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**Research Article**

# Comparative Evaluation of Obturator Nerve Block in Lithotomy versus Supine Position to Prevent Adductor Muscle Contraction during Transurethral Resection of Bladder Tumours- Randomized Controlled Trials (RCT)

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## ABSTRACT

**Background:** Transurethral resection of bladder tumour (TURBT) is often complicated by obturator nerve stimulation which may cause adductor muscle contraction. Obturator nerve block (ONB) is used to prevent this reflex. However, the optimal patient positioning for ONB remains unclear.

**Aim:** To compare the efficacy, ease, and safety of ONB performed in the lithotomy position (interadductor approach) versus supine position (classical pubic approach) under peripheral nerve stimulator (PNS) guidance during TURBT.

**Methods:** In this prospective, randomized, double-blind study, 64 patients (ASA I–II) undergoing TURBT under spinal anaesthesia were equally divided into two groups. Group A received ONB in the lithotomy position (interadductor approach), and Group B in the supine position (classical pubic approach), using 15 mL of 0.25% bupivacaine with a PNS. Parameters assessed included block performance time, number of needle pricks, needle depth, adductor spasm grade, hemodynamic stability, and complications.

**Results:** The lithotomy group showed a significantly higher success rate in preventing adductor spasm (Grade 0: 87.5% vs 65.6%; $p = 0.039$). The mean block performance time and needle depth were shorter in Group A (4.37 ± 0.79 min vs 7.25 ± 1.64 min; $p < 0.001$) and (4.21 ± 0.27 cm vs 4.88 ± 0.40 cm; $p < 0.001$), respectively. Surgeon satisfaction was significantly higher in Group A (87.5% vs 65.6%; $p = 0.039$). Hemodynamic parameters remained stable and no adverse events were reported.

**Conclusion:** ONB using the interadductor approach in lithotomy position is easier, faster, and more effective in preventing adductor spasms during TURBT than the classical pubic approach in supine position, with a comparable safety profile.

**Keywords:** Obturator Nerve Block, Lithotomy Position, Transurethral Resection of Bladder Tumour, Adductor Muscle Contraction, Regional Anaesthesia, Peripheral Nerve Stimulator.

## INTRODUCTION

Bladder cancer is among the most common urological malignancies, with transurethral resection of bladder tumour (TURBT) serving as the cornerstone of diagnosis and treatment (1). Approximately 75–80% of bladder tumours are non-muscle invasive, making TURBT a vital procedure for disease management (2). However, during resection of lateral wall tumours, electrical stimulation of the obturator nerve can lead to violent adductor muscle contraction—known as the obturator jerk—which can cause bladder perforation or incomplete tumour excision (3, 4).

The obturator nerve originates from the anterior divisions of the L2–L4 spinal nerves, passes along the lateral pelvic wall near the bladder neck, and innervates the adductor muscles of the thigh (5). This close anatomical relationship makes it vulnerable to stimulation during TURBT. Various anaesthetic techniques have been proposed to counteract this reflex, including general anaesthesia with muscle relaxants and regional techniques such as

obturator nerve block (ONB) under spinal anaesthesia (6, 7).

Among ONB methods, the classical pubic approach and the interadductor approach are the most commonly practiced (8). The interadductor technique, performed in lithotomy position, allows easier access and visualization of landmarks, while the classical pubic approach in supine position may be technically more demanding (9,10). The addition of a peripheral nerve stimulator (PNS) improves the success rate of ONB by providing real-time feedback for nerve localization (11, 12).

Despite numerous studies, there remains no universal consensus on the optimal position for ONB during TURBT (13, 14). Hence, this study aims to compare the efficacy, ease, and safety of ONB performed in lithotomy versus supine positions under PNS guidance.

## MATERIALS AND METHODS

**Study Design and Setting:** A prospective, randomized clinical trial, double-blind study was conducted in the Department of Anaesthesiology, Sardar Patel Medical College, Bikaner (September 2024 – April 2025), after ethical clearance and written informed consent.

**Sample Size:** Based on Rajurkar et al. (2016) (14), expecting adductor spasm in 66.6% and 31.8% of cases, a minimum of 32 patients per group (total 64) was required at 80% power and 95% confidence interval.

