

Original Article

Comparison between Classic pubic approach and transurethral approach for prevention of obturator jerk in Resection of bladder tumor under subarachnoid block

Shoma Siraj¹, Humayun Kabir Kallol², Nazmul Ahsan Siddiqi Rubel³, Md Khairul Kabir Khan⁴, Md Sharif Uddin Siddique⁵

¹Lt. Colonel, Classified Anaesthesiologist, Combined Military Hospital, Momenshahi Cantonment, Mymensingh, ²Indoor Medical Officer, Dept. of Urology, Dhaka Medical College Hospital, Dhaka, ³Junior Consultant (Anaesthesiology), Sheikh Hasina National Institute of Burn and Plastic Surgery, Dhaka, ⁴Junior Consultant (Anaesthesiology), Mymensingh Medical College Hospital, Mymensingh, ⁵Consultant, Anaesthesia, Analgesia & Intensive Care Medicine, BSMMU

Corresponding Author: Shoma Siraj, Email : shomakallol@yahoo.com

Abstract

Background: *Obturator jerk is a major problem during transurethral resection of bladder tumor which poses a major obstacle in complete resection of bladder tumor and increases risk of bladder perforation and vascular injury. Both Labat's technique and transurethral injection of local anesthetic in bladder wall are used routinely for control of obturator jerk during transurethral resection of bladder tumor.*

Objectives: *The primary objective of this study was to compare the efficacy of obturator block in controlling obturator jerk between anatomic landmark guided classical Labat's technique and transurethral cystoscopic injection of local anesthetic into bladder wall in patients undergoing transurethral resection of bladder tumor under sub-arachnoid block at Combined Military Hospital (CMH), Dhaka.*

Materials and method: *This Prospective randomized comparative study was performed in Combined Military Hospital (CMH), Dhaka from July 2018 to June 2019. Forty patients scheduled for transurethral resection of bladder tumor under sub-arachnoid block belonging to ASA class I, II and III were included in the study and randomly divided into two groups with 20 patients in each group. In Group A (n= 20) Anatomic landmark guided classical obturator block was employed using inj. Lignocaine 3 mg/kg. In Group B (n=20), obturator block was employed by using transurethral cystoscopic injection of Lignocaine 3 mg/kg into bladder wall. The study population was observed for obturator block, duration of surgery, perioperative cardiovascular status, any complications, surgeons and patients satisfaction. Results were analyzed using chi-square and Student t tests as appropriate.*

Results: *In present study, mean age & mean body weight were comparable in both the groups. Complete elimination of obturator jerk was observed in 80% cases of group A and 70% cases of group B. No strong jerk was seen in group A but 5% cases of group B showed strong obturator jerk. But no significant difference was seen in statistical analysis. Mean duration of surgery was 58.2 minutes in Group A and 59.5 minutes in Group B, which was not statistically significant. No significant difference was noted between the groups in terms of perioperative hemodynamic status, complication rate, surgeon and patient satisfaction.*

Conclusion: *Though the results of Labat's technique seems better than cystoscopic injection technique, but there was no statistically significant difference between the two groups in terms of efficacy of block, hemodynamic status, duration of surgery, complications, surgeons and patients satisfaction.*

Keywords: *obturator nerve block, transurethral resection of bladder tumor, obturator nerve, Labat's technique, cystoscopic injection of local anesthetic.*

Introduction

Obturator jerk is the sudden involuntary reflex contraction of adductor group of muscles due to electrical stimulation of the Obturator nerve. Obturator nerve passes in close proximity to the posterolateral bladder wall, bladder neck and prostatic urethra. As a result, transurethral resection of bladder tumor (TURBT) in the lateral bladder wall, when performed under SAB, may provoke obturator reflex, adductor contraction and leg jerking¹. However, Obturator nerve block during TURBT can prevent obturator reflex to avoid complications such as bleeding, Bladder perforation or incomplete tumor resection¹⁻⁵. To avoid the obturator jerk, urologists often cannot fully resect the tumor on the inferolateral bladder wall⁶. Obturator nerve (somatic) originates from anterior division of L₂₋₄. From the angle between external and internal iliac vessels, it runs straight to the Obturator foramen, where it splits anterior and posterior division and supplies to Obturator externus, adductor Magnus, adductor brevis, adductor longus, pectineus and gracilis muscles within the pelvic cavity. It runs close to prostatic urethra, bladder neck and inferolateral bladder wall. When the bladder is distended with irrigation fluid, the obturator nerve become very close to the inferolateral bladder wall. Thus, when performing transurethral surgery in full bladder, electric current can easily stimulate the obturator nerve and activate the obturator jerk, which causes a suddenly push of the bladder wall towards the electrocautery blade and leads to perforation⁷ and may even cause injury to the iliac vessels⁸.

