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# Effect of obturator nerve block during transurethral resection of lateral bladder wall tumors: a comparison of monopolar and bipolar TUR-BT regarding the presence of detrusor muscle in tumor specimens and recurrence of disease

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## Abstract

### Aim

Any unintentional stimulation during electroresection results in adductor contraction and resultant sudden leg movement, which may in turn lead to perforation of bladder or incomplete resection. To avoid this reaction, obturator nerve block (ONB) and bipolar resection is effective to decrease the jerk.

### Patients and methods

A prospective randomized, single-blind study was conducted during 2014–2018. A total of 74 patients were classified into four groups. Group I included 18 patients who received monopolar transurethral resection of bladder tumor (TUR-BT) and group II included 21 patients who received bipolar TUR-BT. Group III included 16 patients who received ONB and monopolar TUR-BT. Group IV included 19 patients who received ONB and bipolar TUR-BT.

### Results

The median age for group I was 61.3 years, and mean operation time was 38.2 min. For group II, median age was 63.0 years, and operation time was 33.55 min. For group III, median age was 65.2 years, and operation time was 31.50 min. For group IV, median age was 64.0 years and operation time was 29.25 min. No recurrence occurred in 83.3% (15/18) in group IV, and no recurrence occurred in 73.3% of group III in comparison with 65% of group II and 68% of group I.

### Conclusion

Bipolar TUR-BT with ONB is an effective method to have muscle in the specimen and to reduce incidence of early recurrence (incomplete resection) and jerks.

**Keywords:** Bipolar transurethral resection of bladder tumor, bladder mass; bladder cancer, monopolar transurethral resection of bladder tumor, obturator nerve block, transurethral resection of bladder tumor

## INTRODUCTION

Bladder cancer is the fourth most common cancer in men in the world. The basic methods for diagnosis and management are endoscopic procedures [cystoscopy and transurethral resection of bladder tumor (TUR-BT)]. Transurethral surgery (TUR-BT) has become the predominant treatment for bladder and prostatic tumors. During TUR-BT, the bladder is filled with irrigation fluid. The obturator nerve is directly adjacent to the lateral

wall of the bladder. Any unintentional stimulation during electroresection results in adductor contraction and resultant

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sudden leg movement, which may in turn lead to intraperitoneal or extraperitoneal perforation of the bladder wall with the resectoscope loop. Indeed, intraperitoneal perforations or obturator artery ruptures necessitate immediate conversion to laparotomy [1]. Adductor muscle spasms have been reported to develop in 20–53% of cases after undergoing TUR-BT [2]. The frequency of tumor cell dissemination can reach 4% in the case of perforation [3]. Although stimulation of the obturator nerve is not an uncommon problem, very little has been reported in the literature about its management. Various measures available for its prevention are as follows: first, spinal anesthesia; second, spinal plus general anesthesia; third, application of muscle relaxants under general anesthesia; fourth, reversal in the polarity of the electrical element; fifth, change in the site of the inactive electrode or in current frequency; sixth, nerve cooling; seventh, avoiding an over-distended bladder; and eighth, using a 90° classic loop. However, unfortunately, all of the aforementioned techniques have been proved ineffective [4,5]. As none of these techniques was found to be effective in preventing the stimulation of the obturator nerve, most researchers [6] suggest using the obturator nerve block (ONB) technique developed in 1965 by Prentiss *et al.* [7], which effectively prevents the muscle spasms during TUR-BT. In this study, we investigated the effect of ONB combined with spinal anesthesia in relation to monopolar or bipolar TUR-BT on the intraoperative complications, presence of detrusor muscle tissue in the tumor specimen, and tumor recurrence.

