

OUTCOMES OF ULTRASOUND GUIDED VERSUS CYSTOSCOPY GUIDED OBTURATOR NERVE BLOCK (ONB) IN TRANSURETHRAL RESECTION OF BLADDER TUMOUR (TURBT)

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Abstract:

Context: Selective obturator nerve block (ONB) limits obturator reflex, adductor contraction, and leg jerking in transurethral resection of bladder tumour (TURBT), which ultimately prevents complications such as bleeding, bladder perforation, or incomplete tumor resection. The present study aims to compare the effectiveness of two different techniques of obturator nerve block during TURBT.

Methods: A prospective, observational study was conducted in the Department of Anaesthesia, Analgesia, Palliative and Intensive Care Medicine, Dhaka Medical College Hospital, Dhaka, Bangladesh, between September 2018 and August 2019 to evaluate the effectiveness of ultrasound guided ONB versus cystoscopy guided ONB in TURBT operation. 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 onset of anesthesia (nerve block), tumour removal and patient outcome 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), ($P<0.001$). Total resectability of tumours were achieved in 28(93.3%) in group A and 23(76.6%) in group B during operation ($P<0.001$), while 2(22.22%) and 7(77.77%) tumours had incomplete removal respectively ($P<0.05$). Among complications, adductor jerks were evident in 2(6.7%) and 7(23.3%), bladder perforation in 1(3.3%) and 4(13.3%), and bleeding in 1(3.3%) and 3(10.0%) cases in group A and group B respectively. The differences were statistically significant ($P<0.05$).

Conclusion: Although both techniques are safe and easy to perform, ultrasound guided ONB results in faster onset of block and better resectability of tumour with less complication over cystoscopy guided ONB.

Keywords: Transurethral resection of bladder tumour (TURBT), Obturator nerve block (ONB), Adductor Jerk, Resectability of tumour.

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Introduction:

Urinary bladder cancer is one of the most common cancer 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 and adduction of the legs, which ultimately increase the risk of serious complications like bladder perforation accompanied by extravascular 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) limits obturator reflex, adductor contraction, and leg jerking during TURBT operation, which ultimately prevents the abovementioned complications during surgery.⁸⁻¹⁰ Labat, in 1922, first described an ONB technique based on surface landmarks.¹¹ However, in course of time, several advanced techniques have been introduced.¹²⁻¹⁵ 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}. In contrast, in cystoscopy guided procedure, anesthetics are injected transurethrally into the urinary bladder using cystoscope and William's needle by the urological surgeon before performing the TURBT.^{2,15,16} Ultrasonography machine is available almost in all the hospitals even in low-resource settings and the needle used here is also easily available. Cystoscopy guided technique is also easily done; however, William's needle used here is a bit costly. Hence, we proposed the present study to compare the effectiveness of these two techniques of ONB in TURBT operation in terms of time to onset of obturator motor block, number of interruptions, complete resectability of tumours and complications during surgery.

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 hospitals in 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 criteria within the defined period. Inclusion criteria include adult patients (18 years and above) and who are undergoing TURBT. Exclusion criteria include patients 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 transurethrally into the urinary bladder 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. Motor blockade was evaluated by thigh adduction and graded (0=Adductor spasm; 1=Reduced adductor spasm i.e. 50% reduction; 2=No adductor spasm). A score of 2 was considered as a successful block. If spasm persisted after 20 min (or intense jerk), the block was classified as failed. Onset of block was defined by the time elapsed from the end of injection (time 0) until a motor block score of 2 was reached. Onset time was not recorded in failed blocks (when spasm persisted at 20 minutes). The primary endpoints of this study were the occurrence of adductor reflex (jerk), ability to achieve total resection of the tumour and the number of surgical interruptions. Incidence and severity of bleeding and bladder perforation were the secondary endpoints.

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 (χ²) 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). The study was approved by the Ethical Review Committee of Dhaka Medical College, Dhaka.