**Inclusion Criteria:**

- Age 20–80 years
- ASA physical status I–III
- Undergoing TURBT under spinal anaesthesia

**Exclusion Criteria:**

- Allergy to local anaesthetic
- Local infection, coagulopathy, or BMI >30 kg/m²
- Major systemic illness (cardiac, renal, hepatic, or neurological)

**Procedure:** All patients received spinal anaesthesia with 0.5% hyperbaric bupivacaine. ONB was performed under PNS guidance (0.5 mA, 1 Hz) using 15 mL of 0.25% bupivacaine.

- **Group A:** Interadductor approach (lithotomy position)
- **Group B:** Classical pubic approach (supine position)

**Outcome Measures:**

- Block performance time (min)
- Needle attempts
- Needle depth (cm)
- Adductor spasm grade (0–2)
- Surgeon satisfaction
- Hemodynamic stability
- Complications

**Statistical Analysis:** Data were analyzed with SPSS v23 using Student's t-test and Chi-square tests. $p < 0.05$ was considered statistically significant.

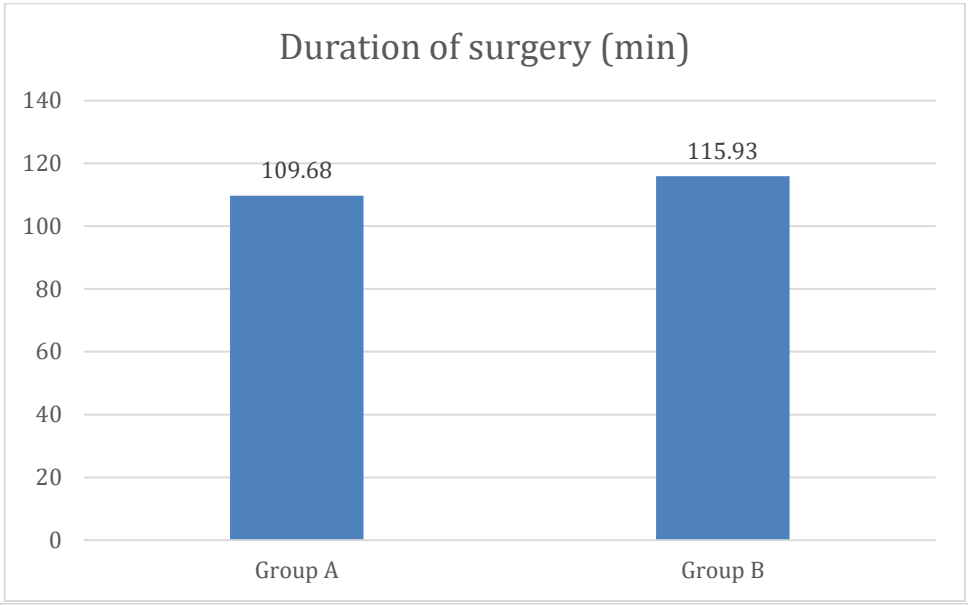
## RESULTS

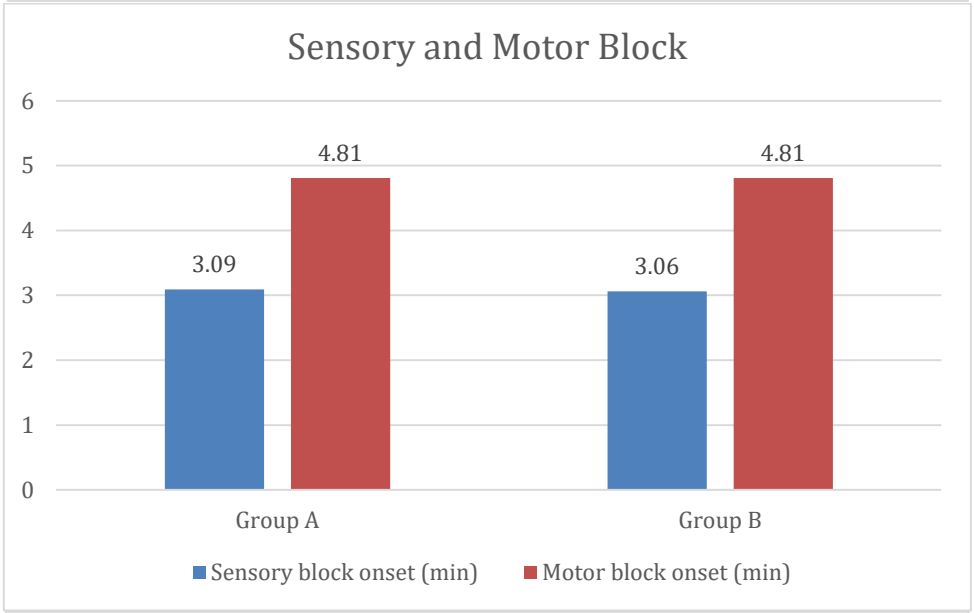
Table 1: Demographic and Baseline Characteristics

