



# Effectiveness of Obturator Nerve Block in Preventing Adductor Reflex During Transurethral Resection of Bladder Tumor

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## ABSTRACT

**Background:** Bladder cancer is ranked as the 9th most widely diagnosed carcinoma around the globe. Transurethral Resection of Bladder tumor (TURBT) and Cystectomy are the two surgery options, the former being commonly used to diagnose, stage, and treat this cancer. Bladder perforation due to adductor jerk, caused by obturator nerve stimulation, is the major problem encountered during TURBT. Thus, to overcome this situation, an obturator nerve block is performed along with spinal anesthesia (SA).

**Objective:** The effectiveness of obturator nerve block (ONB) along with spinal anesthesia during TURBT.

**Methodology.** A prospective study cross-sectional study was conducted from May 2020 to April 2022 at a tertiary care hospital in Sindh, Pakistan. A total of 115 participants were enrolled in the study by convenience sampling and planned to undergo TURBT. A pre-designed proforma was used for data collection. After coding and entering through SPSS 24, the data was analyzed.

**Results:** The results showed that bladder cancer was more prevalent in males (62.6%) and aged 61-70 years (31.3%). The majority of patients belonged to ASA II (62.6 %). Most patients (94.8%) received blocks in a supine position, with a tumor-sized 2-5cm (81.9%) and located mainly on the right side (70.4%). The effectiveness of ONB reported was (96.5%); however, some cases (3.5%) required general anesthesia (GA) to abolish adductor jerk.

**Conclusion:** ONB and spinal anesthesia proved to be safe and effective measures for minimizing complications encountered during TURBT.

**Keywords:** Bladder cancer, Obturator nerve, Transurethral resection, Spinal anesthesia, Adductor jerk, Nerve stimulator.

## Authors' Contributions

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## INTRODUCTION

Bladder cancer ranks as the ninth most commonly reported cancer globally. Within the United Kingdom, it stands as the seventh most prevalent cancer, affecting an estimated 10,000 individuals annually. It doesn't discriminate between genders and is notably diagnosed around the age of 75. To address bladder

cancer, two primary surgical options, Transurethral Resection of Bladder Tumor (TURBT) or cystectomy, are employed.<sup>1</sup> TURBT involves the use of a resectoscope employing electric currents<sup>2</sup>, facilitating diagnosis, staging, and treatment planning by urologists. Given its prevalence among elderly patients, managing this demographic becomes medically intricate, warranting evaluations through

flexible cystoscopy, renal function tests, and upper urinary tract imaging. An additional challenge arises for those with tumors on the bladder's posterolateral region, further complicating their medical situation.<sup>3</sup>

Studies have reported a substantial incidence of bladder perforation, ranging from 16-49%, due to abrupt thigh movement during TURBT if the obturator nerve remains unblocked.<sup>4</sup> This elevates the risk of TURP syndrome and potentially worsens oncological outcomes due to incomplete resections and limited access to the intra-vesical area. Additionally, bladder perforation necessitates laparotomy, amplifying overall morbidity.<sup>1</sup> Particularly with large tumors invading the posterolateral walls, inadvertent stimulation of the obturator nerve during electrosurgical resection leads to this catastrophic event.

In managing such cases, administering muscle relaxants and general anesthesia is standard. However, for patients with cardiopulmonary comorbidities, spinal anesthesia coupled with obturator nerve blockage serves as an alternative.<sup>5</sup> Despite TURBT under spinal anesthesia, there's no assurance of inhibiting the obturator jerk reflex due to the proximity of the obturator nerve to the bladder's lateral wall. Thus, to prevent obturator jerk and mitigate risks of bleeding, bladder perforation, or incomplete tumor resection, obturator nerve block (ONB) becomes imperative during TURBT.<sup>6</sup> Ensuring safe and effective TURBT, ONB emerges as a crucial intervention.<sup>4</sup> Selective ONB was initially described by Labat et al. in 1922.<sup>7</sup>