## PATIENTS AND METHODS

This prospective randomized, single-blind study was conducted in the Departments of Urology and Anesthesiology, National Institute of Urology and Nephrology, Cairo, Egypt, during 2014–2018. The study was conducted according to the Declaration of Helsinki (1996) and was approved by Institute Ethical Committee. After written informed consent was obtained. Overall, 74 patients having clinical and radiological evidence of an endovesical tumor located on lateral and posterolateral wall and undergoing TUR-BT were enrolled for this study. Most of the patients belonged to the urological evaluation. Patients with inguinal lymphadenopathy, nonlateral wall tumor, coagulation disorder, infection or hematoma at the injection site, and known allergy to local anesthetic agents were excluded from the study. During the preoperative visit, all patients were evaluated, and the procedure was explained to them. No sedation or premedication was administered. Patients were randomized using computer method into four groups. Group I (no nerve block was done) included 18 patients who only received spinal anesthesia and monopolar TUR-BT, and group II (no nerve block was done) included 21 patients who only received spinal anesthesia and bipolar TUR-BT. Group III included 16 patients who received spinal anesthesia combined with ONB and monopolar TUR-BT. Group IV included 19 patients who received spinal anesthesia combined with ONB and

bipolar TUR-BT. Spinal block with 25 G Quincke needle at the L3–L4 or L4–L5 interspace, in sitting position, using 3 ml of 0.5% hyperbaric bupivacaine, was performed to attain anesthesia at the T10 level in all patients. Patients were then placed in the supine position with leg slightly abducted (30°) and externally rotated. The inguinal region was prepared with a chlorhexidine 2% solution and 2–3 cm below the inguinal crease. In ONB, the injection needle was advanced by blind anatomical approach. Regional anesthesia needle of 22 Gauge was taken along with 20 ml syringe (Fig. 1).

Needle was inserted at point 1.5 cm lateral and 1.5 cm inferior to pubic tubercle. The needle was inserted through the skin vertically, and if it touched the inferior ramus of pubis, then after slightly withdrawing, it was advanced laterally and superoposteriorly. Negative suction was applied to ensure that no blood came out and then 10 ml of 1% lidocaine was injected. Injection was repeated on the contralateral side if required. Monopolar TUR-BT was performed on group I and group III patients using a 26-F 30° optic monopolar resectoscope (Karl Storz GmbH, Tuttlingen, Germany). Bipolar TUR-BT was performed on group II and IV patients using a 26-F 30° optic bipolar resectoscope and loop for resection at settings of 50 W cutting and 40 W coagulation. The same diathermy power was used in monopolar technique. The presence of obturator reflex and development of bladder perforation were noted during tumor resection. Five minutes after the end of injection, the surgeon who was masked to group assignment entered the operating room to start TUR-BT and to evaluate the motor blockade, which was graded according to Shah *et al.* [8] classification.

- (1) 0 = powerful adductor spasm.
- (2) 1 = Reduced adductor spasm (50% reduction).
- (3) 2 = No adductor spasm.

The strength of thigh adduction was measured at 5, 10, and 15 min (min) after injection, and a score of 2 was considered as a successful block. If spasm persisted after 15 min, the block was classified as failed. The following data were recorded intraoperatively. The Clavien–Dindo classification was used to correct a specific complication to rank a complication in an objective and reproducible manner [9]. Moreover blood loss was classified according to American College of Surgeons [10].



**Figure 1:** Site of injection of blind obturator nerve block.

## RESULTS

Statistical analysis was performed using the Statistical Package for the Social Sciences (SPSS Inc., Chicago, Illinois, USA) version 16.0. Descriptive data were given as mean ± SD. Student's (*t*) test was performed. For comparison of age, tumor size and operation time. Tumor localization, adductor contraction, and complications were compared using Fisher's exact  $\chi^2$ -test. *P* value of greater than 0.05 was taken as significant. The median age for group I was 61.3 years (48–72), tumor size was 25.2 mm (10–58), and operation time was 38.2 min (22–63). For group II, median age was 63.0 years (49–74), tumor size was 28.2 mm (13–62), and operation time was 33.55 min (23–51). For group III, median age was 65.2 years (47–79), tumor size was 24.2 mm (14–68), and operation time was 31.50 min (23–51). For group IV, median age was 64.0 years (51–71), tumor size was 26.2 mm (13–57), and operation time was 29.25 min (20–47).

A total of 74 patients were evaluated and nine patients were excluded from study [three because of not achieving the considered level of tumor site, and six because of presence of multiple tumors in other sites (posterior or anterior) during cystoscopy]. Overall, 46 (62%) patients were males and 28 (38%) patients were females (*P* < 0.50). The mean age of the patients was 60.8 ± 7.5 years. The groups were not different regarding age, tumor localization, and tumor size. The tumor size and number would affect the duration of resection, blood loss, complete resection, and effectiveness of resection, so they should be in consideration.