In present study, the effectiveness and side effect of classical pubic approach of Obturator block and transurethral Obturator block were compared in prevention of Obturator jerk during TURBT.

Materials & methods

This prospective randomized comparative study was conducted in department of anesthesia, combined military hospital (CMH) Dhaka during July 2018 to June 2019. Patients admitted for transurethral resection of bladder tumor located at lateral, posterolateral wall and neck of bladder under Subarachnoid block in combined military Hospital (CMH), Dhaka within the study period. Patients aged more than 18 years

undergoing elective transurethral resection of bladder tumor involving lateral, posterolateral wall and neck of bladder under subarachnoid block with ASA class I, II, III were included in study. Patients with coagulopathy, local site infection, bladder tumor at anterior, posterior wall or dome of bladder, scar or surgery at lumbar spine and pubic region and known hypersensitivity to local anesthetic agents were excluded from study. Obturator jerk was classified as strong (jerk with displacement of leg), moderate (jerk with no or minimum displacement of leg) and weak (only visual appearance of adductor contraction). Surgeons satisfaction was classified as complete (comfortable during TURBT without any obturator jerk), relative (few adductor jerks without major difficulties in TURBT) and lack (difficult surgery due to frequent adductor jerk or any major complications).

Forty patients suffering from bladder tumor located at lateral, posterolateral wall and neck of bladder, scheduled for operation under SAB were included in the study and randomly divided into two groups with 20 patients in each group. In Group A (n=20), patients received anatomic landmark guided classical obturator block and in group B (n=20), received drugs injected transurethrally into the bladder wall. Permission for the study was taken from ethical committee of combined military hospital, Dhaka. Total 40 patients were selected for the study during pre-anesthetic checkup strictly following the inclusion and exclusion criteria. After taking informed written consent patients were randomly divided into two equal group (Gp A and Gp B). Both the groups received lignocaine 3 mg/kg body weight. As for example, for 70 kg patient, 210 mg lignocaine is required which is present in 10.5 ml 2% lignocaine. The drugs were given as per the groups:

Group A: Anatomic landmark guided classical obturator block

Group B: The drugs were injected transurethrally into the urinary bladder wall.

Preoperative assessment included ultrasonography and a computerized scan of the urinary bladder to decide the side to which obturator nerve was to be blocked. All patients after aseptic preparation received subarachnoid block in lumbar 3–4 or 4–5 space in sitting position by 25 G Quincke needle with injection 0.5% heavy bupivacaine in a dose of 0.2 mg/kg

body weight. After the completion of the block, patients were laid in the supine position and subsequently wait for 5 min for fixation of drug and they will be assessed for sensorimotor block. Further procedure will be performed as per the group allocation. In group A, while the patient lying supine in lithotomy position with thighs externally rotated and abducted, the spine of the pubic bone on the involved side was identified. A point 1.5 cm lateral and inferior to it is marked for needle insertion. A 25G spinal needle is inserted perpendicular to the skin over this landmark until the upper part of the inferior ramus is contacted at an approximate depth of $\frac{1}{2}$ to 1 inch. It is redirected laterally and slightly inferiorly to slip past the inferior ramus and just underneath the superior ramus of the pubic bone, then advanced an additional $1\frac{1}{2}$ inch to lie in the area of the obturator foramen. Ten ml of 2% lignocaine inj. is infiltrated as the needle moves back and forth slowly. In the group B, with all aseptic precautions, surgeons introduce cystoscope into bladder transurethrally, assess site size and location of tumor. Then surgeon injects required amount of drug into base of bladder and posterolateral aspect of bladder wall in ipsilateral side using Botox needle. For both the groups, a waiting period of 20 min were allowed for the full effect of the block and then resection was allowed to perform. Monopolar cautery was used to resect the tumor with cutting loop by a fixed urologist. During the operative procedure, the primary endpoint of the study is resectability of the tumor whether hampered or unhampered by adductor reflex and if present, number and strength of reflexes. Bleeding and bladder perforation are the secondary endpoints. Perioperative complications for first 24 hours of procedure of procedure, patient and surgeon satisfaction of the procedure were recorded in a preformed data sheet.

