Original article

Ultrasound Guided Versus Cystoscopy Guided Obturator Nerve Block (ONB) in Transurethral Resection of Bladder Tumours (TURBT): A Comparison of Haemodynamic Status of the Patients

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Abstract:

Background: Selective obturator nerve block (ONB) is a current trend in transurethral resection of bladder tumour (TURBT), which is easy to administer, safe and prevents some major complications during operation. ***Objective:*** To compare the haemodynamic status of two groups of patients underwent two different techniques of obturator nerve block during TURBT operation – ultrasound guided ONB vs. cystoscopy guided ONB. ***Methods:***This prospective, observational study was conducted in the Department of Anaesthesia, Analgesia, Palliative and Intensive Care Medicine, Dhaka Medical College Hospital, Dhaka, from September 2018 to August 2019. A total of 60 selected patients were randomly allocated into two groups: ultrasound guided ONB (group A) and cystoscopy guided ONB (group B) i.e., 30 in each group. Then heart rate and blood pressure were assessed at different point during and after surgery. ***Results:*** Mean age of the patients was 54.7±8.53 years. In total, 34(57%) cases were male and 26(43%) were female. Male to female ratio was 1.3:1. In group A, 19(63.3%) patients had ASA II status and 11(36.7%) had ASA III status, while in group B, the numbers were 18(60%) and 12(40%) respectively. There was no significant difference in demographics and ASA status between two groups (P>0.05). Average onset of obturator nerve block was faster in group A (8.17±1.4 min) than group B (11.3±2.68 min), (P<0.001). Mean heart rate at baseline, at the end of the operation and postoperative room were found 77.56±2.69 and 76.35±3.09, 77.16±1.59 and 75.67±2.21, 76.34±6.24 and 75.67±6.42 in group A and B respectively, while simultaneous recorded mean systolic blood pressure were 115.23±5.56 and 116.45±5.82, 118.73±1.63 and 118.54±1.72, 116.73±3.32 and 116.37±4.13 respectively and mean diastolic pressure were 78.82±1.67 and 79.87±2.98, 77.68±2.34 and 77.18±4.15, 73.63±1.15 and 73.53±2.28 respectively. However, the differences in haemodynamic status between two groups were not statistically significant(P>0.05). ***Conclusion:*** Our data suggest no difference between two techniques in terms of changes in haemodynamic status of the patients who underwent TURBT operation.

Keywords: Transurethral resection of bladder tumor (TURBT);obturator nerve block (ONB); heart rate, systolic blood pressure; diastolic blood pressure

Bangladesh Journal of Medical Science Vol. 22 No. 02 April'23 Page : 348-352
DOI: https://doi.org/10.3329/bjms.v22i2.64994

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Introduction:

Urinary bladder cancer is one of the most common cancers worldwide[1]. Transurethral resection of bladder tumour (TURBT) is a relatively common procedure used to treat cancer of the urinary bladder[2,3]. TURBT can be performed under general anaesthesia or spinal anaesthesia. If spinal or general anaesthesia is administered without use of muscle relaxant, use of the cautery resectoscope may result in stimulation of the obturator nerve which in turn causes adduction of the legs and leg jerking. That ultimately increase the risk of serious complications like bladder perforation accompanied by extravesical spread of the tumour and even injury to the obturator artery leading to severe haemorrhage[4-7]. Several studies reported that selective obturator nerve block (ONB) prevents those abovementioned complications during surgery[8-10]. Several advanced techniques of ONB have been introduced to date. Two common methods of obturator nerve block are ultrasound guided ONB technique and cystoscopy guided ONB. Ultrasound guided regional anesthesia allows better visualization of the target nerve(s) with the placement of local anesthetics and catheters in close proximity to the target nerve(s) for the anesthesiologist[2,4,10]. However, in cystoscopy guided procedure, anesthetics are injected through urethra into the urinary bladder using cystoscope and William's needle by the urological surgeon before performing the TURBT[2,11,12]. Whatever may be the procedure, monitoring of haemodynamic status of the patients is very crucial. Intraoperative hemodynamic perturbations are common because of anesthetic agents and techniques, surgical manipulations, and the patient's medical comorbidities[13]. The most common physiologic consequencesthat needto be observed in perioperative management of the patients are heart rates and blood pressure of the patients. However, clinical studies on hemodynamic effects of specific nerve block procedure like ONB leading to different cardiovascular responses have not been well-studied in our country. Since superiority of any technique in terms of hemodynamic stability is barely investigated, we proposed this study to compare the changes in haemodynamic status of the patients underwent TURBT operations with either of two techniques of ONB – ultrasound guided ONB or cystoscopy guided ONB.