| Parameter | Group A (Lithotomy) | Group B (Supine) | p-value |
|---|---|---|---|
| Number of patients | 32 | 32 | - |
| Mean age (years) | 61.37 ± 11.73 | 61.65 ± 11.51 | 0.923 |
| Sex (Male/Female) | 26/6 | 27/5 | 0.740 |
| ASA Grade I/II | 27/5 | 25/7 | 0.522 |

Table 2: Procedural Parameters

| Parameter | Group A (Lithotomy) | Group B (Supine) | p-value |
|---|---|---|---|
| Duration of surgery (min) | 109.68 ± 11.77 | 115.93 ± 18.02 | 0.106 |
| Sensory block onset (min) | 3.09 ± 0.58 | 3.06 ± 0.91 | 0.871 |
| Motor block onset (min) | 4.81 ± 1.06 | 4.81 ± 0.85 | 1.000 |
| Block performance time (min) | 4.37 ± 0.79 | 7.25 ± 1.64 | <0.001 |
| Needle depth (cm) | 4.21 ± 0.27 | 4.88 ± 0.40 | <0.001 |
| Number of pricks | 1.4 ± 0.55 | 1.9 ± 0.92 | 0.011 |


Duration of surgery (min)
140
120
100
80
60
40
20
0
109.68
115.93
Group A
Group B


Sensory and Motor Block
6
5
4
3
2
1
0
3.09
4.81
3.06
4.81
Group A
Group B
Sensory block onset (min)
Motor block onset (min)

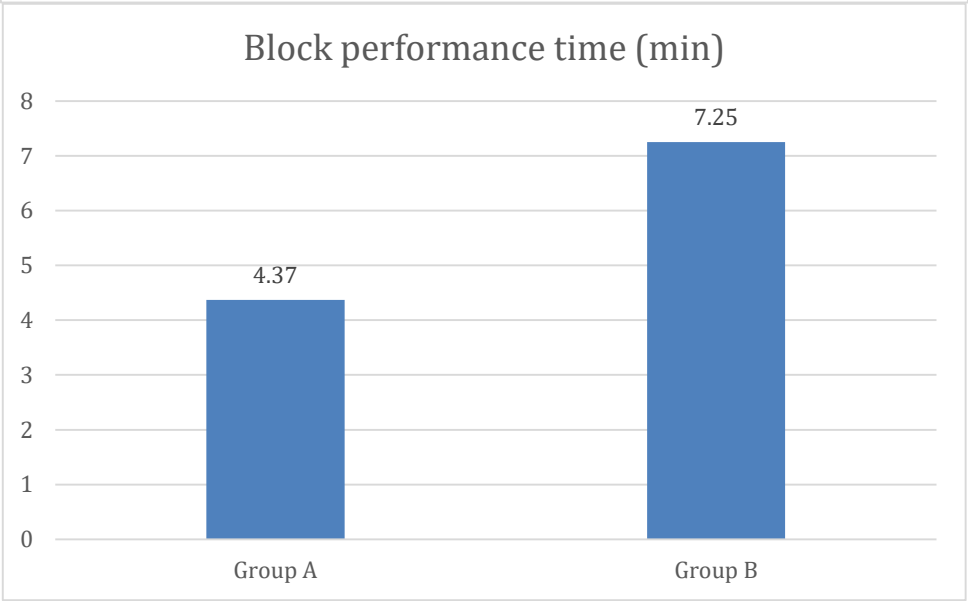

Block performance time (min)
8
7
6
5
4
3
2
1
0
4.37
7.25
Group A
Group B

Table 3: Surgeon Satisfaction

| Parameter | Group A (Lithotomy) | Group B (Supine) | p-value |
|---|---|---|---|
| Surgeon satisfaction (Excellent) | 87.5% | 65.6% | 0.039 |
| Surgeon satisfaction (Good) | 12.5% | 34.4% | |