All data were recorded in a data sheet. Statistical analysis was performed using SPSS version 20. The data was tabulated as a mean $\pm$ standard deviation and significance was analyzed by using independent sample t-test for continuous variables and categorical variables were compared with Chi-square test. Statistical significance was set at $P < 0.05$.

Result

Table 1 : Comparison of patients' demographic characteristics in both groups (n=40)

Patients' characteristics	Group A	Group B	P value
Age (years)	63.6 $\pm$ 13.08	64.35 $\pm$ 9.23	0.417
Sex			
Male	12(60)	13 (65)	0.5
Female	8(40)	7(35)	
Body weight	64.4 $\pm$ 9.80	70.15 $\pm$ 12.14	0.0538
ASA grading			
ASA grade I	12(60)	13(65)	0.5
ASA grade II	6(30)	6(30)	
ASA grade III	2(10)	1(5)	

Mean age of Group A patients were 63.6 years and Group B patients were 64.35 years. Age of the patients were compared by Students T test and found no statistical significance (P value. Out of 40 patients 12 (60%) and 13 (65%) were male in group A and group B respectively. Female were 40% and 35% respectively. Statistical analysis was done by Chi Square test p value was 0.5 which is >0.05 and is not significant. Mean body weight for group A was 64.4 Kg and for group B was 70.15Kg. Body weight of each group were compared by Students T test and found no statistical significance (P value. Most of the patients in both groups belong to ASA grade I and no statistically significant difference was noted between the two groups.

Table 2 : Location of Tumors in patients of study group

Groups	Number (n)	Tumors located in right or left lateral wall	Tumors located in right or left postero-lateral wall	Tumors located in bladder neck	P value
A	20	15 (75%)	3 (15%)	2(10%)	0.640496
B	20	13 (65%)	4 (20%)	3 (15%)	

Table 2 shows that, In group A 15 (75%) patients had tumors located in right or left lateral wall of urinary bladder, 3 (15%) patients had it in posterolateral walls and rest 2(10%) patients had it in neck of bladder. On the other hand, in group B, 13 (65%) patients had tumors located in right or left lateral wall of urinary bladder, 4 (20%) patients had it in posterolateral walls and rest 3 (15%) patients had it in neck of bladder. Statistical analysis done by chi-squared test (χ^2 test) and result was not found significant ($p>0.05$).

Table 3 : Efficacy of block, Duration of Surgery, surgeon and patient satisfaction (n=40)

Efficacy of Block	Group A (n=20)	Group B (n=20)	P value
No jerk	16(80)	14(80)	
Mild jerk	2(10)	2(10)	
Moderate jerk	2(10)	3(15)	0.721
Strong jerk	0	1(5)	
Duration of surgery (minutes)	58.2 ± 10.24	59.5 ±10.48	0.532
Surgeons satisfaction			
Completely satisfied	18(90)	2(10)	
Relatively satisfied	2(10)	3(15)	0.517
Not satisfied	0	1(5)	

In Group A, Complete elimination of obturator jerk was observed in 16 (80%) cases whereas it was 14 (70%) cases in Group B. Mild jerk was observed in 2 (10%) cases in both groups. Moderate jerk was observed in 2 (10%) cases in Group A and 3(15%) cases of Group B. strong jerk was observed only in 01(5%) case in group B which was absent in group A. Statistical analysis done by Chi-squared test (χ^2 test) which shows p value 0.721 and this result was not found significant ($p>0.05$). Mean duration of surgery in Group A patients were significantly lower than Group B patients. It was 58.2 minutes in Group A and 59.5 minutes in Group B. statistical analysis with Students T test shows P value >0.05 which is not significant. Surgeon was

satisfied in 18 (90%) cases of group A and 16 (80%) cases in group B. Relative satisfaction was noted in 2 (10%) and 3 (15%) cases Group A and Group B respectively. In 1 (5%) patient in group B surgeon was not satisfied due to strong obturator jerk. Statistical analysis done by chi-squared test (χ^2 test) which shows P value 0.517 and this result was not found significant ($p>0.05$).