Methods:

This prospective, observational study was conducted in the Department of Anaesthesia, Analgesia, Palliative and Intensive Care Medicine, Dhaka Medical College Hospital, Dhaka, Bangladesh which is one of the largest tertiary level facilitiesof the country, between September 2018 and August 2019. A total of 60 patients were selected from the same hospital based on our inclusion and exclusion criteriawithin the defined period. Inclusion criteria includeadult patients (18 years and above) and who are undergoing TURBT. Exclusion criteria includepatients with coagulopathy, infection, had surgery at lumbar spine or pubic region or with history of local anaesthetic toxicity, or any history of acute lung injury, acute respiratory distress syndrome, traumatic abdominal injury, neuromuscular disease, or having chemotherapy/radiotherapy. We used purposive sampling technique. The patients were then randomly allocated (computer generated randomization schedule) into two groups: ultrasound guided ONB (group A) and cystoscopy guided ONB (group B) having 30 patients in each group. Preoperative assessment was done in all patients which included an ultrasonography and /CT scan of the urinary bladder to decide the side to which obturator nerve to be blocked. Then drugs were administered at operation time. Both the groups received 10 ml 2% preservative free lignocaine along with 5 ml 0.5% preservative free plain bupivacaine. In group A, drugs were injected after locating obturator nerve with a portable ultrasound machine (Sonosite M-TURBO, Fujifilm, Canada), by one of the investigators i.e.,anaesthesia physician. All the anatomical variations of obturator nerves and its branching were observed. Administration of local anesthetics into the interfascial plane between the pectineus and obturator externus muscles produced block of both the anterior and posterior branches of the obturator nerve. In group B, drugs were injected into the urinary bladder through urethra using cystoscope and William's needle by the urological surgeon performing the TURBT. For both the groups, a waiting period was 20 minutes were allowed for the full effect of the block and then resection was allowed to perform. The endpoints of this study were the assessment of heart rate, systolic and diastolic blood pressure at regular intervals during and after operation. All data were recorded, compiled, and

analysed to see the difference between two groups.

Categorical parameters were expressed as frequency and percentage and continuous parameters were expressed as mean±SD. Comparisons between groups in continuous parameters were done by unpaired Student's-t test, while categorical parameters were compared using Chi-Square ($\chi 2$) test. The significance of the results was determined in 95% confidence interval (CI) and a value of $P<0.05$ was considered to be statistically significant. All statistical analyses were performed using the Statistical Package for Social Science (SPSS; version 23.0).

Ethical consideration: The study was approved by the Ethical Review Committee of Dhaka Medical College, Dhaka, Bangladesh

Results:

Most of the patients i.e., 39(65%) were in 40-59 years age group, while the rest 21(35%) belonged to 18-39 years age group. Mean age was 54.7±8.53 years. In total, 34(57%) cases were male and 26(43%) were female. Male to female ratio was 1.3:1. In group A, 18(60.0%) of cases were male and 12(40.0%) were female, while in group B, the numbers were 16(53.3%) and 14(46.7%) respectively. However, no significant difference was evident in demographics between two groups (P>0.05) (Table1). In Group A, 19(63.3%) had ASA II and 11(36.7%) had ASA III status, while in Group B, the number were 18(60%) and 12(40%) respectively. No significant difference was observed between the groups (Table2). Average onset of obturator nerve block was faster in group A (8.17±1.4 min) than group B (11.3±2.68 min); the difference was statistically significant (P<0.0001) (Table 3). Mean heart rate at baseline, at the end of the operation and in the postoperative room were found 77.56±2.69 and 76.35±3.09,77.16±1.59 and 75.67±2.21,76.34±6.24 and 75.67±6.42 in group A and group B respectively; however, the difference was statistically not significant (P>0.05) (Table 4). Mean systolic blood pressure recorded at baseline, at the end of the operation and in the postoperative room were 115.23±5.56 and 116.45±5.82, 118.73±1.63 and 118.54±1.72, 116.73±3.32 and 116.37±4.13 respectively in group A and group B (P>0.05) (Table 5), while mean diastolic pressure recorded were 78.82±1.67 and 79.87±2.98, 77.68±2.34 and 77.18±4.15, 73.63±1.15 and 73.53±2.28 in group A and group B respectively (P>0.05) (Table 6).

Table1. Age and sex distribution of the patients (n=60)

Variables		Group A (n=30)	Group B (n=30)	P value
Age (in years)	18-39	9(30.0%)	12(40.0%)	>0.05^{NS}
	40-59	21(70.0%)	18(60.0%)	
	Mean±SD	54.7±8.53		
Sex	Male	18(60.0%)	16(53.3%)	>0.05^{NS}
	Female	12(40.0%)	14(46.7%)	

Parentheses indicate corresponding percentage. P-value reached from unpaired Student's-t test and Chi-square test respectively, NS= not significant.

Table2. ASA physical status of the patients (n=60)

ASA status	Group A (n=30)	Group B (n=30)	P value
ASA II	19(63.3%)	18(60%)	>0.05^{NS}
ASA III	11(36.7%)	12(40%)	

Parentheses indicate corresponding percentage. P-value obtained from Chi-square test, NS= not significant.

Table3. Time to onset of obturator motor block (n=60)

Time (Minutes)	Group A (n=30)	Group B (n=30)	P value
≤5	2(6.7%)	0	
6-10	23(76.7%)	19(63.3%)	
>10	5(16.7%)	11(36.7%)	
Mean±SD	8.17±1.42 min	11.3±2.68 min	<0.001^{S}

Parentheses indicate corresponding percentage. P-value reached fromunpaired Student's-t test, S=significant.