The duration of surgery was highly different between GI and GIV. The number of monopolar TUR-BT (group I) surgeries more than 60 h was 3, and the number of monopolar TUR-BT (group I) surgeries more than 45 m was 7. The number of bipolar TUR-BT with ONB (group IV) surgeries more than 45 h was 4, and no case was reported more than 1 h (Table 1). Regarding tumor size, there was insignificant variation in the size in the four groups. Group I had 14 patients with tumor size less than 5 cm and four patients more than 5 cm, whereas group II had 18 patients with tumor size less than 5 cm and three patients more than 5 cm. Tumor size in group III less than 5 cm was observed in 14 patients, whereas tumor size less than 5 cm was observed in 17 patients.

However, the efficacy of ONB with monopolar TUR-BT and bipolar TUR-BT (group IV) was significantly higher compared with non-ONB with monopolar TUR-BT (group I) and bipolar TUR-BT (group II) regarding the incidence of obturator Jerk. There were six obturator jerk cases in group I and eight reduced obturator jerk cases in group I. Incidence of powerful obturator jerk was 33% (6/18) in group I, but it was only 0.05% (1/19) in group IV. In addition, there was a significant difference of reduced obturator jerk between group I 44% (8/18) and group III 19% (3/16) (Table 2). Seven of the cases underwent incomplete resection because of presence of the obturator reflex: three cases group I, three of group II, and one case of group III.

However, the efficacy of ONB with bipolar TUR-BT (group IV) was insignificantly higher compared with monopolar TUR-BT (group I) regarding the perforation. There were three bladder perforations in group I and one perforation in group 2. One perforation occurred in group III, and no perforation occurred in group IV (*P* = 0.130).

The blind anatomical ONB was considered as a successful block in 81% (13/16) of group III and considered successful in 89% (17/19) of group IV. Moreover, the efficacy of ONB with bipolar TUR-BT (group IV) was significantly higher compared with ONB with monopolar TUR-BT (group III) regarding the presence of detrusor muscle in tumor specimens (in first apparently complete cystoscopy) and recurrence of the disease. In group IV, the presence of muscle was 89% (17/19), whereas it was 55.5% (10/18) in group I, 61% (13/21) in group II, and 75% (12/16) for group III (Table 3).

There were no significant differences in the four groups regarding blood loss and blood transfusion. Overall, 8% of cases had CIII and CIV bleeding, and they were subjected to blood transfusion (6/74) (Fig. 2).

The patients were evaluated histopathologically for grading, staging, and type of tumor. Overall, 69 patients were classified as superficial transitional cell carcinoma (TCC), four cases were classified as invasive TCC, and one case with squamous cell carcinoma. The superficial TCC was followed for early

**Table 1: Duration of surgery**

	<15 min	15-30 min	30-45 min	min	>60 min
Group I	1	5	5	4	3
Group II	0	6	6	6	3
Group III	0	7	3	6	0
Group IV	2	9	4	4	0
Highly significant	<i>P</i> <0.001				

**Table 2: Incidence of obturator Jerk**

	Grade 0	Grade 1	Grade 2	Total
Group I	6	8	4	18
Group II	3	11	7	21
Group III	1	3	13	16
Group IV	1	1	17	19
Highly significant	<i>P</i> <0.001			

Grade 0, powerful adductor spasm; group 1, reduced adductor spasm (50% reduction); group 2, no adductor spasm.

**Table 3: Presence of detrusor muscle in specimen**

	Yes	No	Total
Group I	10	8	18
Group II	13	8	21
Group III	12	4	16
Group IV	17	2	19
Highly significant	<i>P</i> <0.001		

recurrence (first 3 months).

There were significant differences in ONB groups (group III and group IV) regarding the tumor recurrence. No recurrence was occurred in 83.3% (15/18) in group IV and no recurrence was occurred in 73.3% (11/15) of group III, in comparison with 65% (13/20) of group II and 68% (11/16) of group I (Table 4).