Table 4 : Distribution of the study patients according to hemodynamic status (n=40)

	Heart Rate (Beats Per Minute)			MAP (mmHg)			SpO ₂ (%)		
	Group A (n=20)	Group B (n=20)	P value	Group A (n=20)	Group B (n=20)	P value	Group A (n=20)	Group B (n=20)	P value
	Mean±SD			Mean±SD			Mean±SD		
Baseline	85.2±1.9	85.4±1.6	0.661	71.8±3.8	70.3±4.0	0.142	97.2±0.7	97.0±0.7	0.273
At 15 minutes	79.2±2.2	79.4±1.9	0.708	67.5±4.3	66.3±4.7	0.307	97.4±0.8	97.6±0.7	0.307
At 30 minutes	72.1±2.5	72.8±2.4	0.273	70.2±4.3	68.8±4.7	0.234	97.8±0.7	98.0±0.9	0.341
At 45 minutes	67.7±3.0	68.9±3.0	0.127	72.8±4.6	71.3±4.6	0.212	98.2±0.4	98.4±0.7	0.180
At 60 minutes	62.1±3.9	63.2±2.9	0.220	66.3±4.8	66.4±4.8	0.936	98.2±0.4	98.4±0.5	0.093

Table 4 shows that Heart rate, MAP and SpO₂ was within normal limit for both group and this is not statistically significant.

Table 5 : Distribution of the study patients according to complications (n=40)

Complications	Group A (n=20)		Group B (n=20)		P value
	n	%	n	%	
Hypoxia	0	0	0	0	
Bradycardia	2	10	2	10	41.0
Bladder perforation	0	0	0	0.0	
Arrhythmia	0	0	0	0	
Vomiting	2	10	3	15	0.633
Hypotension	3	15	2	10	0.633
Hematoma	0	0	0	0	

Table 5 shows that 2(10%) patients in both groups developed bradycardia which was managed accordingly. 2(10%) patients in group A

& 3(15%) patients in group B suffered from vomiting. 3(15%) patient in group A and 2(10%) patient in group B suffered from hypotension. But no patient showed major complication like bladder perforation or arrhythmia. P value reached from chi square test which was 0.633 in both cases and was not significant.

Discussion

Since 1961, many studies were performed regarding control of Obturator jerk. Obturator jerk is not uncommon. If the Obturator jerk is completely eliminated, the transurethral resection of bladder tumor is smooth and complete. To prevent obturator jerk different studies have been done in different times. In a study Hobika and Clerke Stated that the effectivity of neuromuscular blocking drugs like d-tubocurarine or Succinylcholine are used to control Obturator jerk with general anesthesia. Succinylcholine produces its blockage by continuous depolarization of the neuromuscular membrane, whereas d-tubocurarine competes physiologically with acetylcholine at this point. And under these circumstances, electrical stimuli to the peripheral nerve cannot cause muscular contraction⁹. Here the patients need controlled or assisted respiration during procedure by administration of muscle relaxant and here also preliminary endotracheal intubation is desirable. For this, the above-mentioned procedure is not getting popularity. In another study, Crecvy stated that periprostatic and subvesical infiltration with 0.5% lignocaine done through a modified O'conor sheath and spinal puncture needle guided by finger through per rectal route, produces effective Obturator jerk control¹⁰. Here the author described that, the patients who develop Obturator jerk must have Obturator nerve with abnormal course or that it received an anomalous branch. It is a blind procedure and target point of infiltration is no always accessible.

In a study, Gasparich, Mason and Berger showed that, the effective control of Obturator nerve stimulation in Obturator canal can be done with infiltration of lignocaine through perineal route by help of nerve stimulator with variable voltage¹¹. This procedure is painless as the patient already remains under anesthesia. But the identification and localization of obturator canal is blind here as well as some special equipment like exploring needle with metal hub, adaptor

etc. are required. Also, chance of Obturator vessel injury is more. In another study, Augsperger and Donohue Stated that Obturator nerve reflex is successfully blocked by infiltration of local anesthetic in the obturator canal with 22-gauge spinal needle through perineal route¹². The needle is inserted 2 cm lateral and 2 cm caudal to pubic tubercle with direction 15-30 lateral and 15-30 cranial with posterior superior and lateral advancement. Here also chance of vessel injury is more as the procedure is blind and the procedure is ineffective if abnormal course or abnormal branch of Obturator nerve present. About 10% patients have abnormal course or abnormal branch of Obturator nerve.