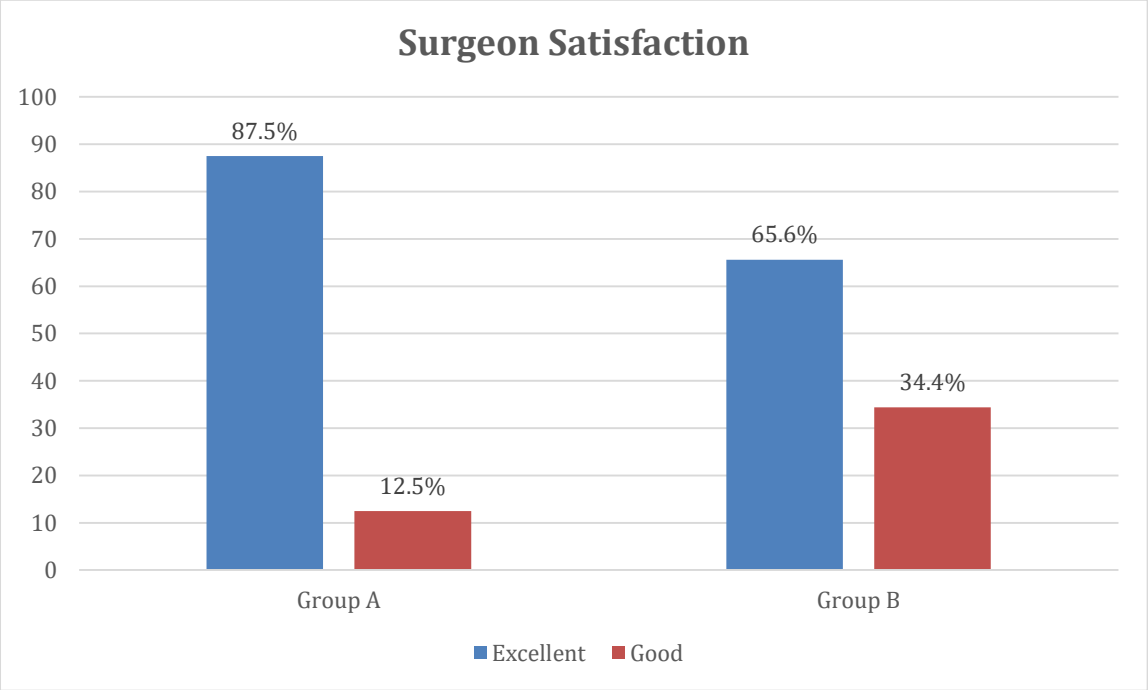



Table 4: Hemodynamic Stability

| Parameter | Group A | Group B | p-value |
|---|---|---|---|
| Systolic BP (mmHg) | 125.9 ± 6.6 | 122.8 ± 8.3 | 0.109 |
| Diastolic BP (mmHg) | 81.6 ± 6.0 | 75.3 ± 7.0 | 0.000 |
| Heart Rate (beats/min) | 83.0 ± 6.9 | 84.0 ± 7.6 | 0.576 |
| $SpO_2$ (%) | 99.4 ± 0.7 | 99.3 ± 0.8 | 0.745 |

Both groups showed stable hemodynamic parameters with no significant difference ($p > 0.05$). No adverse events such as vascular puncture, hematoma, or local anaesthetic toxicity were observed.

## DISCUSSION

The present study provides evidence in favour of interadductor approach for obturator nerve block performed in the lithotomy position which has significant advantages over the classical pubic approach in the supine position during transurethral resection of bladder tumours. Our findings demonstrate higher efficacy in preventing adductor muscle spasms (Grade 0: 87.5% vs. 65.6%, $p = 0.039$), reduced procedural complexity, and enhanced surgeon satisfaction, while maintaining an excellent safety profile.