## DISCUSSION

TUR-BT needs to meet the following characteristics to achieve its diagnostic and therapeutic goal: complete resection of all visible tumors, the presence of muscle in the specimen, and avoidance of complications. The adduction of thigh results from direct stimulation of the motor neurons within the obturator nerve. Thus, elimination of the contraction can be achieved through blockade of the neuromuscular transmission, with agents such as succinylcholine or other neuromuscular blocking drugs or local anesthetic blockade distal to the site of stimulation [11]. Augsparger and Donotle [12] had administered ONB in 13 patients, planned for TURBT. Of 13 procedures, 11 resulted in complete ablation and two resulted in ~80% reduction of the adductor spasm. As 46.8% of all superficial bladder tumors are located on the lateral wall [13], obturator reflex is a common problem in urology practice. The undesirable outcomes of TUR-BT include bladder perforation, bleeding that is difficult to control, and occasionally, incomplete resection of the tumor [14]. Incidence of perforation in TUR-BT has been said to be underreported, and in various studies, it ranges from 1.3 to 3.5% [15,16].

In our study, the incidence of perforation was 6.7% (5/74). There was insignificant improvement regarding perforation

with ONB and bipolar TUR-BT. Dick *et al.* [17] have reported 5% incidence of intraperitoneal perforation and 13% incidence of hemorrhage. Overall, 6% of the patients required transfusion on the day of surgery whereas 07% postoperatively. However, Collado *et al.* [18] reported 1.3% incidence of bladder perforation (83% of these are extraperitoneal) and 3.4% incidence of blood transfusion. In our study, the bleeding complication cases that required transfusion were 10.8% (8/74), which is comparable to previous studies. However, interestingly, the risk of bleeding appears to be increased to some extent in our study, and this may be owing to the increased use of antiplatelet agents for prevention of cardiovascular events. Severe bleeding tends to be associated with larger tumors and early deep bladder perforations. Slightly higher rate of transfusion also may be owing to less hemoglobin level at the time of surgery in our patients. Regarding completion of resection and presence of detrusor muscle in the specimen, the bipolar TUR-BT and ONB is the superior procedure and is highly significantly different than other procedures. Overall, 89% of group IV cases have muscle in the specimen compared with 55% of group I. Mariapan *et al.* [19] concluded that the incidence of presence of muscle in the specimen was 67.7%.

The presence of muscle is crucial to avoid understating, unnecessary delay in definitive treatment, and need for another TUR-BT.

The major limitation of the present study was the small number of patients in both groups, and the short duration of follow-up to standardize the factors affecting tumor recurrence rates. To obtain more conclusive results, future studies should be conducted with a larger series over a longer period and should investigate the locations of tumor recurrences in patients who undergo repeat TUR.

## CONCLUSION

ONB plays an additive role on the quality of analgesia for bladder surgery. The method of bipolar TUR-BT with ONB offers a high rate of efficacy and ensures optimal and safe conditions for the resection of a tumor located on the inferolateral wall of the urinary bladder. The results of this study indicated that bipolar resection of bladder tumors with ONB has lower incidence of complications, especially early recurrence (incomplete resection) and obturator jerks.

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### Conflicts of interest

There are no conflicts of interest.

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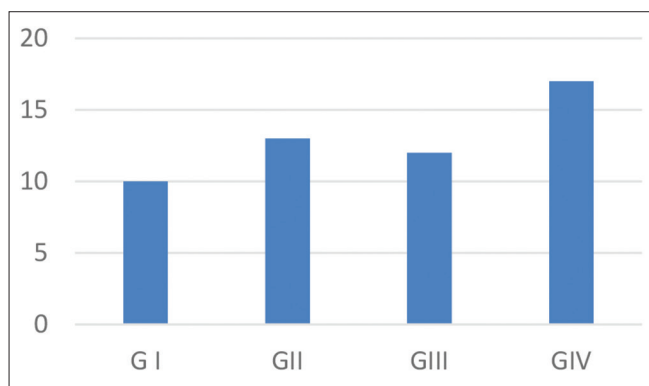


Figure 2: Comparison of the presence of muscle in the specimen.

	Yes	No	Total	% of no recurrence
Group I	7	11	18	38.8
Group II	8	13	21	38
Group III	5	11	16	31
Group IV	4	15	19	21
Highly significant			<i>P</i> <0.001	

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