The obturator nerve primarily stems from L3 to L4, with minor contributions from L2. It courses along the psoas muscle, descending into the deep obturator canal, bordered by the obturator muscles, membrane, and superior pubic ramus. Upon exiting, it divides into anterior and posterior branches, innervating the hip's articular branch and adductor muscles, followed by deeper innervation into knee joints. Its path through the pelvic cavity extends to the prostatic urethra, bladder neck, inferolateral bladder wall, ultimately exiting to the thigh, where it can be easily blocked.<sup>8</sup> Peripheral nerve block techniques, including ONB, garner significant acceptance in anesthetic care, offering advantages such as effective analgesia, reduced opioid dependence, accelerated recovery, shorter hospital stays, improved mobility, and heightened patient satisfaction.<sup>9</sup>

The current study aimed to assess the efficacy of Obturator Nerve Block (ONB) using a Nerve stimulator in conjunction with Spinal Anesthesia (SA) among patients undergoing Transurethral Resection of Bladder Tumor (TURBT) to prevent adductor jerk.

## METHODOLOGY

A prospective study was conducted at the Department of Anesthesia, Peoples Medical College Hospital (PMCH), Shaheed Benazirabad, Pakistan, following ethical approval from the Ethical Review Committee of Peoples University of Medical and Health Sciences for Women, Nawabshah (Ref. No. PUMHSW/SBA/Reg./371 dated 30-04-2020). The study included adult patients admitted to the hospital for Transurethral Resection of Bladder Tumor (TURBT) between May 2020 and April 2022. Exclusions comprised patients with advanced cardiac disease, neurological disorders, site injection infections, electrolyte imbalances, those requiring general anesthesia, using anticoagulant drugs, or allergic to local anesthetics. Pregnant women and patients declining participation were also excluded.

Following pre-operative evaluation, patients were briefed on the anesthetic procedure. In the operating theater, a multipara monitor tracked pulse rate, oxygen saturation, non-invasive blood pressure (NIBP), and ECG. Intravenous access was maintained using lactated Ringer's solution. Pre-medication involved 0.2 mg of Glycopyrrolate and 2 mg of Midazolam via intravenous routes.

Spinal anesthesia was administered in a seated posture at the L3–L4 or L4–L5 interspace using a 27-gauge Quincke needle and 4 ml of 0.5% hyperbaric bupivacaine, aiming for a block up to the T10 level. Subsequently, patients were positioned supine with legs externally rotated and slightly abducted at a 30° angle. The inguinal region was prepared with an antiseptic solution, and Obturator Nerve Block (ONB) was performed using a nerve stimulator 1.5 cm lateral and 1.5 cm caudal to the pubic tubercle. Nerve stimulation commenced at 2mA, reduced to 0.5 mA before injecting 10 ml of 0.5% Ropivacaine injection following negative aspiration. The procedure was replicated on the contralateral side if necessary, and a structured proforma was completed by the anesthesiologist administering the block.

Demographic variables encompassed gender, age, weight, and ASA status. Proforma also included onset time and maximum duration of the block as variables. Other recorded parameters were patient positioning, attempts to perform the block, ease of the block, ONB effectiveness, tumor characteristics (size, site, number), surgery duration, tumor respectability, intraoperative movement, need for general anesthesia due to adductor jerks, surgeon satisfaction, patient comfort, complications, and blood transfusions.

## RESULTS

A total of 175 patients were enrolled in the study. Among the subjects, the majority were males (62.6%), aged between 61 and 70 years (31.3%). Around one-third (33.9%) of patients had a body weight range of 61 to 70 kgs, and roughly 3/5<sup>th</sup> of the patients had ASA class II. Detailed demographic characteristics of patients are shown in Table I.

**Table I. Demographics of the study participants.**

Variables	Groups	N (%)
Gender	Male	72 (62.6%)
	Female	43 (37.4%)
Age groups (years)	31-40	6 (5.2%)
	41-50	16 (13.9%)
	51-60	34 (29.6%)
	61-70	36 (31.3%)
	71-80	17 (14.8%)
Body weight (kg)	81-90	6 (5.2%)
	51-60	36 (31.3%)
	61-70	39 (33.9%)
	71-80	28 (24.3%)
ASA status*	81-90	12 (10.4%)
	I	9 (7.8%)
	II	72 (62.6%)
	III	34 (29.6%)

Table II depicts the diagnostic data of the patients regarding tumor characteristics. While estimating the tumor size, approximately 4/5<sup>th</sup> of patients (81.7%) had tumors sized 2-5 cm, having multiple growths (82.6%). Moreover, around two third of patients (70.4%) witnessed a tumor on the right side.

