% ($p > 0.05$). Spinal anesthesia was used more often in patient who had previous surgery 65.5% compared with general anesthesia 36.82% ($p < 0.05$). The average surgery duration in Group A was longer than group B (77.10 ± 35.59 minutes vs 68.42 ± 30.55 minutes) ($p < 0.05$). The average length of hospital stay in Group B was shorter than Group A (3.90 ± 2.72 days vs 5.47 ± 4.25 days) ($p < 0.05$). There was no difference between Group A and Group B in complication and the needs of tranfusion.* ***Conclusion:*** *PCNL under spinal anesthsia was feasible and safe even better in the shorter surgery duration and the length of hospital stay.*

Key words: *Percutaneous nephrolitotomy, spinal anesthesia, general anesthesia.*

ABSTRAK

Tujuan: *Penelitian ini bertujuan untuk membandingkan luaran PCNL dengan anestesi umum dan anestesi spinal.* ***Bahan & Cara:*** *PCNL dilakukan pada tahun 2000-2001 dengan jumlah total 760 tindakan yang dibagi menjadi kelompok A sebanyak 220 PCNL dengan anestesi umum dan sisanya 540 PCNL dengan anestesi spinal dalam kelompok B. Data dari kedua kelompok dievaluasi menggunakan Chi square test dan Mann-Whitney test.* ***Hasil:*** *Angka bebas batu pada kelompok A sebesar 71.37% hampir sama dengan kelompok B 72.97% ($p > 0.05$). Anestesi spinal lebih sering digunakan pada pasien yang memiliki riwayat operasi sebelumnya sebesar 65.5% dibandingkan dengan anestesi umum 36.82% ($p < 0.05$). Rerata lama operasi pada kelompok A lebih panjang daripada kelompok B (77.10 ± 35.59 menit vs 68.42 ± 30.55 menit) ($p < 0.05$). Rerata lama rawat di rumah sakit pada kelompok B lebih pendek dibandingkan kelompok A (3.90 ± 2.72 hari vs 5.47 ± 4.25 hari) ($p < 0.05$). Tidak ada perbedaan dalam hal komplikasi dan kebutuhan tranfusi antara kelompok A dan kelompok B.* ***Simpulan:*** *PCNL dengan anestesi spinal layak dan aman bahkan lebih baik dalam hal durasi operasi dan lama rawat di rumah sakit yang lebih singkat.*

Kata kunci: *Percutaneous nephrolitotomy, anestesi spinal, anestesi umum.*

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INTRODUCTION

Revolution of urology surgery from open surgery to minimal invasive surgery (endourology) as first marked by Goodwin, et al (1955) who introduced kidney puncture and Harris et al (1975) who used broncoscope as nephroscope. Minimal invasive surgery was more selected than open surgery related to its safety, feasibility and the outcome which was the same or even better. Minimal invasive surgery for renal stone including percutaneous nephrolitotomy (PCNL), ureterorenoscopy lithotripsy (URS lithotripsy), Retrograde intra renal surgery (RIRS). Since its first description by Fernsto¨rm and Johansson in 1976, PCNL has been established as procedure of choice for the treatment of renal calculi with the size more than 2cm, multiple renal calculi, staghorn stone and in the case of failed to shockwave lithotripsy (SWL).[1-6]

Even a minimal invasive surgery, PCNL still need anesthesia. PCNL can be performed under general, regional or even local anesthesia.[7,8] Each of

this modality has its own risk and benefit. General anesthesia had risk more than any other related to multi drug that used, but general anesthesia was the choosen methods if we planed to perform long duration of surgery because it was the best way to protect the airway.[1]

OBJECTIVE

The purpose of this study compared the outcome of PCNL under general and spinal anesthesia for the outcome.

MATERIAL & METHODS

Between 2000 until 2011 PCNL has been performed in Cipto Mangunkusomo hospital under general anesthesia and some case performed under spinal anesthesia. From 2009 until 2011 most of PCNL was performed under spinal anesthesia. No subject was excluded because we include all patients which was on our PCNL database.

From 760 patients who had been performed PCNL from 2000 until 2011, we divided into two groups, Group A, PCNL under general anesthesia, Group B, PCNL under spinal anesthesia.We compare sex, stone location, renal side, stone burden, number of puncture, the needs of blood tranfusion, residual stone, complication, history of previous surgery, hydronephrosis, age, length of hospital stay after surgery and surgery duration.

The statistical analysis was performed using SPSS 18.0. The Chi-Square test was used for analysis of proportion, evaluation of means was performed by Mann-Whitney test. A $p < 0.05$ was considered to be statistically significant.

RESULTS

Table 1. Patient characteristic of percutaneous nephrolitotomy under general vs spinal anesthesia.

	General Anesthesia		Spinal Anesthesia		p
	Mean ± SD	Median (min-max)	Mean ± SD	Median (min-max)	
Age	48.63 ± 11.77	49 (8-77)	51.09 ± 11.33	52 (7-83)	0.008
	Total (%)		Total (%)		
Sex					0.233
Male	145 (65.9%)		331 (61.29%)		
Female	75 (34.1%)		209 (38.71%)		
History of Surgery					0.000
Yes	139 (63.18%)		186 (34.44%)		
No	81 (36.82%)		354 (65.56%)		

Table 2. Stone profile of percutaneous nephrolitotomy under general vs spinal anesthesia.

