

Postoperative mean pain score of bupivacaine VS placebo in patient undergoing percutaneous nephrolithotomy

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Objective: To compare postoperative mean pain score of bupivacaine VS placebo in patient undergoing percutaneous nephrolithotomy (PCNL).

Methodology: This randomized controlled trial was conducted at urology ward, Jinnah Postgraduate Medical Center, Karachi from April 15 to November 2016. Sixty patients were randomized into test (Group A) and control (Group B) by lottery method. Group A received 20 ml/50 mg of 0.25% bupivacaine and Group B was received 20 ml of normal saline. All had standard general anesthesia. Post operatively, the VAS was used to assess the pain by an independent observer, blinded to the randomization at 6, 12 and 24 hours. After 24 hours mean of VAS was calculated and noted.

Results: Mean age of patients in groups A was 26.87 ± 7.186 (18 – 45), and in groups B was 29.57 ± 10.345

(18 – 60) years. In group A, 12 (40%) were female and 18 (60%) were male patients. In group B 15 (50%) were female and 15 (50%) were male patients. Mean total analgesia of the patients in groups A was 1.10 ± 0.31 (0.96 – 1.24), and in groups B was 3.54 ± 0.56 (3.36 – 3.78). In group A, one (3.3%) were upper calyx, 17 (56.7%) middle calyx and 12 (40%) lower calyx patients while in group B, 5 (16.7%) were upper calyx, 12 (40%) middle calyx and 13 (43.3%) lower calyx patients. Mean VAS score in group A was 4.20 ± 1.424 and in group B it was 6.20 ± 0.182 ($p = 0.0001$).

Conclusion: The peritubal infiltration of local anesthetic 0.25% bupivacaine after PCNL is effective in decreasing VAS scores, analgesic usage and longer pain-free period without side effects.

Keywords: Infiltration, nephrostomy, invasive.

INTRODUCTION

Stone is a common problem affects 18 to 10% of population in South Asia.¹ It was Fernstrom and Johansson who extracted stone from kidney for first time through nephrostomy tract in 1976.² Since the development of recent advances in medical sciences, management of stone disease is also changed from invasive open surgeries to non-invasive and minimal invasive treatment options like ESWL, RIRS and PCNL.³ With that modern advancement in stone disease on one hand there is lesser morbidity with maximum stone free rate overall on other hand.⁴

PCNL is a harmless and effective procedure for management of kidney stone than the open surgery, with earlier recovery, less prevalence of urosepsis, maximum stone clearance and cost effective.⁵⁻⁷ The pain perception of patients undergoing PCNL, especially during the first few hours after the operation, is the most bother some problem and may increase morbidity.⁸ Although the use of small size nephrostomy tube has shown decrease in analgesia requirement as well, it does not significantly give relief to the patient and hinder in

post-operative smooth recovery.⁹

There is no standard approach for the management of post-operative pain after PCNL.¹⁰ The topical administration of local anesthetics in the surgical area has proven effective in reducing post-operative pain after various surgical procedures.¹¹ The local infiltration of bupivacaine reduces pain before its development because it's given prior to occurrence of pain and as its locally given so there is systematic side effect specially to central nervous system, hence more relief is obtained with less side effects.¹² This peritubal infiltration of bupivacaine after PCNL not only decreases pain intensity but also decreases analgesic dose required post operatively.¹³ Khan et al showed marked reduction in pain in bupivacaine arm then placebo group.¹⁴ The rationale behind this study was postoperative mean pain score comparison of bupivacaine VS placebo.

METHODOLOGY

This randomized controlled trial was conducted at urology ward, Jinnah Postgraduate Medical Center, Karachi from April 15 to November 2016. It included

60 patients aged > 18 and < 60 years of both gender, willing for standard PCNL having single renal stone size of > 3 cm, measured by CT pyelogram, X-Ray KUB or Ultrasonography. Those patients in which tubeless PCNL was done, supra-coastal puncture or multiple puncture were done, or patients requiring additional procedure and patients with history of allergy to bupivacaine or those patients experienced serious bleeding during or after the surgery leading to shock (BP < 80/40 mmHg and Pulse rate > 120 beats/minutes) were excluded from this study.

The patients were randomized into test (Group A) and control (Group B) by lottery method. Group A received 20 ml/50 mg of 0.25% bupivacaine and group B received 20 ml of normal saline. All patients had standard general anesthesia. With a 1 – 2 cm incision at the loin, PCNL needles were passed into the kidney pelvis and were confirmed by fluoroscopy, a guide wire was passed and working sheath were introduced. A nephroscope is then passed through the working sheath and stone is broken down and removed, then a nephrostomy tube is placed at the puncture site. After fixation of the nephrostomy tube, 22 gauge spinal needle were used to infiltrate bupivacaine or normal saline from the renal capsule to the skin under ultrasound and fluoroscopic guidance at 3, 6, 9, 12 o'clock position around nephrostomy tube.