Another study conducted by Patel, Shah and Patel showed that the Obturator nerve blockade was administered by infiltration of 1% lignocaine through perineal route with 22-gauge spinal needle¹³. Here the needle is inserted perpendicularly to the superior ramus of the pubic bone until touches the bone. The needle is then slightly withdrawn and redirected to inferior margin, then advanced 1.5 to 2 cm, then infiltration of local anesthetic done to block the conduction. Among 25 patients, satisfactory response was observed in 24 patients (94% effective). Here the localization of Obturator nerve is also blind and operator dependent. Junne showed that use of 2% lignocaine and electrical stimulation to locate obturator nerve to inhibit the obturator jerk is better than blind anatomic approach, although its success rate is not 100%⁶.

Ensuring adequate nerve blockade is or important step in preventing Perioperative obturator jerk. Gasparich, Mason and Berger recommended that after a local anesthesia injection, 2 mA stimulation should be used to ensure full Obturator blockade¹¹ while Akata, Murakami and Yoshinaga Recommended that the bladder should not be overly distended during the procedure and the electrocoagulation voltage should be lowered⁵.

No significant difference was noted between age, sex and body weight distribution between group A and B. Regarding location of tumor, most of the tumors in both groups were located in lateral wall of bladder. Rest of the Tumors were located either in posterolateral wall or bladder neck. This result is comparable with study of Rahman, Abedin, Islam et al where they showed most of Tumors

were located in lateral bladder wall¹⁴. But there was no significant difference in between location of two groups of tumors. Junne YK noticed that most of the Tumors producing obturator jerk are located on lateral and inferolateral wall of bladder⁶ which supports our findings. In this study, in group A patients, Labat's technique of obturator nerve block showed that, it completely eliminated obturator jerk in 80% cases without any form of adductor contraction in lateral, posterolateral wall and bladder neck tumor resection. In 10% cases, there was only mild visible contraction seen in muscles. And in rest 10% cases little stronger contraction seen by it was not able to displace the thigh. No strong obturator jerk with displacement of thigh was noted. So, we can say that, Labat's technique was completely effective in 80% cases and partially effective in 20% cases. No cases of complete ineffectiveness were demonstrated. Junne shows that use of 2% lignocaine and electric stimulation to locate obturator nerve to inhibit the obturator jerk is better than blind anatomic approach, although its success rate is still not 100%⁶. In another study, Augsperger and Donohue stated that, with the blind anatomic approach, the effectiveness of inhibiting the obturator jerk was about 83.8%- 85.7%, while with nerve stimulation, the result was superior¹², and according to Gasparich, Mason and Berger, the effectiveness reached 89.4-100%¹¹. They used nerve stimulation approach with 0.5 mA and 3-4 ml of 15ml of 1% lignocaine was injected only once with a success rate of 100%. While Kobayashi and Takiyama used nerve stimulation technique with 0.5 mA and injected 7-40 ml of 0.25% bupivacaine once, with success rate of 89.4%¹⁵.

On the other hand, in group B patients, transurethral injection of lignocaine was given in bladder wall. It completely eliminated obturator jerk in 70% cases. Mild jerk was visible in 10% cases, 15% cases showed moderate jerk without any displacement of thigh and in 5% case, there was strong jerk with displacement of leg. Bladder tumor resection was difficult in the last-mentioned case and patient needed general anesthesia with muscle relaxation. Rahman, Abedin, Islam et al stated that, in their study, 45 patients were conducted with endoscopic injection of 2% lignocaine to control obturator jerk, 42 patients (93.3%) developed complete

elimination and 3 patients (6.7%) developed partial elimination of obturator jerk. In their series overall response in complete resection of bladder tumor was 100%¹⁴. From the above scenario it seems that, in our study, effectiveness of Labat's technique of obturator nerve block was better than endoscopic injection of local anesthetic in bladder wall. But statistical analysis failed to show any significant difference between the two techniques. In this study, we found that, operative duration was slightly higher group B patients, 58.2 minutes in Group A and 59.5 minutes in Group B, but this was not clinically significant. Most of the time surgeon was satisfied with level of blockade and completed resection of tumor without any perforation or excessive hemorrhage. It was 90% cases in group A and 20% cases in group B. 10% cases in group A and 15% cases in group B, surgeon was satisfied partially. In 1 case in group B, surgeon was not satisfied due to strong obturator jerk. But the difference was not statistically significant.