	General Anesthesia		Spinal Anesthesia		p
	Mean ± SD	Median (min-max)	Mean ± SD	Median (min-max)	
Stone Burden	40.93 ± 22.87	35 (10-192)	36.76 ± 17.66	32 (5-107)	0.031
	Total (%)		Total (%)		
Stone Location					0.09
Superior Calyx	7 (3.18%)		9 (1.67%)		
Media Calyx	7 (3.18%)		2 (0.37%)		
Inferior Calyx	31 (14.09%)		65 (12.10%)		
Pyelum	46 (20.90%)		114 (21.22%)		
Staghorn	129 (58.64%)		347 (64.61%)		
Stone Side					0.104
Left	99 (45%)		240 (44.44%)		
Right	120 (54.54%)		284 (52.59%)		
Bilateral	1 (0.46%)		16 (2.97%)		
Hydronephrosis					0.033
Yes	142 (64.54%)		308 (57.03%)		
No	78 (35.46%)		232 (42.97%)		

Table 3. Intraoperative result of percutaneous nephrolitotomy under general and spinal anesthesia.

	General Anesthesia		Spinal Anesthesia		p
	Mean ± SD	Median (min-max)	Mean ± SD	Median (min-max)	
Length of operation	77.10 ± 35.59	60 (20-210)	68.42 ± 30.55	60 (10-210)	0.001
	Total (%)		Total (%)		
Number of Puncture					0.617
1	213 (97.26%)		447 (96.33%)		
2	5 (2.28%)		16 (3.44%)		
3	1 (0.46%)		1 (0.22%)		

Table 4. Postoperative outcome of percutaneous nephrolitotomy under general vs spinal anesthesia.

	General Anesthesia		Spinal Anesthesia		p
	Mean ± SD	Median (min-max)	Mean ± SD	Median (min-max)	
Length of Stay	5.47 ± 4.25	4 (1-139)	3.90 ± 2.72	3 (1-128)	0.000
	Total (%)		Total (%)		
Residual stone					0.654
Yes	63 (28.63%)		146 (27.03%)		
No	157 (71.37%)		394 (72.97%)		
Complication					0.080
Yes	21 (9.58%)		28 (5.91%)		
No	198 (90.42%)		445 (94.09%)		
Transfusion					0.774
Yes	14 (7.14%)		35 (7.79%)		
No	182 (92.86%)		414 (92.91%)		

DISCUSSION

PCNL can be performed after the administration of general, epidural or local anesthesia.[1,9] General anesthesia is usually preferred when a more lengthy procedure is planned becaise it is the best means of protecting the airway when patients are in prone position. Regional anesthesia can be used for percutaneous procedures, but seceral problems may be associated with these regional anesthetic techniques. Local anesthesia may be an option when general anesthesia is contraindicated.

General anesthesia can raised problem for such condition as PCNL for staghorn stone because posibility of excessive fluid absorbtion and imbalance electrolyte.[10] Spinal anesthesia have superiority compare to general anesthesia, in shorter length of stay in hospital after procedure.[9,11] As, in this research, the length of stay after PCNL with spinal anesthesia compare with general anesthesia is 3.90 ± 2.72 day, and 5.47 ± 4.25 day respectively. Considering the advantages, regional anesthesia is promising alternatives.

From 760 PCNL patients, we devide into two groups, Group A (n = 220), PCNL with general anesthesia and Group B (n = 540), PCNL with spinal anesthesia. We compare sex, stone location, stone side, stone type, stone burden, number of puncture, need of blood tranfusion, operation duration, residual stone, compliaction, surgery history, hidronephrosis and length of stay in hospital between Group A and Group B.

Similar research had been done in Urology Department on 2010 with the stone free rate between general and spinal anesthesia was 77.6% and 72% respectively.[12] The result of this research was similar with our research, where spinal anestesia was better than general anesthesia, 72.97% and 71.37% respectively. The stone free rate was lower than the 2010 result.

On this research, the duration of surgery under general anesthesia a little longer than spinal anesthesia. This result was the same as Rasyid's. Surgery under spinal anesthesia had shorter time than general anesthesia, 68.42 min and 77.10 min respectively. If we compared with Mehrabi's, the

duration of PCNL under spinal anesthesia was 95.0 ± 37.8 min. On the previous research by Rasyid, the need of blood tranfusion was higher on Group A. But on this research we found no significant difference between Group A and B ($p > 0.05$). Tangpaitoon on his research found that no difference of haemoglobin between Group A and Group B, besides lower complaint of nasusea and vomit, lower pain after surgery. There were no difference for haemoglobin level before and after PCNL, complication post operative, succeess rate and length of stay in the hospital. Tangpaitoon conclude spinal anesthesia was as effective as general anesthesia for PCNL and spinal anesthesia had advantage on the lower level of post operative pain, patient satisfaction, shorter analgesic used without adding complication.

One of the most superiority of spinal anesthesia was the shorter length of stay. We found that length of stay after PCNL under spinal anesthesia was 3.9 day and 5.4 day for PCNL under general anesthesia. this result was the same with Rasyid, that 4.1 day and 5.6 day for group A and group B respectively.

Kuzgunbay and friends on his study, split 82 PCNL patient into two groups, groups with general anesthesia and spinal anesthesia. they report the mean age for both group was 48.63 ± 11.77 year and 51.09 ± 11.33 year respectively and the total stone burden for both group was 40.93 ± 22.87 and 36.76 ± 17.66 ($p < 0.05$). and for other parameter such as duration of operation, irrigation solution, haemoglobin changes due to operation and length of hospital stay was not significant statistically ($p > 0.05$). So they conclude that PCNL can be performed under spinal anesthesia as effective and safe as general anesthesia.[13] The same conclusion was made by Borzouei and friends that PCNL can be performed under spinal anesthesia safely and acceptable.[14]

In this study, we found that the use of general anesthesia was higher for patient with history of surgery before and patient with hydroneprosis, this is statistically significant.

CONCLUSION

PCNL which first introduced with general anesthesia, now can be performed with spinal anesthesia and give better result especially the shorter operation duration and lengof hospital stay after PCNL.

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