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) (Table-I). 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 (Table-II). 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-III). Total resectability of tumours were achieved in 28(93.3%) in group A and 23(76.6%) in group B during operation (P<0.001), while 2(22.22%) and 7(77.77%) tumours had incomplete removal respectively (P<0.05). Number of operative interruptions were 4(13.3%) and 10(33.3%) respectively; however, the difference was statistically not significant (P>0.05) (Table-IV). Adductor jerk was noted in 2(6.7%) of cases in group A, while 7(23.3%) of cases in group B. The difference was statistically significant (Table-V).

Table-I
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.

Table-II*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.

Table-III*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 from unpaired Student's-t test, S=significant.

Table-IV*Distribution of cases according to resectability of tumours*

Variables	Group A (n=30)	Group B (n=30)	P value
Totally resectable tumours	28(93.3%)	23(76.6%)	<0.05 ^S
Unresectable tumours	2(22.22%)	7(77.77%)	<0.05 ^S
Number of operative interruptions	4(13.3%)	10(33.3%)	>0.05 ^{NS}

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

Table-V*Distribution of cases according to complication (n=60)*

Complications	Group A (n=30)	Group B (n=30)	P value
Adductor Jerk	2(6.7%)	7(23.3%)	<0.05 ^S
Bladder Perforation	1(3.3%)	4(13.3%)	<0.05 ^S
Bleeding	1(3.3%)	3(10.0%)	<0.05 ^S
No complications	28(93.3%)	23(76.67%)	>0.05 ^{NS}

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

Discussion:

A growing demand for cost-effective anesthesia and a favorable postoperative recovery profile have resulted in increased demand for different regional techniques.¹¹ Among these, peripheral

nerve blocks are cost effective anaesthesia techniques which are used to achieve proper anesthesia by avoiding airway instrumentation and hemodynamic consequences of general and spinal anesthesia.^{9,11,17} As we have mentioned

earlier that several findings suggested ONB as to effective facilitating complete resection of a urinary bladder tumour by immobilizing the surgical field, avoiding nerve stimulation and jerks as well as preventing other complications like bleeding or bladder perforation, while doing TURBT.⁸⁻¹⁰ Hence, for decades, ONB has become essential for performing TURBT safely and effectively.

In our study, average onset of obturator nerve block was faster in ultrasound guided ONB (8.17±1.4 min) than in cystoscope based ONB (11.3±2.68 min); the difference was statistically significant. Our results are in congruence with Sharma et al.², Shah, Sofi & Nengroo¹⁰ and Sinha et al.¹⁴. Total resectability of tumours were achieved by us: in 28(93.3%) in ultrasound guided ONB patients and 23(76.6%) in cystoscope based ONB patients. The difference was significant between the two groups (P<0.001). In a similar study done by Sharma et al.² reported that resectability of the tumor without jerk performed in 19(95%) patients of obturator nerve block with nerve locator, while in 15(75%) patients of obturator nerve block with cystoscope. The difference was also significant between the two groups, which supports our findings. Khorrami et al.¹⁵ reported that transvesical blockade of obturator nerve through cystoscope along with spinal anesthesia (30 patients) and compared it with spinal anesthesia only (30 patients). They observed a significant jerk in the control group (16.5%) compared to the intervention group (3%). More visible jerks were observed in our study, which could be due to impeded penetration of local anesthetic through the thicker bladder wall of the patients or unable to locate the nerve properly by the person involved.

More recent studies have reported that the use of sonography is associated with higher success rates of 97.2% in ONB procedures as reported by Akkaya et al.¹³ and Lee et al.¹⁸, which are a little higher than that of ours. In our study, the success rate was 93.3% in ultrasound guided obturator nerve block procedures. This difference may be due to drug affect (not maintained properly which resulted in

decreased potency) or may be junior surgeon performing operative procedure. Complications resulting from poor nerve blockade and subsequent adductor jerks have been reported in many studies.⁴⁻⁷ We observed similar complications like bleeding in 1(3.3%) and 3(10.0%), and bladder perforation in 1(3.3%) and 4(13.3%) in ultrasound guided ONB patients and cystoscope based ONB patients respectively. The difference was significant between the two groups. 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 is 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 are safe and easy to perform: however, ultrasound guided procedure results in a faster onset of block and a higher success rate with less complication over cystoscopy guided procedure. However, further studies with larger sample and multi-centre trials along with high technical back up are recommended.

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