Table4. Comparison of mean heart rate (n=60)

Heart rate (beats/min)	Group A (n=30)	Group B (n=30)	P value
Base Line	77.56±2.69	76.35±3.09	
After 5 minutes	76.36±4.53	76.15±4.91	
After 15 minutes	62.43±7.12	63.23±5.34	
After 30 minutes	59.34±6.23	59.26±5.67	
After 60 minutes	69.56±1.34	68.26±1.87	P>0.05^{NS}
End of operation	77.16±1.59	75.67±2.21	
Postoperative follow up after 30 minutes	76.34±6.24	75.67±6.42	

All values were expressed as Mean±SD. P value reached from unpaired Student's-t test, NS= not significant.

Table5. Comparison of mean systolic pressure (n=60)

Heart rate (beats/min)	Group A (n=30)	Group B (n=30)	P value
Base Line	115.23±5.56	116.45±5.82	
After 5 minutes	111.12±5.76	110.54±5.54	
After 15 minutes	110.45±4.87	110.23±4.67	
After 30 minutes	110.43±7.98	111.14±3.81	
After 60 minutes	114.75±3.65	115.35±2.15	P>0.05^{NS}
End of operation	118.73±1.63	118.54±1.72	
Postoperative follow up after 30 minutes	116.73±3.32	116.37±4.13	

All values were expressed as Mean±SD. P value reached from unpaired Student's-t test, NS= not significant.

Table6. Comparison of mean diastolic pressure (n=60)

Heart rate (beats/min)	Group A (n=30)	Group B (n=30)	P value
Base Line	78.82±1.67	79.87±2.98	
After 5 minutes	73.23±3.45	73.34±2.32	
After 15 minutes	73.26±3.18	73.13±3.48	
After 30 minutes	74.56±1.42	73.89±1.35	
After 60 minutes	77.73±1.15	76.63±2.65	P>0.05^{NS}
End of operation	77.68±2.34	77.18±4.15	
Postoperative follow up after 30 minutes	73.63±1.15	73.53±2.28	

All values were expressed as Mean±SD. P value reached from unpaired Student's-t test, NS= not significant.

Discussion:

Peripheral nerve blocks are cost effective anesthetic techniques used to provide anesthesia while avoiding airway instrumentation and hemodynamic consequences of general anesthesia[9,13]. Patient satisfaction, a growing demand for cost-effective anesthesia, and a favorable postoperative recovery profile have resulted in increased demand for such regional techniques[3,9,14].There are no reports of complications associated with obturator nerve block and this lack of reported complicationsis more likely due to the infrequent use of this block rather than to its inherent safety[9,15]. However, regarding haemodynamic status, we meticulously observed our patients. A stable and moderate heart rate is necessary for adequate diastolic filling and coronary blood flow[16]. We know that hypertension along with ischemic heart diseaseis common in the elderly. In addition, decreasedautoregulation and sympathetic tone and increasedperipheral vascular resistance result in adecreased adaptability of the circulatory systemto stress[16,17].In general, we tried to maintain BP within 20 percent of the patient's baseline and keep diastolic arterial pressure ≥65 mmHg (and systolic BP ≥100 mmHg) to avoid myocardial infarction (MI) or myocardial injury after noncardiac surgery (MINS), acute kidney injury (AKI), central nervous system (CNS) ischemic events, or mortality. Besides, we attempted to avoid tachycardia and maintain an HR <90 bpm. In patients with ischemic heart disease, we maintained a lower HR (i.e.,between 50 and 80 bpm) since tachycardia compromises both myocardial oxygen supply and demand. Any severe bradycardia was managed immediately, e.g., if HR is <40 bpm, associated with transient episodes of asystole, or is hemodynamically significant with signs of inadequate perfusion (e.g. hypotension, electrocardiographic evidence of ischemia etc.).

Our data revealed no significant difference while changes happened in haemodynamic status of the two groups of patients underwent two different the procedures. Our results are in congruence with Sharma et al.[2], Shah, Sofi & Nengroo[10], and Khorrami et al.[11].

To the best of our knowledge, this is the first ever study done in our country comparing these two techniques of ONB in TURBT operation. Hence, there is no previous domestic report found to compare with the results of the present study.One of our study limitations was its small sample size, since we only enrolled patients from one selected hospital in Dhaka city within a short period of time. Moreover, potential biasness in data due to absence of blinding was another limitation of the study.

Conclusion:

Our data suggest that both the techniques of ONB give optimum hemodynamic stability over 90 minutes after receiving ONB. No statistical difference was evident in changes of haemodynamic status of the patients between the procedures. However, further studies with larger sample and multi-centre trials along with high technical back up are recommended.

Funding statement: No funding.

Conflict of interest: The authors declare no competing financial or personal interests.

Authors' contribution: Concept and study design: MZ, RB;
Data collection and compilation: MZ, TJZ, SC, GD, MRA, AMS, MJ, TM, RB, HJK;
Data analysis: MZ, TM;
Critical writing, revision and finalizing the manuscript: MZ, TJZ, SC, GD, MRA, AMS, MJ, TM, RB, HJK.

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