The superior success rate observed in Group A aligns with the interadductor approach as a more effective technique for obturator nerve block. The 87.5% complete prevention of adductor spasms in our lithotomy group comparable with Pladzyk et al. study in which they reported 94% success in lithotomy position in their extensive series of over 500 cases (13). This consistent finding among studies favour the clinical reliability of this technique. The classical pubic approach in Group B, while demonstrating acceptable efficacy at 65.6%, falls within the variable success rate range of 60.5-91.7% reported in the literature for traditional techniques (13).

The significantly lower incidence of adductor spasms in the lithotomy group has important clinical implications not only in procedural success but also preventing catastrophic complications including bladder perforation, hemorrhage, incomplete tumor resection, and potential extravesical dissemination of malignant cells. Our study demonstrates that the interadductor approach in lithotomy

position provides more consistent protection against these complications.

The mean block performance time was substantially shorter in Group A (4.37 ± 0.79 min vs. 7.25 ± 1.64 min, $p < 0.001$), representing a time saving of approximately 40%. This aligns with observations by Jo et al., who reported that the inguinal approach required fewer needle attempts and was technically easier than the pubic approach (15). The reduced needle depth required in the lithotomy group (4.21 ± 0.27 cm vs. 4.88 ± 0.40 cm, $p < 0.001$) and fewer needle pricks (1.4 ± 0.55 vs. 1.9 ± 0.92, $p = 0.011$) reflect important technical advantages of the interadductor approach. The classical pubic approach requires precise identification of the pubic tubercle and navigation of needle around the superior pubic ramus, which can be technically challenging, particularly in obese patients or those with difficult anatomy, while the interadductor approach benefits from more superficial and palpable landmarks, including the adductor longus tendon and femoral artery, which facilitate accurate needle placement even in obese patients (15,16).

Furthermore, the lithotomy position eliminates the need for repositioning after spinal anesthesia, reducing the time between block completion and starting surgery. This is particularly valuable that it allows the ONB to be performed at any stage of the procedure without disrupting the sterile surgical field. The classical pubic approach, performed in the supine position, may require patient repositioning after the block, introducing additional time delays and potential contamination risks.

Both groups in our study had hemodynamic stability throughout the procedure, with no significant differences in systolic blood pressure, heart rate, or oxygen saturation. This finding is consistent with the established safety profile of obturator nerve block as an adjunct to spinal anesthesia (16).

Surgeon satisfaction was significantly higher in Group A (87.5% excellent vs. 65.6% in Group B, $p = 0.039$), which may be contributed to more effective ONB preventing adductor spasms and overall smooth surgical workflow, more complete tumor resection with reduced risk of bladder perforation, leading to improved oncological outcomes and reduced operating time (17,18).

Based on our study findings and supporting literature, the interadductor approach for obturator nerve block in the lithotomy position should be considered the technique of choice for TURBT procedures involving lateral wall tumors. This approach offers multiple advantages: (1) higher success rate in preventing adductor spasms, (2) shorter performance time, (3) easier technical execution with clearer anatomical landmarks, (4) fewer needle attempts required, (5) no need for patient repositioning after spinal anesthesia, and (6) comparable safety profile to alternative techniques. The technique is particularly valuable in resource-limited settings where ultrasound guidance is unavailable, as peripheral nerve stimulator-guided interadductor approach provides reliable nerve localization with high success rates.

### Limitations and Future Directions

There are few limitation to our study. First, the relatively small sample size of 32 patients per group may have limited statistical power for detecting rare complications or smaller effect sizes in secondary outcomes. Second, we did not include an ultrasound-guided group for direct comparison with nerve stimulator-guided techniques. Future research should explore direct comparison of nerve stimulator-guided versus ultrasound-guided interadductor approach in the lithotomy position, cost-effectiveness analysis among different ONB techniques, evaluation of different local anesthetic agents and volumes for optimal block efficacy and duration.

## CONCLUSION

ONB performed in lithotomy position using the interadductor approach under PNS guidance provides superior efficacy, shorter performance time, and improved surgeon satisfaction compared with the classical pubic approach in supine position, without additional risk of complications.

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