**Table II. Characteristics of tumors among patients.**

Variables	Groups	N (%)
Size of tumor	< 2 cm	6 (5.2%)
	2-5 cm	94 (81.7%)
	> 5 cm	15 (13.0%)
Number of growths	Solitary	20 (17.4%)
	Multiple	95 (82.6%)
Site of tumor	Right	81 (70.4%)
	Left	30 (26.1%)
	Bilateral	4 (3.5%)

**Table III. Data of different variables from the procedure.**

Variables	Groups	No (%)
Time to block to the onset	5 min	113 (98.3%)
	10 min	2 (1.7%)
Maximum time duration to block	15 min	105 (91.3%)
	16-30 min	10 (8.7%)
Patient position	Supine	109 (94.8%)
	Lithotomy	6 (5.2%)
Number of attempts to block	1	102 (88.7%)
	2	11 (9.6%)
	3	2 (1.7%)
Ease of block	Easy	105 (91.3%)
	Difficult	6 (5.2%)
	Failed	4 (3.5%)
Effectiveness of ONB	Yes	111 (96.5%)
	No	4 (3.5%)
Duration of surgery	<30 minutes	20 (17.4%)
	30-45 minutes	87 (75.7%)
	>45 minutes	8 (7.0%)
Movement during operation	Not observed	109 (94.8%)
	Observed	6 (5.2%)
Requirement of GA due to adductor jerk	No	111 (96.5%)
	Yes	4 (3.5%)
Surgeon satisfaction	Complete	111 (96.5%)
	None	4 (3.5%)
Patient discomfort	No discomfort	111 (96.5%)
	Mild to moderate discomfort	4 (3.5%)
Complications	Bleeding	69 (60%)
	No complication	46 (40%)
Blood transfusion	None	91 (79.1%)
	Yes	24 (20.9%)

Table III presents the data on different factors involved in the surgical procedure. All patients belonged to SA + ONB- (100%) group. Almost all patients (98.3%) had a maximum onset to block within 5min, and (91.3%) had a duration of the block of 15min. Most patients, 94.8%, received a block in

the supine position during the first attempt to block the nerve (88.7%) and had an easy nerve block (91.3%); however, 3.5% failed to block the nerve. ONB was found to be an effective technique in the majority of patients (96.5%). Around 3/4<sup>th</sup> of patients (75.5%) had a duration of surgery between 30-45min. During the surgery, only 3.5% of patients required general anesthesia (GA) due to adductor jerk arises. Regarding complications, three-fifth of patients (60%) got bleeding, and around one-fifth (20.9%) required blood transfusion.

While calculating the mean, standard deviation, range, minimum, and maximum for the number of attempts to block was 1.130, 0.387, 2.0, 1.0, and 3.0, respectively. On the calculation of mentioned factors previously, for the age, the values were 62.400, 12.2416, 55.0, 35.0, and 90.0 respectively. For the overall weight calculation, when same factors, already mentioned calculated showed values of 68.539, 9.2729, 36.0, 54.0, and 90.0, respectively. The same parameters, when calculated for time to block onset, the results showed values of 5.087, 0.6565, 5.0, 5.0, and 10.0, respectively.