70% and 60% patients in Group A and Group B patients respectively had excellent satisfaction level, 15% and 20% good, 15% and 10% fair respectively. 10% patients in Group B were poorly satisfied. Statistical analysis did not find significant ($p>0.05$) difference.

Patients in both groups was stable during the procedure and peroperative vital parameters did not show any statistically significant difference between the two procedures. Few the patients in both groups suffered from milder form of complications, like vomiting, hypotension and bradycardia. But no patient showed major complication like bladder perforation, hypoxia or arrhythmia. No statistically significant difference was found between the two procedures.

CONCLUSION

This study showed a potentially important role of obturator nerve block with local anesthetic either by Labat's technique or by endoscopic injection in the bladder in transurethral resection of bladder tumor to suppress hazardous obturator jerk. None of the technique could prove the superiority over another, but both are almost equally effective. Complication profile is also low in both the techniques with good patient and surgeon satisfaction.

Conclusion:

As both the techniques are effective in prevention of obturator jerk without any significant statistical difference, any one of the procedure can be used to prevent this problematic jerks during TURBT.

Reference

1. Kuo JY. Prevention of obturator jerk during transurethral resection of bladder tumor. JTUA. 2008; 19:27-31
2. Mydlo JH, Weinstein R, Shah S, Solliday M, Macchia RJ. Long term consequences from bladder perforation and/or violation in the presence of transitional cell carcinoma: Results of a small series and a review of the literature. J Urol. 1999; 161:1128-32
3. Tatlisin A, Sofikerim M. Obturator nerve block and transurethral surgery for bladder cancer. Minerva UrolNefrol. 2007;59:137-41
4. Hradec E, Soukup F, Novák J, Bures E. The obturator nerve block. Preventing damage of the bladder wall during transurethral surgery. Int Urol Nephrol. 1983;15:149-53.
5. Akata T, Murakami J, Yoshinaga A. Life-threatening haemorrhage following obturator artery injury during transurethral bladder surgery: A sequel of an unsuccessful obturator nerve block. Acta Anaesthesiol Scand. 1999;43:784-8.
6. Junne YK. Prevention of Obturator jerk during transurethral resection of bladder tumor. JTUA. 2008; 19:27-31
7. Collado A, Chechile GE, Salvador J, Vicente J. Early complication during endoscopic treatment for superficial bladder tumor. J Urol. 2000; 164:1529-32
8. M'liss A, Hudson. Transurethral resection of bladder tumor. In: Marshal FF, eds. Textbook of operative surgery. 1st ed. W.B Saunders Company: 1996:22
9. Hobika JH, Clerke BG. Use of neuromuscular blocking drugs to counteract thigh adductor spasm induced by electrical shocks of the obturator nerve during transurethral resection of bladder tumor. J Urol. 1961; 85: 285-0.
10. Crecvy CD. Preventing stimulation of obturator nerve during transurethral surgery. J Urol. 1969; 101:368
11. Gasparich PG, Mason JT, Berger RE. Use of nerve stimulator for simple and accurate obturator nerve block before transurethral resection. J Urol. 1984; 132: 291-293.
12. Augsperger RR, Donohue RE. Prevention of Obturator nerve stimulation during transurethral surgery. J Urol. 1980; 123: 170-172
13. Patel D, Shah B, Patel BM. Contribution of the obturator nerve block in the transurethral resection of bladder tumors. Indian J. Anaesth. 2004; 48(1): 47-49.
14. Rahman S, Abedin J, Islam MS, Islam S, Hossain M, Alam A. Effectiveness of endoscopic injection of 2% lignocaine in to the bladder wall to control obturator jerk during transurethral resection of bladder tumor. Bangladesh J UROL 2010; 13(2): 64-9
15. Kobayashi M, Takiyama R. A report of 107 cases of obturator nerve block. Jpn J anesth. 1991; 40: 1138-43