Post operatively, VAS (0 means no pain and 10 means unbearable pain) were used to assess the pain by an independent observer, blinded to the randomization at 6, 12 and 24 hours. After 24 hours mean of VAS as mentioned in the operational definition were calculated

and noted on Performa.

Statistical Analysis: SPSS version 20 was used for analysis. T-test was applied to compare mean VAS at 24 hours postoperatively between groups. $P \leq 0.05$ were considered significant.

RESULTS

Mean age of patients in groups A was 26.87 ± 7.186 (18 – 45), and in groups B was 29.57 ± 10.345 (18 – 60) years. In group A, 12 (40%) were female and 18 (60%) were male patients. In group B 15 (50%) were female and 15 (50%) were male patients (Table 1). Mean VAS score of the patients in groups A was 4.20 ± 1.424 (2 – 7), in groups B it was 6.20 ± 0.997 (4 – 8). Mean stone size of the patients in groups A was 3.4 ± 4.1 (3.1 – 5.3), and in groups B was 4.7 ± 3.7 (3.1 – 5.2). Mean duration of stone and mean total analgesia are shown in Table 2.

Table 1: Distribution of gender (n = 60).

		Groups		Total
		A	B	
Gender	Female	12	15	27
		40.0%	50.0%	45.0%
	Male	18	15	33
		60.0%	50.0%	55.0%
Total		30	30	60
		100.0%	100.0%	100.0%

Table 2: Descriptive statistics of quantitative variables (n = 60).

Groups		n	Minimum	Maximum	Mean	SD
A	Age	30	18	45	26.87	7.186
	Vas Score	30	2	7	4.20	1.424
	Stone size	30	3.1	5.3	3.4	4.1
	Duration of stone (Months)	30	1.5	6	3.5	1.7
	Total analgesia	30	0.96	1.24	1.10	0.31
C	Age	30	18	60	29.57	10.345
	Vas Score	30	4	8	6.20	.997
	Stone size	30	3.1	5.2	4.7	3.7
	Duration of stone (Months)	30	2	7	3.4	2.3
	Total analgesia	30	3.36	3.78	3.54	0.56

Table 3: Stratification of VAS score with respect to gender (n = 60).

Gender	Group	N	Mean	SD	Std. Error Mean
Female	B	12	4.67	1.670	.482
	C	15	6.07	.961	.248
Male	B	18	3.89	1.183	.279
	C	15	6.33	1.047	.270

For female: P-value = 0.01 (sig.)

For male: P-value = 0.001(sig.)

Comparison of VAS score was stated in term of mean and standard deviation of both groups in group A, VAS score was 4.20 with standard deviation 1.424. In group B, VAS score was 6.20 with standard deviation 0.182 (Table 3).

DISCUSSION

Pain after PCNL is not only embracing for patient but it also affects quality of life, increase analgesic usage, delays recovery and overall increase cost of patient and hospital.^{15,16} Like other surgical procedures, PCNL also leads to pain especially when nephrostomy is used. Different methods were used to decrease pain after PCNL like small bored nephrostomy tube, no nephrostomy, local anesthetic infiltration over renal capsule and peritubal infiltration.¹⁴

Opioids are commonly used for reducing pain intensity, but not free of side effects.¹⁷ Maghsoudi et al used paracetamol as analgesic intravenously after PCNL, it decreases pain and increases pain free interval while reducing pain score (reduces 6 and 24 hours postoperative pain free period interval compared without paracetamol.¹⁸ Haleblan et al, found no marked difference in patient using narcotic as analgesic in comparison to placebo.¹⁶

In Jonnavithola et al study which was RCT showing peritubal infiltration 10mL of 0.25% of bupivacaine at kidneys capsular area. In his study tramadol was used as analgesic and pain free time and dosage of analgesic requirement were compared. According to his study pain free time was an analgesic consumption was as such 4.6 ± 5.4 hours and 105 ± 85 mg and 14.7 ± 9.6 hours and 31 ± 44 mg, respectively.¹⁷ Parikh et al reported efficacy of bupivacaine peritubal infiltration after PCNL in 60 patients; pain intensity was lower in bupivacaine group then controlled and also lesser analgesic dose requirement in bupivacaine arm.¹⁹

Karami et al²⁰ and Lojanapiwat et al²¹ preferred smaller caliber nephrostomy to decrease pain after PCNL. Our

routine practice is to keep nephrostomy tube of 22-24 Fr size after PCNL patients. The other modalities of pain relief after PCNL are subcutaneous infiltration, tract infiltration and systemic analgesics.

CONCLUSION

The peritubal infiltration of local anesthetic 0.25% bupivacaine after PCNL is effective in decreasing VAS scores, analgesic usage and longer pain-free period without side effects.

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