## DISCUSSION

TURBT is performed to diagnose and treat bladder cancer.<sup>10</sup> While comparing spinal anesthesia (SA) and general anesthesia (GA) during TURBT, the former offers various advantages, including decreased duration of surgery, fast recovery, good postoperative analgesia, and better tolerance by elderly patients with cardiopulmonary comorbidities. On the other hand, there are certain demerits, because of adductor jerk and bladder perforation, lead to bleeding and more extended hospital stay. To address these issues, ONB is considered a standard procedure.<sup>11</sup> It has been observed that the mostly older patients have carcinoma of the urinary bladder as out of 10 patients, 9 are over the age of 55 years. Moreover, at the time of diagnosis the average is 73 years, and among them men are mostly affected<sup>12, 13</sup>

Cyrus Emir Alavi et al. carried out a study in which they performed TURBT by using SA alone and SA along with ONB. The patients were in the age group 60-85 years and belonged to III-IV ASA physical status. The mean age in our study was 62 years (Mean age=62.4), while most patients belong to ASA class II<sup>14</sup> Shah et al. conducted the research in which they compared ONB in TURBT using ultrasound (US)

guided technique alone against US-guided nerve stimulation technique. Time to block onset was one of the variables studied. The patients belonged to the group in whom the US-guided technique and the nerve stimulation technique performed showed a motor block onset average of 6.67±2.40 minutes, which was faster than the other group. The results are consistent with our study in terms of time as the majority of patients motor onset time recorded was 5 minutes, but as we have not performed the US-guided technique, our study showed better results even without carrying out advanced technique.<sup>6</sup>

Karolina pladzyk carried out research in which they block in lithotomy position during TURBT. The resultant efficacy reported was 94% when the total number of participants was 542. Out of these, in 31 cases, the need arises to give GA. In our study, the results are such that ONB was effective in 94.8% but the patient position in most cases was supine. In the present study, GA need in any participant did not arise.<sup>15</sup>

Srilata et al. conducted research in which they compared subjects in which to block the Obturator Nerve, the inguinal approach used against the classic approach using SA, and the parameters evaluated were ease of block, number of attempts to block, and complications. They found that the number of block attempts was comparable with the inguinal approach, with a p-value of 0.45. In our study, most patients seemed to have a motor blockage on the first attempt. Based on their result, ease of block comes under the easy category when the inguinal approach was carried out compared to the classic approach. In our study, where ONB is carried out by nerve stimulation under SA, the ease of block in the majority also falls under the easy category.<sup>16</sup>

Alavi et al. carried out research in which they studied the effectiveness of spinal anesthesia in a combination of ONB and SA alone. Their results showed that ONB, along with SA, was effective and safe compared to SA alone. This result is consistent with our study, as the effectiveness in the present study was 96.4%.<sup>14</sup> Malik et al. carried out a study in which they blocked ONB along with SA. Among other variables, the size of the tumor and the number of masses reported in the study were 1-6 cm and two masses, respectively. Now, the former variable results are comparable with the present study in which the size of the tumor concluded is 2-5 cm,

whereas no masses in the majority of cases reported in the present study were multiple.<sup>17</sup> In addition, compared to their study, the surgery duration was higher in our study.

Rajesh V Nagmonthe et al. studied ONB with nerve stimulation under SA. By studying movement during operation and requirement of GA due to adductor jerk. One case required GA in their study, and 96.66% no minimum adductor jerk was observed.<sup>18</sup> In our study, in 96.5% of cases, GA was not required, whereas 94.8% showed no movement during surgery. Thallaj and Rabah et al., while studying surgeon satisfaction while performing ONB during TURBT, it was appropriate<sup>10</sup> and is consistent with our study results. Dick et al., while studying the complications, came across hemorrhage problems.<sup>19</sup> This is consistent with our study as the bleeding was the complication encountered in our study. While studying the need to transfuse blood, Collado observed transfusion needed in 3.4% of cases<sup>20</sup>, while in our study, 20.9% of patients required blood transfusion. There are certain limitations in our study. Firstly, it was a single center-based clinical trial. Secondly, we did not include the patients who received general anesthesia and spinal anesthesia alone for the resection of the bladder tumor.

## CONCLUSION

As TURBT is performed as a routine procedure for bladder tumor and diagnosis, obturator nerve stimulation may pose bladder perforation, thus, further complications if it is not blocked. But from the study, it is concluded that if, along with spinal anesthesia, the obturator nerve is blocked, it will increase reliability, efficacy, and better outcomes when the procedure is taken into consideration with minimum complications.

## CONFLICT OF INTEREST

The authors declare that there is no conflict of interest

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